UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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Ericsson Inc.

Petitioner,

v.

Motorola Mobility LLC

Patent Owner.

Patent No. 11,184,130 B2
Filing Date: June 26, 2017
Issue Date: November 23, 2021

Title: DEMODULATION REFERENCE SIGNAL CONFIGURATION

*Inter Partes* Review No. IPR2025-00174

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# DECLARATION OF CRAIG BISHOP

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## I. INTRODUCTION

I, Craig Bishop, declare the following:

1. I have been retained as an independent expert witness on behalf of Ericsson Inc. ("Petitioner") related to Inter Partes Review ("IPR") of U.S. Patent No. 11,184,130 ("the '130 patent").

2. I am being compensated for my work in this matter at my accustomed hourly rate. I am also being reimbursed for reasonable and customary expenses associated with my work and testimony in this investigation. My compensation is not contingent on the results of my study, the substance of my opinions, or the outcome of this matter. I have no financial interest in the '130 patent and have had no contact with the named inventors of said patent. Neither have I reviewed the '130 patent in detail, nor do I have any personal interest in the outcome of this IPR.

3. I have been asked to opine on the date of public accessibility for the following documents: TR 38.912 v14.0.0 (Ex. 1003), R1-1710789 (Ex. 1004), and R1-1710294 (Ex. 1005). In doing so I have also considered my own academic background, knowledge, and professional experiences in the field of wireless communications and 3rd Generation Partnership Project (3GPP) standards-development, as described below.

4. Whilst I have attempted to organize the information presented in this declaration into helpful sections and/or divisions, my opinions are supported by the

information in the declaration in its entirety.

5. In forming the opinions expressed in this declaration, I have considered the reference materials cited herein and my own academic background and professional experiences as outlined below. While I have attempted to organize the information presented in this declaration into helpful sections and/or divisions, my opinions are supported by the information in the declaration in its entirety.

## II. QUALIFICATIONS

6. My complete qualifications and professional experience are described in my *curriculum vitae*, a copy of which is attached as **Appendix 1**. The following is a summary of my relevant qualifications and professional experience.

7. I earned my Bachelor of Electronic Engineering degree with Honors from Polytechnic of Central London in 1989. In 2005, I earned my MSC in Computer Science with Distinction from the University of Kent.

8. After graduating with my first degree, I worked as an operations engineer at the British Broadcasting Corporation (BBC) for 4 years, then as a civil servant at the UK Radiocommunications Agency until 1996, during which time I became involved in telecommunications standardization in the European Telecommunication Standards Institute ("ETSI"), working in particular in Technical Committee Radio Equipment and Systems (TC RES2) concerned with the standardization of Private Mobile Radio (PMR). From 1994 through 1996, I acted

as Rapporteur for voice and data related PMR standards ETS 300 113, ETS 300 219 and ETS 300 390. I participated as the only TC RES2 delegate on behalf of the UK Radiocommunications Agency, generating proposals in support of UK administration and business requirements, downloading and reviewing other meeting input documents, and proposing changes as necessary to ensure input documents and the resulting specifications were in line with said requirements.

9. In 1996, I joined Samsung Electronic Research Institute as a Senior Standards Engineer where I worked for 16 years, eventually becoming Director of Standards and Industry Affairs in 2011. My work at Samsung mainly focused on the standardization of Global System for Mobile Communications (GSM)/ General Packet Radio Service (GPRS), Universal Mobile Telecommunications System (UMTS), the IP Multimedia subsystem (IMS), and Long-Term Evolution (LTE)/ Evolved Packet System (EPS) systems. Initially, I participated in ETSI Special Mobile Group (SMG) committees SMG1, SMG2, SMG4, SMG5, and SMG9, and relevant UMTS related sub-committees working on the air interface radio access network protocols, service, and terminal aspects of UMTS and GSM/GPRS until 1999. In particular, I was a participant in the ETSI SMG2 meetings leading up to selection of Wideband Code Division Multiple Access (WCDMA) as the radio access technology for the Frequency Division Duplex (FDD) mode of UMTS.

10. Beginning in 1998, I worked as a Principal Standards Engineer on the

3rd Generation Partnership Project (3GPP) on UMTS. I attended the inaugural 3GPP Technical Specification Group (TSG) meetings held in December 1998, and I began attending Working Group (WG) meetings in 1999. Specifically, I was a regular participant in Radio Access Network (RAN) WG1, Services & System Aspects (SA) WG1, Terminals (T) WG2, but I also attended TSG RAN and T plenary meetings and sometimes other Working Groups covering similar technical aspects as in my previous work in ETSI. As an example, RAN WG2 was, and is, a Working Group responsible for the specification of layer 2 and layer 3 Radio Resource, protocols for the UE. As part of this work, I would prepare meeting contributions in support of Samsung's research and development activities. Also, by way of preparation for each meeting, I would download all contributions and review those of interest to Samsung, and where necessary, prepare additional input to the meeting based on said review.

11. Beginning in 2000, I acted as project manager and then as system engineering manager at Samsung, providing technical requirements for the team working on Samsung's UMTS modem development. This involved scrutiny of ongoing standardization work, particularly in RAN WG1, RAN WG2, and TSG Core Network (CN) WG1, from which I would download, and assess the impact of, contributions on Samsung's development projects, ensuring that Samsung's development team was kept informed about the latest developments as layers 2 and

3 of the UMTS standard were stabilized.

12. During this period, in addition to authoring and presenting technical contributions for the 3GPP standard, and producing technical requirements for the radio modem, I acted as Rapporteur for 3GPP Technical Reports covering User Equipment ("UE") capability requirements (3GPP TR 21.904) from 1999–2000, and the Evolution of the 3GPP System (3GPP TR 21.902) in 2003 (the first Study Item to consider the 3GPP system beyond UMTS towards LTE/EPS).

13. In 2005, I became Head of Advanced Technologies, Standards and Regulation (ATSR) at Samsung. In addition to my managerial duties which included responsibility for standards, research, and regulatory engineers including three standards engineers who were regularly attending 3GPP RAN WG2 and Core Network and Terminals (CT) WG1 Working Groups, I personally continued to work on 3GPP standardization issues. From 2005 until 2008, I regularly attended and participated in SA WG2 meetings, mainly focusing on IP Multimedia Subsystem (IMS) including voice over IMS but also looking at wider Evolved Packet System (EPS) related issues. From 2008 until 2011, I regularly attended and participated in SA WG1 meetings. I also attended SA plenary meetings from 2008 until I left Samsung in 2013. As well as generating contributions in support of Samsung's research and development as preparation for each meeting, I would download and review documents from other 3GPP members, identifying those of interest to

Samsung and, where necessary, preparing additional contributions on behalf of Samsung. The work required a sound working knowledge of the broader 3GPP system to ensure effective management of the ATSR team, effective participation in meeting discussions, expert assessment of third-party standards contributions, and provision of implementation guidance to Samsung developers.

14. From 2005 until I stopped attending SA WG1 meetings in 2011, I authored and presented over 100 contributions to SA WG2 and SA WG1 meetings at 3GPP and appeared as an author/co-author on 18 patent applications related to User Equipment operation in the IMS and the 3GPP Core Network.

15. In 2011, I became Director of Standards and Industry Affairs at Samsung, and in November of that year I was elected to the Board of ETSI on which I served for a term of 3 years until November 2014. In this position I gained further perspective on the organisation, management, and activities of ETSI and its Technical Committees and Partnership Projects including 3GPP.

16. Since leaving Samsung in January 2013, I have formed my own consulting company which is a member of ETSI, and as part of various projects undertaken, I have continued to regularly access the ETSI and 3GPP document servers, and to keep abreast of ETSI and 3GPP document handling and publication practices.

17. Through my extensive work in ETSI and on 3GPP standardization

issues over the years, I have become very familiar with ETSI and 3GPP practices for when and how the technical standards (including revisions thereto) and other standards-related contributions are made publicly available, including in the 1999-2012 timeframe when I was attending or monitoring various 3GPP Working Groups including RAN WG1 and RAN WG2, and since 2013 in support of my work as a independent standardisation consultant.

18. For purposes of my analysis in this declaration, I have been informed that Ericsson contends that a person of ordinary skill in the art ("POSITA") in the field of the '130 patent at the time of the alleged invention of the '130 patent would have had a master's degree in electrical engineering, computer engineering, or computer science, or equivalent and at least three years of experience in the field of telecommunications or wireless systems. Additional education might compensate for less experience, and vice-versa. Similarly, I understand that Motorola has contended in other proceedings that a POSITA with respect to the '130 Patent would have at least a bachelor's degree in electrical engineering or computer science or a related degree, and at least two years of experience designing, developing, or researching cellular communication technology and that additional education might compensate for less experience, and vice-versa. I have considered both POSITA standards here, and the conclusions I have reached would be the same under either POSITA standard.

## III. PUBLIC AVAILABILITY OF 3GPP STANDARDS PROPOSALS AND OTHER DOCUMENTS

19. Based on my years of experience working in various capacities in 3GPP and on 3GPP standards issues, I am familiar with the operational practices of the 3rd Generation Partnership Project (3GPP) relating to technical documents including specifications, draft standards and proposals, and standards-related technical contributions, as well as the practices through which 3GPP makes these documents public.

### A. Prominence and Purpose of 3GPP

20. 3GPP was inaugurated in December 1998 to produce Technical Specifications and Technical Reports for the Universal Mobile Telecommunications System (UMTS), a 3G Mobile System based on evolved GSM core networks and a new radio access network known as UTRA (UMTS Terrestrial Radio Access). **Appendix 2** at 2, 3 ("[3GPP] Partnership Project Description"); **Appendix 3** at 1; **Appendix 4** at 5. At that time, various standards organisations agreed to cooperate to produce a "complete set of globally applicable Technical Specifications" that would then be transposed into standards by the relevant standardization bodies (also known as Organizational Partners). **Appendix 2** at 3, 5 ("[3GPP] Partnership Project Description"). 3GPP "attracted a very strong commitment from organisations and companies around the world, reflecting the truly global nature of the project".

**Appendix 4** at 7.

21. 3GPP is a global initiative partnership made up of Organizational Partners, Market Representation Partners, and Individual Members. **Appendix 5** at 7, 8; **Appendix 2** at 10. Today, 3GPP unites seven telecommunications standard development organisations ("Organizational Partners") from around the world: the Association of Radio Industries and Businesses (ARIB) and the Telecommunication Technology Committee (TTC) from Japan, the China Communications Standards Association (CCSA) from China, the Telecommunications Standards Development Society, India (TSDSI) from India, the Telecommunications Technology Association (TTA) from Korea, the European Telecommunications Standards Institute (ETSI), and the Alliance for Telecommunications Industry Solutions (ATIS) from the United States. These Organizational Partners are regional standards organisations that have the authority to define, publish, and set standards for their respective regions. **Appendix 2** at 12. 3GPP also includes "Market Representation Partners" that represent various industry perspectives and offer market advice. **Appendix 5** at 8 (3GPP Working Procedures, "Market Representation Partnership"); **Appendix 2** at 14; **Appendix 4** at 5. Additionally, 3GPP includes individual member companies ("Individual Members") that participate in 3GPP through their membership of a 3GPP Organizational Partner. **Appendix 5** at 8 (3GPP Working Procedures, "Individual Membership"); **Appendix 6** at 5 (textbook

including a chart showing 3GPP structure at the time of publication); **Appendix 8** at 9, 10. As an example of how prominent 3GPP was and remains in the industry, there were 350 participating Individual Members in 2008, and 583 by 2017. **Appendix 7** at 9 (3GPP Project Coordination Group document showing 3GPP membership numbers to 2018). There were 827 individual members as of June 2024. **Appendix 9**.

22. As noted in paragraph 20, a primary goal of 3GPP is to provide an environment to produce technical specifications and technical reports that define and standardise technologies covering cellular telecommunications networks, including User Equipment or Mobile Device (UE) technologies, Radio Access Network (RAN) technologies, Core Network (CN) technologies, and service and system capabilities such as work on codecs, security and quality of service. The specifications also provide hooks for interworking with non-3GPP networks including but not limited to Wi-Fi networks.

23. Given the prominence of 3GPP in the wireless communication industry, beginning in 1999 and continuing through today, interested POSITAs were tracking the developments of the latest 3GPP specifications and reports to ensure timely development of products and services by their companies that were consistent with the standards being developed. In other words, it is my opinion that a POSITA would have to be familiar with 3GPP and with the specification-related documents

produced as part of the 3GPP process in order to properly perform his or her job. Without access to and knowledge of the 3GPP documentation, including for example the substantive contents of 3GPP technical specifications, an engineer could not develop products that were interoperable with the worldwide 3G, 4G, and later 5G standards. Because 3GPP documents were an important aspect of a POSITA's professional experience, textbooks and articles about cellular communications commonly directed readers to the 3GPP website for information regarding standards development. **Appendix 4** at 9 (directing readers to the 3GPP website at the conclusion of the chapter on the success of 3GPP in the standards development process). As a POSITA myself, I would regularly visit the 3GPP website for the latest developments mobile communications standards setting and refer colleagues involved in the development of such devices to the 3GPP website as a valuable reference.

24. My personal experience at Samsung confirms 3GPP's prominence in the wireless industry. For example, engineers and managers at Samsung who were responsible for implementing 3GPP compliant modem software (and who were not attending 3GPP meetings or involved with development of the 3GPP standard in any direct way) would often enquire as to which version of a given 3GPP specification they should be developing. Further, between 2000 and 2004, part of my role at Samsung involved advising software engineers implementing the 3GPP standard on

the correct interpretation of the specifications and ensuring that they were made aware of any changes and proposals made during the 3GPP standards development process that would impact their work. I also for a time maintained an internal company database that tracked 3GPP approved changes, to help the software engineers at Samsung implementing the 3GPP standard more readily stay informed as to changes that would impact their work. The database also included links to relevant 3GPP documents so that engineers could access the documents more directly. In short, the technical output of 3GPP was, and continues to be, well known at 3GPP member companies, even for engineers who were not directly involved with designing the 3GPP system or contributing to the 3GPP standard process.

### B. 3GPP's Policy of Making Documents Public

25. 3GPP's policy was to make 3GPP documents available to the public, including to interested POSITAs. The free availability of 3GPP documents to any interested member of the public was widely recognized in the industry. As an example of the prominence of 3GPP and its place in the wireless standards industry, I note that textbooks directed readers to the 3GPP website for information about relevant standards. For example, **Appendix 6** at 6, 9 ("The latest specifications can be obtained from 3GPP [9]", "[9] http//:www.3GPP.org"); **Appendix 8** at 10 ("3GPP TSs and TRs are publicly available at the 3GPP web site at either of the following URIs: http://www.3gpp.org/specs/specs.htm

http://www.3gpp.org/ftp/Specs/archive/"). Because the purpose of 3GPP is worldwide adoption of a common standard, no restrictions on distribution or discussion have ever been placed on 3GPP documents. **Appendix 10** at 8 ("No password is needed to access any information on the 3GPP Web site, all information is openly published").

### C. 3GPP Structure and Standards Development Process

26. Within 3GPP, responsibility for producing specifications was delegated to the Technical Specification Groups (TSGs). **Appendix 5** at 13 (3GPP Working Procedures, "TSG tasks"). At its inception, 3GPP was divided into four Technical Specification Groups (TSGs), each covering a particular category of technology. **Appendix 2** at 31 (3GPP Partnership Project Description); **Appendix 6** at 5, 6 (textbook listing four TSGs and noting the subsequent addition of a fifth TSG); **Appendix 4** at 6, 11, 12. Each TSG is further divided into a number of Working Groups (WGs). **Appendix 8** at 8, 9; **Appendix 4** at 6; see also **Appendix 5** at 13 (3GPP Working Procedures). Two of the TSGs from 1999 are still in existence in 2024: TSG Radio Access Networks (RAN) and TSG Service & Systems Aspects (SA). The activities of two other TSGs, TSG Core Networks (CN) and TSG Terminals (T), were amalgamated under Core Network and Terminals (CT) following the closure of TSG T in 2005, with responsibility for terminal test specifications being moved to a RAN working group (RAN WG5). The fifth TSG,

GSM EDGE Radio Access Networks (GERAN), was responsible for evolution of the GSM radio technology from 2000 until that TSG closed in 2016 and its work was transferred to a RAN working group (RAN WG6) which was itself closed in July 2020.

27. The TSGs held quarterly plenary meetings where members' contributions, draft specifications/reports, and other documents that had been agreed upon by the Working Groups were presented for discussion and approval. **Appendix 5** at 23 (3GPP Working Procedures, "Deliverable types," stating that Technical Specifications and Technical Reports are "drawn up by the TSGs" and are approved by TSGs); **Appendix 8** at 9 ("3GPP Deliverables"). Once a Technical Specification was or Change Requests creating a new version of a Technical Specification were, formally approved by TSG plenary, the latest version of said Technical Specification would be created by the Mobile Competence Centre (MCC) and uploaded to the file server. **Appendix 10** at 6; **Appendix 11** at 1. In that way, the conclusion of 3GPP TSG plenary meetings serves as notice that new versions of specifications incorporating Change Requests approved by the TSG meeting will shortly be made available on the public 3GPP server.

28. As part of the standards development process, delegates could submit contributions on behalf of the Individual Members. Members had an incentive to stay updated on 3GPP developments because those members usually wanted to

contribute to the standard and make suggestions as to what technology and/or features should (or should not) be included. Delegates also attended 3GPP meetings to keep their employers abreast of developments related to the standards that would ultimately apply to those members and the products those members (*e.g.*, companies) produced. 3GPP members around the world and the interested POSITAs employed by them would have been motivated to stay up to date regarding 3GPP technology evolution to ensure their research and development programmes remained relevant to the systems being specified and that their products were compliant with the published 3GPP specifications. In light of this need to follow the standards development process, delegates often distributed 3GPP-related documents far beyond the attendees at 3GPP meetings. This was certainly my experience at Samsung.

### D. 3GPP Documents

#### 1. Technical Specifications and Reports

29. The technical specifications and reports developed by 3GPP were, and still are, driven by the technical contributions of 3GPP members. As part of that development process, various types of documents were produced. The 3GPP process involved the consideration of temporary documents ("TDocs," also referred to as "contributions,"), many of which constituted technical proposals for how the system should be implemented and were adopted as the basis for parts of the technical

specifications.

30. As I noted in paragraphs 20 and 22, a primary purpose of 3GPP is to prepare, approve, and maintain globally applicable Technical Specifications and Technical Reports. **Appendix 5** at 7 (3GPP Working Procedures, "Purpose"). A "Technical Specification," as defined by 3GPP, is "[a] 3GPP output document containing normative provisions approved by a Technical Specification Group". **Appendix 5** at 28. 3GPP would (and still does) periodically freeze a complete set of standards (referred to as a "Release"), and each set would include many new specifications. **Appendix 10** at 6. 3GPP would also make publicly available draft specifications that would usually be included as part of the next Release once approved.

31. It was widely known that Technical Specifications (and Technical Reports) were publicly available on 3GPP's website. **Appendix 6** at 6, 9, **Appendix 8** at 10. It was also well known that the latest version of a given specification that was under change control would be made available following each TSG Plenary meeting responsible for that specification, and that TSG Plenary meetings usually occur four times per year. **Appendix 10** at 6; **Appendix 11** at 1.

32. Latest and previous versions of technical specifications could be easily accessed from the 3GPP website. The specifications page provided direct links to the specifications area in the 3GPP website's file repository. **Appendix 11** at 1. In

the 2017 timeframe, the specifications page listed the specifications by the date of the approval of the latest versions reflecting the TSG plenary meeting date. *E.g.*, **Appendix 11** at 1.

33. Additionally, the 3GPP specifications followed a clear numbering scheme to help the public, including interested POSITAs, identify the subject matter of each specification. **Appendix 12** at 1. As described on the 3GPP Numbering Scheme webpage, all 3G and GSM specifications had a specification number of 4 or 5 digits, where the first two digits defined the series. **Appendix 12** at 2. The Numbering Scheme webpage included a table showing the subject matter corresponding to each series. **Appendix 12** at 1. For example, the "38 series" focused on Radio Technology beyond LTE. **Appendix 12** at 1. An interested POSITA could narrow down the relevant specifications based on whether the specification applied to only 5G, evolved UTRA (aka 4G or LTE), to 3G, to GSM, or to GSM and 3G[1] (GSM only specifications were transferred from ETSI to 3GPP in July 2000). **Appendix 12** at 1.

34. The specifications were stored on the 3GPP website's file repository as zipped files, where the filenames followed the structure: SM[-P[-Q]]-V.zip. This

[1] For a specification in the 21–35 series, applicability to both GSM and 3G could be determined based on the third digit of the specification number, where a "0" would indicate that the specification applied to all systems. Specifications outside the 21–38 series in 2017 applied only to GSM systems.

format corresponded to the numbering scheme discussed in paragraph 33. "S" represented the series number; "M" represented the mantissa (the part after the series number); "P" represented an optional part number; "Q" represented an optional sub-part number; and "V" represented the version number (without the separating dots). **Appendix 12** at 2.

35. The Working Groups would create incremental versions of the draft specifications (*e.g.*, V0.2.1, V1.0.0, V1.1.0, etc.). These versions were made available on the 3GPP website's file repository which is accessible from the 3GPP specifications page. The version numbering scheme for Technical Specifications and Technical Reports was standardized by 3GPP. The version number included three fields: the major version field, the technical version field, and the editorial version field. **Appendix 13** at 1. The major version field reflects the stage of the specification, with "0" representing an immature draft and a value of "3" or greater representing a specification that has been approved by the relevant TSG and thus placed under change control. **Appendix 13** at 3. The technical version field begins at zero and is incremented every time a technical change is made to the specification (either as part of the drafting process or as part of an approved change request). **Appendix 13** at 3. The editorial version field begins at zero and is incremented each time a non-technical change is made to the specification (*e.g.*, to fix a typo or formatting issue). **Appendix 13** at 3.

36. I understand that the alleged invention in the '130 patent relates to cellular telecommunications networks, and more particularly to demodulation reference signals in a wireless communication system. Any POSITA interested in demodulation reference signals in a wireless communication system would have been monitoring 3GPP's activities in this area and would probably have been already participating as a full or associate member or observer in the standard development process or would have at least known that information regarding the proposed revisions to the technical specifications under discussion were available through 3GPP.

### 2. 3GPP TDocs

37. As mentioned in paragraph 29, the technical specifications and reports developed by 3GPP were and are driven by the technical contributions of 3GPP member companies. As part of that development process, various types of documents were produced and submitted. As relevant to this case, the 3GPP process involved the consideration of temporary documents or "TDocs," which are also referred to as proposals, contributions, or Change Requests ("CRs" - when proposing changes to approved Technical Specifications or Reports). The agreement of proposals submitted as TDocs results in the production of Technical Specifications and Reports.

38. Prior to each Working Group meeting, members of the Working Group

would prepare TDocs to identify, discuss, and/or propose a new feature or change(s) to an existing feature or to identify a technical issue for discussion. Interested POSITAs would have known that TDocs could be a helpful source of technical information regarding the 3GPP specifications.

39. Each TDoc was assigned a TDoc number, according to a standard format set by 3GPP.[2] As described in the 3GPP Working Procedures, the numbering system followed the format xminnzzzz. **Appendix 5** at 17. This general naming convention has been in use since at least 1999 with only minor variations. Within that format, "x" referred to the relevant TSG. For example, "R" was used for TSG RAN. Likewise, "m" referred to the relevant Working Group. **Appendix 5** at 17. A document for RAN WG1 would therefore begin with "R1". The two digits "nn" represented the year (*e.g.,* 17), and the digits "zzzz" represented the unique document number. This document number was used as the TDoc's filename.

40. Each TDoc would include in its header the meeting at which the contributor intended the TDoc to be discussed. Most TDocs were uploaded to the 3GPP website for public viewing prior to the relevant Working Group meeting listed on the TDoc. TDocs created at, or following, meetings, were uploaded during or after the meeting to which they pertained. The documents were uploaded to the

[2] Documents other than technical contributions (such as meeting reports) were also assigned TDoc numbers for ease of reference.

public file repository in an area allocated to the particular Working Group. **Appendix 10** at 8; **Appendix 14** at 1 (RAN WG1 homepage with link to WG1's "Documents area"). Immediately upon upload, any member of the public could download and access the TDocs and other documents offered for discussion. This process has been in place since I began attending Working Group meetings in 1999.

### E. The 3GPP Website's Public File Repository

41. All TDocs, Technical Reports, and Technical Specifications were also freely available to interested member of the public through the public file repository accessible via the 3GPP website. Interested members of the public would have been well aware of 3GPP and of the 3GPP website. 3GPP documents were accessible to any member of the public through the 3GPP website without providing any login credentials or other exclusive access criteria. **Appendix 10** at 8 ("No password is needed to access any information on the 3GPP Web site, all information is openly published").

42. During the 2017 timeframe, any interested member of the public could locate relevant documents of interest on the 3GPP website using reasonable diligence based on the website's indexing scheme or the TDoc's naming convention. The TDoc's on the 3GPP website were (and remain) organized according to the relevant Working Groups within 3GPP (each of which focused on particular subject matter) and then further organized based on the meetings of those groups. The

Technical Specifications and Reports were (and remain) organized according to their subject matter as indicated by their series number and version. POSITAs would have known which Working Groups and which Technical Specification series focused on particular subject matter.

43. An interested member of the public could locate documents of interest by first navigating a web browser to the 3GPP website (www.3gpp.org). In the 2017 timeframe, to locate TDocs from the 3GPP home page, a user could have clicked "Specification Groups" **Appendix 15**. The corresponding webpages contained links to the 3GPP's public file repository (*e.g.*, through the "Documents area" link of the RAN WG1 page). **Appendix 14**. To locate specifications, a user could have clicked "Specifications" and followed links as described in section III.D.1 above. Instead of accessing the 3GPP file repository from the 3GPP website home page, a user could have also accessed the file repository through the web address www.3gpp.org/ftp or directly using ftp client software connected to ftp.3gpp.org. A POSITA was also able to search for relevant documents using keywords on the search facility on the 3GPP website from at least 2000, and from at least 2015 using the 3GPP search portal (https://portal.3gpp.org/#/), where an interested person could search for documents by title and source, among other things.

44. The top two levels of indexing within the file repository were based wholly on subject matter, as reflected by the division of subject matter among the

various TSGs and Working Groups, or into various Specifications. Specifically, an individual could select the relevant Specification Series ('Specs') or Specification Group (TSG) covering the subject matter of interest. **Appendix 16**.

45. For example, if the individual were interested in the radio access aspects of 3GPP, they would click "tsg_ran." From there, the individual would click on the particular RAN Working Group covering the subject matter of interest. **Appendix 17**.

46. Then, if the individual were interested in the Radio Interface Radio layer 1, the individual would know to choose the folder for WG1. **Appendix 17**. Once a user is in the relevant Working Group folder (RAN WG1 in this example), an individual would see a list of all meetings held by RAN WG1 including ad hoc meetings. **Appendix 18** at 3, **Appendix 19**. As shown in **Appendix 18** and **Appendix 19**, a folder existed for each meeting. For example, "NR_AH_1706" corresponded to TSG RAN WG1 NR ad hoc held in June 2017.

47. A POSITA would know which meeting(s) would have covered particular subject matter based on the working groups area of responsibility (*e.g.*, for RAN WG1 - **Appendix 14)**, and from publicly available meeting agendas, many of which POSITAs received directly via the 3GPP Working Group email reflector lists. **Appendix 20**. Further, an individual could ascertain what subject matter was addressed at each meeting by reviewing the report issued after each meeting, also

often linked in (or attached to) an email sent via the group's email reflector, and always submitted to following meeting for approval. **Appendix 21**, **Appendix 22** at 8.

48. In my experience, whilst the servers used for 3GPP file repository and many of its directories have been updated since 1999, and directories may as a result have later dates associated with them (*e.g.*, reflecting the last time they were modified in some way or their contents were updated), the original upload date for files including specifications has always been preserved, providing a true and accurate indication of their earliest availability for download.

49. Once an individual navigated to the desired meeting folder, for example "NR_AH_1706" the individual could then select the "Docs" folder to view the documents associated with that meeting. **Appendix 19, Appendix 23.** The documents within this folder were listed by TDoc number, and interested members of the public would have known to review the meeting report for each meeting to confirm which topics were discussed at that meeting. *E.g.*, **Appendix 24**. An indexed list of TDocs including details of TDoc numbers, titles, agenda items, and sources, among other attributes, was also available in the TDocs directory for each meeting, as well as being included as an Annex to each meeting report, **Appendix 23** at 62, **Appendix 24** at 3, **Appendix 24a**.

50. Many TDocs were uploaded to the public file server for public viewing

prior to the relevant meeting (although some TDocs, particularly those created during, or approved via email following, a meeting, were uploaded during or soon after the meeting). **Appendix 10** at 8. Throughout and since my participation in 3GPP, it has been recommended that delegates attending a meeting download the relevant set of documents from the 3GPP file repository onto their personal computers prior to each meeting. **Appendix 10** at 7. Given that any interested member of the public could and was likely to subscribe to the Working Group email reflector, it would also have been simple to locate the location of relevant TDocs on the 3GPP server based on the information sent out to said email reflector.

51. Following each 3GPP meeting, the secretary would usually distribute the meeting minutes via the corresponding email list with a request for comments. *E.g.,* **Appendix 21, Appendix 24**. Said email would effectively therefore inform subscribers that the meeting had taken place, would inform subscribers of the documents that had been treated (or not), and in the event that the meeting was a TSG plenary meeting, serve as notice that new versions of specifications incorporating Change Requests approved by the TSG meeting, would shortly be made available on the 3GPP public server. Further, an interested member of the public following a certain topic would have known to check said report for related contributions.

52. 3GPP's public file repository provides a reliable mechanism for

identifying the date and time a document was uploaded to the website and then available to download for public viewing. When a document is uploaded, the file server automatically assigns the document a time stamp—*i.e.*, an accurate and automatically computer-generated electronic record of when the document was uploaded—as part of the regular business practices of 3GPP. **Appendix 10** at 8. This has always been the practice regarding uploading documents to the 3GPP file repository, and my personal experience confirms that the time stamps have always been a reliable way to determine when a file was uploaded to the 3GPP website and immediately available for public download.

53. Further, whilst the servers used for 3GPP file repository and many of its directories have been updated since 1999, and directories may as a result have later dates associated with them (*e.g.*, reflecting the last time they were modified in some way or their contents were updated), the original upload date for files including specifications has always been preserved, providing a true and accurate indication of their earliest availability for download.

### F. The 3GPP Listserv

54. An important means to facilitate discussions, and for distributing draft specifications and other information to 3GPP members and interested members of the public was through the 3GPP email listservs (also referred to as the "email exploder" or "email reflector"). All TSGs and Working Groups, including TSG

RAN WG1, have corresponding listservs. Each listserv acts as an email alias that distributes emails and email attachments sent to that alias to every person subscribed to that listserv.

55. Subscribing to a listserv is and was simple and was open to any member of the public—not just 3GPP members. **Appendix 25**. The email listservs were featured prominently on 3GPP's Specification Groups page and could be accessed via the "Email Lists" link. **Appendix 15**. That link would take a user to a page providing instructions to subscribe to and access the list of ETSI email listservs including those for 3GPP. **Appendix 25**. It is my opinion that the 3GPP email listservs were well known among persons interested in following or participating in the development of wireless cellular standards. **Appendix 4** at 7 ("[g]iven that 3GPP has participants from all over the world, the use of the Internet, email exploders [i.e., listservs] and other such facilities have proved invaluable for distributing and sharing information, working drafts and so on"); **Appendix 26**, Section 5 ("The vast majority of the technical discussions and decision making in both IETF and 3GPP is done over mailing lists. … It is recommended that interested individuals subscribe to and participate in these lists.").

56. There were over a thousand subscribers to the RAN WG1 listserv. **Appendix 27** at 2, **Appendix 28** at 2. The people that subscribed were typically engineers, such as me, but also technology strategists and technical managers. The

subscriber list typically included at least all those persons who planned to attend an upcoming meeting where a TDoc may be discussed. The typical practice among people who were to attend an upcoming meeting was to use the WG's listserv to review and discuss opinions about the ideas conveyed in TDocs. The email listserv for RAN WG1 provided an efficient way for contributors to quickly and efficiently disseminate their views. The number of subscribers for a particular WG listserv usually far exceeded the number of people attending those WG meetings. For example, 394 delegates attended RAN WG1 NR AH #2, whereas the RAN WG1 email list had over 1000 subscribers at that time. See, e.g., **Appendix 29**, **Appendix 27** at 2, **Appendix 28** at 2.

57. No confidentiality limitations or restrictions on further dissemination were placed on documents distributed via the listservs. **Appendix 10** at 9 ("This distribution on the group's email exploder is important, because once that happens, the document is effectively in the public domain, since membership of the exploder is open to all and is (almost) unpoliced.") (emphasis added). This has been the practice and understanding since I became involved with 3GPP in 1998-1999.

58. The listserv emails were (and remain) archived in a public online archive (available at http://list.etsi.org/scripts/wa.exe?INDEX). This archive has existed and been accessible to POSITAs since the email lists were created in 1998. **Appendix 30**. Each archived email contains a computer-generated date stamp

indicating when the email was sent and thereby when any attached document became publicly disclosed through distribution to listserv subscribers. The listserv archives are text searchable, and include advanced searching features. For example, and without limitation, the archives can be searched using keywords, quoted phrases, and terms and connectors (e.g., "and," "or," and "and not"). The archives have been text searchable since at least 2002.

## IV. 3GPP EXHIBITS

### A. Exhibit 1003 ("TR 38.912 V14.0.0")

59. 3GPP TR 38.912 v14.0.0 (Ex. 1003) is a draft Technical Report titled "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Study on New Radio (NR) access technology (Release 14)". Ex. 1003 at 1. The report states that it was produced by 3GPP in March 2017. Ex. 1003 at 1.

60. 3GPP TS 38.912 v14.0.0 being an approved version of the Release 14 report on the study into New Radio access technology was approved by email following TSG RAN #75 held March 6 – 9, 2017. An interested member of the public would know that the latest version of an approved specification or report would be available following the plenary meeting responsible for that specification (in this case TSG RAN) in accordance with 3GPP standard practice as described in paragraphs 31. The approval of TS 38.912 v14.0.0 by email is documented in the main body and in Annex B of the meeting report from TSG RAN #75. **Appendix**

**31**, at 12, 62, **Appendix 31a** at index 855.

61. To obtain this document, I directed a web browser to the URL: https://www.3gpp.org/ftp/Specs/archive/38_series/38.912. **Appendix 32**. I selected the link for "38912-e00.zip" and downloaded a zip file of the same name. The zip file contained a Microsoft Word document, titled "38912-e00.doc." A true and correct copy of the Word document within the zip file (38912-e00.doc) is provided as Ex. 1003.

62. The file numbering scheme "e00" reflects version 14.0.0. After version 9 (e.g. "-900" would be version 9.0.0), the 3GPP Technical Specifications and Report file numbering scheme continues with letters. "a" represents version 10, and so on; "e" therefore reflects version 14.

63. TS 38.912 v14.0.0 was available to download from 3GPP's public file on March 24, 2017, as evidenced by the upload date corresponding to that file:

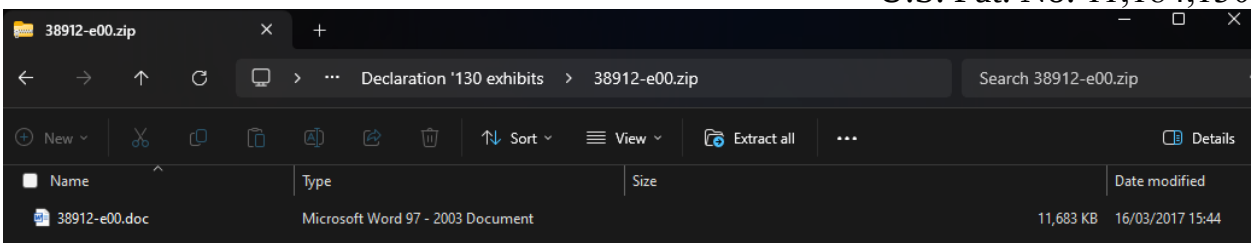


www.3gpp.org / ftp / Specs / archive / 38_series / 38.912

| sort by name/desc | sort by date/desc | sort by size/desc |
|---|---|---|
| 38912-001.zip | 2016/06/07 14:42 | 27,6 KB |
| 38912-002.zip | 2016/09/22 18:02 | 58,4 KB |
| 38912-100.zip | 2017/03/16 14:29 | 8112,7 KB |
| 38912-e00.zip | 2017/03/24 9:34 | 4047,3 KB |
| 38912-e10.zip | 2017/08/03 15:24 | 4048,3 KB |
| 38912-f00.zip | 2018/07/19 14:11 | 4048,6 KB |
| 38912-g00.zip | 2020/07/18 17:03 | 4049,8 KB |
| 38912-h00.zip | 2022/04/06 22:24 | 4051,9 KB |
| 38912-i00.zip | 2024/04/04 19:55 | 4054,5 KB |

**Appendix 19**, at 1.

64. The word document within the zip file "38912-e00.zip" has a date stamp of March 16, 2017. An excerpt of the zip file directory is provided below. Selecting the link for "38912-e00.doc" with a date stamp of March 16, 2017, I have confirmed that the technical contents of the file "38912-e00.doc" are the same as those provided in TS 38.912 v14.0.0. A true and correct copy of the Microsoft Word document titled "38912-e00.doc" is the TS 38.912 v14.0.0 that is provided in Ex. 1003.




65. As I described above in paragraphs 24 and 30-32, technical specifications and reports were readily available through the 3GPP website in the 2017 time period. Interested POSITAs would have been well aware of 3GPP and of the 3GPP website, and they would have known that 3GPP documents were available to the public. *Supra* ¶¶ 22–24, 30-32. As specifically explained in paragraph 31, the specifications area of the 3GPP file repository was accessible from the 3GPP website's specifications page (which, in turn, was directly accessible from the 3GPP Home Page through the "Specifications" link). Additionally, the Specifications page provided a direct link to versions of technical specifications grouped according to their approval date. ¶ 30-32. An interested POSITA had the ability to narrow the relevant specifications of interest based on the subject matter covered by each Working Group, as well as the specification numbering scheme.

66. In addition, the 1000+ subscribers to the 3GPP RAN WG1 listserv would each have received 84 emails (between January and August 2017) discussing the creation and subsequent updating of TR 38.912 v14.0.0. **Appendix 32**, **Appendix 28** at 2, **Appendix 29** at 2. Further, the 1000+ subscribers to the RAN Plenary listserv would have received 13 emails discussing the approval of, and

subsequent changes to, TR 38.912, and would therefore have been explicitly informed as to its availability. **Appendix 33**, **Appendix 28** at 1, **Appendix 29** at 1.

67. With that knowledge, to download TR 38.912 v14.0.0, an interested POSITA could have navigated to the specifications area of the file repository via the direct link on the specifications page. **Appendix 11** at 1. As described in paragraph 40, that navigation structure was simple, as it was based on the filename structure. Thus, an interested POSITA would have been capable of navigating to relevant 3GPP specifications on the 3GPP website using reasonable diligence.

68. The upload time stamp indicates that 38921-e00.zip was uploaded to 3GPP's publicly available website on March 24, 2017, and that any member of the public could have downloaded the zip file, extracted the Word document enclosed, and viewed the contents of the Word document without restriction on that date, and anytime thereafter. Based on my personal knowledge and experience, this time stamp accurately reflects the date the document was uploaded to the 3GPP public file repository, and I have no reason to believe this time stamp is inaccurate. I have therefore determined that TR 38.912 v14.0.0 was available for any member of the public to download from the 3GPP website as of March 24, 2017. Further, as described in paragraph 24, 3GPP documents were freely available and were not burdened by any confidentiality requirements or restrictions on further dissemination.

69. It is my opinion, therefore, that from March 24, 2017, an interested POSITA using reasonable diligence could have located TR 38.912 v14.0.0 on the 3GPP website, downloaded the reference without providing any credentials, and disseminated the reference to others without restriction.

**B. Exhibit 1004 (R1-1710789)**

70. R1-1710789, entitled "RS structures for NR-PDCCH," is a technical contribution submitted to 3GPP TSG RAN WG1. It follows the general naming format ("xminnzzzz.ext") described in the paragraph 39[3]. Accordingly, "R1" indicates that the contribution was submitted to RAN WG1, "17" indicates the year (2017) that this technical contribution was submitted, and "10789" is the unique number that was assigned to this contribution document by the working group secretary.

71. Document R1-1710789 was submitted to the RAN WG1 ad-hoc meeting #2 in Qingdao, China, which was held June 27-30, 2017. Ex. 1004 at 1.

72. To confirm the availability of R1-1710789 on the 3GPP document server in the 2017 timeframe, I navigated to the 3GPP website at http://www.3gpp.org, selected "3GPP Groups" from the menu bar, and then selected

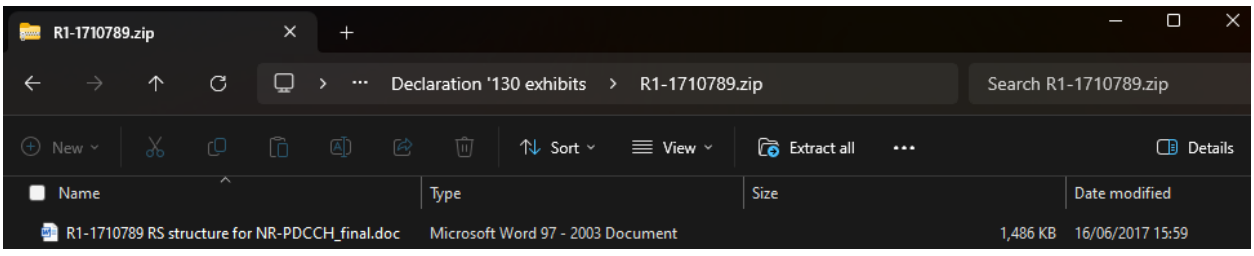
[3] RAN WG1 added another "z" digit to the document number, starting at RAN WG1 #86b in 2016, to cater for the increasing number of contributions being submitted.

"RAN WG1" from the dropdown menu. I then selected the "Documents area" link to access the public file server where documents for the TSG-RAN Working Group 1 are stored, and from where I navigated to the documents for "TSGR1_AH" (ad hoc) and then "NR_AH_1706" (June 2017 ad hoc meeting) and finally "Docs". R1-1710789 was available to download from 3GPP's public file server on June 17, 2017, as evidenced by the corresponding upload date:

| | | |
|---|---|---|
| R1-1710788.zip | 2017/06/17 5:15 | 386,3 KB |
| R1-1710789.zip | 2017/06/17 5:15 | 1315,4 KB |
| R1-1710790.zip | 2017/06/17 5:15 | 51,4 KB |

**Appendix 23** at 27.

73. The Docs directory index stated that R1-1710789 was uploaded on "2017/06/17". I selected the link for "R1-1710789.zip" and downloaded a zip file of the same name. The zip file contained a Microsoft Word document, "R1-1710789 RS structure for NR-PDCCH_final.doc", with a date stamp of 16/06/2017 (European date format), the day before the zip file was uploaded.



74. A true and correct copy of the document within the zip file (R1-1710789 RS structure for NR-PDCCH_final.doc) is provided as Ex-1004. Based on my experience, I understand that these date stamps mean that R1-1710789.zip was uploaded to 3GPP's publicly available website on June 17, 2017, and that any member of the public could have downloaded the zip file, extracted the Word document enclosed, and viewed the contents of said document without restriction on June 17, 2017 and thereafter.

75. The report from RAN WG1 Ad Hoc Meeting 2 confirms the availability of R1-1710789 at that time and that it was available in the meeting. **Appendix 24** at 54. I have no reason to believe the date stamp, nor the report from RAN WG1 AH#2, are inaccurate. I have therefore determined that R1-1710789 was publicly available on the file server no later than June 17, 2017.

76. Based on the information above, it is my opinion that R1-1710789 titled "RS structures for NR-PDCCH" and provided as Ex-1004 was publicly available to download from the 3GPP file server no later than June 17, 2017 and could have been distributed thereafter without restriction.

**C. Exhibit 1005 (R1-1710294)**

77. R1-1710294, entitled "On DL DMRS Design," is a technical contribution submitted to 3GPP TSG RAN WG1. It follows the general naming format ("xminnzzzz.ext") described in the paragraph 39. Accordingly, "R1"

indicates that the contribution was submitted to RAN WG1, "17" indicates the year (2017) that this technical contribution was submitted, and "10294" is the unique number that was assigned to this contribution document by the working group secretary.

78. Document R1-1710294 was submitted to the RAN WG1 ad-hoc meeting #2 in Qingdao, China, which was held June 27-30, 2017. Ex. 1005 at 1.

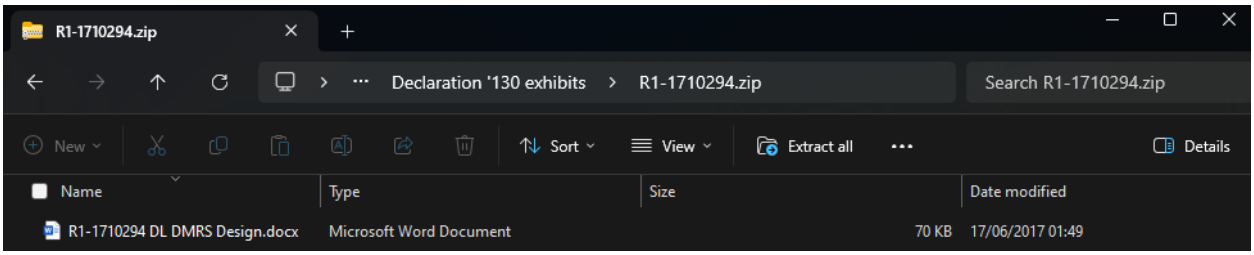
79. To confirm the availability of R1-1710294 on the 3GPP document server in the 2017 timeframe, I navigated to the 3GPP website at http://www.3gpp.org, selected "3GPP Groups" from the menu bar, and then selected "RAN WG1" from the dropdown menu. I then selected the "Documents area" link to access the public file server where documents for the TSG-RAN Working Group 1 are stored, and from where I navigated to the documents for "TSGR1_AH" (ad hoc) and then "NR_AH_1706" (June 2017 ad hoc meeting) and finally "Docs". R1-1710294 was available to download from 3GPP's public file server on June 17, 2017, as evidenced by the corresponding upload date:

| | | |
|---|---|---|
| R1-1710293.zip | 2017/06/17 5:31 | 161,6 KB |
| R1-1710294.zip | 2017/06/17 5:31 | 64,2 KB |
| R1-1710295.zip | 2017/06/17 5:31 | 33,3 KB |

**Appendix 23** at 13.

80. The Docs directory index stated that R1-1710294 was uploaded on

"2017/06/17". I selected the link for "R1-1710294.zip" and downloaded a zip file of the same name. The zip file contained a Microsoft Word document, "R1-1710294 DL DMRS Design.doc", with a date stamp of 17/06/2017 (European date format), the same day the zip file was uploaded.




81. A true and correct copy of the document within the zip file (R1-1710294 DL DMRS Design.doc) is provided as Ex-1005. Based on my experience, I understand that these date stamps mean that R1-1710294.zip was uploaded to 3GPP's publicly available website on June 17, 2017, and that any member of the public could have downloaded the zip file, extracted the Word document enclosed, and viewed the contents of said document without restriction on June 17, 2017 and thereafter.

82. The report from RAN WG1 Ad Hoc Meeting 2 confirms the availability of R1-1710294 at that time and that it was available in the meeting. (**Appendix 24** at 46). I have no reason to believe the date stamp, nor the report from RAN WG1 AH#2, are inaccurate. I have therefore determined that R1-1710294 was publicly available on the file server no later than June 17, 2017.

83. Based on the information above, it is my opinion that R1-1710294 titled "On DL DMRS Design" and provided as Ex-1005 was publicly available to download from the 3GPP file server no later than June 17, 2017 and could have been distributed thereafter without restriction.

## V. CONCLUSION

84. Based on the information in section IV, A above, it is my opinion that Ex-1003, 3GPP TR 38.912 v14.0.0 titled: "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Study on New Radio (NR) access technology (Release 14)", was publicly available to download from the 3GPP server without restriction on March 24, 2017.

85. Based on the information in section IV, B above, it is my opinion that Ex-1004, R1-1710789, was publicly available to download from the 3GPP server without restriction on June 17, 2017.

86. Based on the information in section IV, C above, it is my opinion that Ex-1005, R1-1710294, was publicly available to download from the 3GPP server without restriction on June 17, 2017.

87. I declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were

made with the knowledge that wilful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

November 11, 2024



**Printed Name: Craig Bishop**



Ericsson Ex. 1008, p. 42 of 900
Ericsson v. Motorola

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# Appendix 1

# Curriculum Vitae


**Name:** Craig Bishop

**Contact Tel No.:** +44 (0)7984 564949 (mobile)

**Email**: craig@bishopcom.co.uk

**Current job title:** Independent Consulting Engineer, CEO

**Address:** 43 Ospringe Street, Faversham, Kent, ME13 8TW


**Key Skills and Experience**

- 35 years Telecoms, Radio and Broadcast experience
- 27 years experience of 2G/3G/4G telecoms standardisation
- Extensive knowledge of 3GPP and ETSI specifications and procedures including document handling and publication practices
- Sound understanding of 3GPP systems, including Radio Access Interfaces and Networks, Access Stratum protocols, Core Networks, Non-Access Stratum protocols, and IMS
- Experience of ETSI role from regulatory perspective (harmonised standards, mandates, spectrum, etc)
- Depositions, reports, and declarations as expert witness in cases on 3GPP technologies and on 3GPP & ETSI practices and procedures.
- Intellectual property analysis including prior art search and evaluation of patent essentiality
- Application of data analytics and machine learning techniques to standards and IP data
- Programming in Java, Python, C, Octave (Matlab)

**Career History**

## Bishop Communications Ltd. 01/13 –

## Independent Telecommuncations Standards and Intellectual Property Consultant

Company is a full ETSI member

Activities have included:

- Provision of expert support for IPR litigation from standards landscape analysis / background technical reports to expert testimony reports / declarations and depositions on matters including the public availability of 3GPP and ETSI prior art.
- Intellectual property analysis assessing strengths and weaknesses of patents and patent portfolios, conducting searches for prior art, evaluating patent essentiality, and acquring relevant documentation.
- Provision of expertise for EC funded ETSI Specialist Task Force (STF489) to produce implementation guidelines for Total Conversation for emergency services. Project delivered on time / budget and well received. Ouput published March 2016 as ETSI TR 103 201.
- Provision of expertise for ETSI Specialist Task Force (STF555) assessing the impact on existing standards of communications involving IoT devices in all types of emergency situations. Project delivered on time / budget and well received. Ouput published July 2019 as ETSI TR 103 582.
- Provision of standards consultancy services for Samsung Electronics in ETSI including membership of the ETSI Board until November 2014

Technologies covered in patent related work include: 3GPP GSM, UMTS, LTE, 5G NR radio interface technologies (Phy, MAC, RLC, RRC), 3GPP access and core networks (GPRS/UMTS & EPC NAS), IMS. Organisations covered include 3GPP & ETSI.

Clients served / represented include: ADT, Apple, AT&T, Blackberry, Cradlepoint, DELL, Ericsson, Honeywell, HTC, Huawei, LG, Lenovo, Motorola, Nokia, Oneplus, Oppo, Samsung, Sierra Wireless, Thales, T-Mobile, Sprint, Verizon, Vodafone, Xiaomi, ZTE.

Working with: Addy Hart LLP, Alston & Bird LLP, Baker Botts LLP, Banner Witcoff LLP, DLA Piper LLP, European Telecommunications Standards Institute (ETSI), Fish & Richardson P.C., Gibson Dunn LLP, Haynes and Boone LLP, Hillebrand-CE GmbH, Kirkland & Ellis LLP, K&L Gates LLP, MckoolSmith LLP, PV Law LLP, Paul Hastings LLP, Perkins Coie LLP, Powell Gilbert LLP, Sidley Austin LLP, Samsung Electronics Research & Development Institute UK (SRUK), Taylor Wessing LLP, Williams & Connolly LLP, WilmerHale LLP.

Expert testimony through deposition:

- *Huawei Technologies Co. Ltd. vs. T-Mobile US, Inc., et al.*, Case Nos. 2:16-cv-0052-JRG-RSP, 2:16-cv-0055-JRG-RSP, 2:16-cv-0056-JRG-RSP, and 2:16-cv-0057-JRG-RSP (E.D. Tex.). On behalf of T-Mobile US Inc.
- *T-Mobile US, Inc., et al.* v. *Huawei Technologies Co. Ltd.*, Case Nos. IPR2017-00696 and IPR2017-00697 (PTAB). On behalf of T-Mobile US Inc.
- *LG Electronics, Inc., v. Koninklijke KPN N.V.*, Case No. IPR2018-00558 (PTAB). On behalf of LG Electronics, Inc.
- *Nokia of America Corp. and Ericsson Inc. v. IPCOM, GMBH & Co.,* Case No. IPR2021-00533 (PTAB). On behalf of Ericsson Inc.
- *IPCom, GmbH & Co., Plaintiff, v. AT&T Inc., et al, Defendant, Nokia of America Corp., Intervenor, Ericsson Inc., Intervenor.,* Civil Action No. 2:20-CV-322-JRG*, and IPCom, GmbH & Co., Plaintiff, v. Verizon Communications, et al., Defendant, Nokia of America Corp., Intervenor, Ericsson* nc*., Intervenor.,* Civil Action No. 2:20-CV-323-JRG. On behalf of Ericsson Inc.
- *Ericsson Inc. v. Koninklijke KPN N.V.,* Case No. IPR2022-00069 (PTAB). On behalf of Ericsson Inc.

Expert testimony in court:

- *Between IPCom GmbH and Vodafone, et al.,* Claim No. HP-2018-000030 Claim No. HP-2018-000031, High Court of Justice, Business & Property Courts of England and Wales, Intellectual Property List (ChD), Patents Court. Retained by Vodafone.
- *Between (1) Mitsubishi Electric Corporation (2) Sisvel International SA and Oneplus Mobiletech UK Limited, Oppo Mobile UK Ltd, Xiaomi Technology UK Limited, et al.,* Claim No. HP-2019-000014, High Court of Justice, Business & Property Courts of England and Wales, Intellectual Property List (ChD), Patents Court. Retained by Oneplus, Oppo, and Xiaomi (trial held remotely due to COVID-19 restrictions)

## Samsung Electronics Research Institute (SERI) 12/96 – 01/13

## Director Standards and Industry Affairs 03/11 – 01/13

Mission and Tasks as for previous role plus:

- Proactive member of ETSI Board following election as Board member in November 2011
- Worked with Samsung internal and external legal counsel in response to EC investigation into Samsung suspected abuse of Standards Essential Patents.
- Deposed by Apple as fact witness in ITC investigation 337-TA-794.

## Head of Advanced Technologies Standards & Regulation 09/05 - 03/11

Mission: To help position Samsung and SERI at the forefront of mobile telecommunication developments through participation in and leadership of mobile communications standards and European regulatory affairs

Key tasks:

- Developed standards and research strategy and coordinated activites with head office, acting as official Samsung contact for the European Telecommunications Standars Institute.
- Programme managed standardisation and regulation projects covering 3GPP (RAN2, CT1, SA2, SA1, SA, RAN, CT), OMA, and mobile Broadcast strategies and technologies (DVB Forum), European Framework projects (FP7), Spectrum Management (CEPT, ETSI EM, TFES, BRAN, …) and European Regulatory affairs (Digital Europe, relations with European Commission, …). - Grew department from 3 to 12 persons to cater for these activities.
- Participated and actively contributed to 3GPP SA1 (11/08 – 11/11), SA2 (10/05 – 08/11) , SA and ETSI TC SCP groups on issues including IMS / CS Interworking (VCC / SRVCC, VoLTE, T-ADS, ICS), Local IP Access & Selected IP Traffic Offload (LIPA-SIPTO), MOSAP, M2M/MTC, Embedded / 4FF UICC.
- Drafted and filed communication technology related patents related to 3GPP SA2 and CT1 technologies – 18 filed, mainly IMS and 3GPP NAS related
- Supported Samsung IP team with analysis of Samsung and 3rd party communication technology related patents and claim charts including GSM/GPRS, UTRAN, NAS, and IMS patents
- Chaired SERI Patent Committee from 2007-2009 - SERI achieved patent targets for first time in 2007 and did so in every year following

## Standards consultant – part time 09/04 – 09/05

(Whilst studying fulltime for MSC)

During this time, I conducted a review of the wireless communication technolgies and the associated standards space, with a particular emphasis on 802.16a, as well as 3G and 802.11 evolutions. I was also involved in analysis of 3rd party patents and claim charts on request from Samsung IP team.

## Technology Manager System Engineering group 06/03 – 09/04

Mission: To establish a System Engineering group within SERI to support development of SERI's dual mode GSM/UMTS radio modem platform.

Key Tasks:

- Defined and implemented System Engineering group strategy including recruitment and line management of the group which grew from 3 to 10 engineers during this period.
- Developed detailed system requirements for SERI's dual mode 2G/3G radio modem platform(s) including production of background documentation describing system wide behaviour
- Defined system test programme for platform, including example test cases using off the shelf test equipment. This project outsourced (under my supervision) to a third party company for completion.
- Provided continued support to development engineers in terms of understanding specification and system requirements, particularly with respect to Access Stratum and Non Access Stratum specifications and protocols.
- Instigated and managed studies investigating optimised system architecture for future Samsung mobile platforms.
- Analysed Samsung and 3rd party 3GPP technology related patents and claim charts on request by Samsung IP team and reported on their value and standards essentiality.

## Technology Manager Standards & System Group 04/02 – 06/03

Mission: To provide Standards support to SERI development teams and Samsung's global standardisation activities.

Key Tasks:

- Devised and implemented revised strategy to improve the focus of activities and provide improved support for software developers from a system perspective.

- Attended 3GPP TSG SA plenary and occasional SA WG1 meetings - acted as rapporteur for 3GPP Evolution technical report 3GPP TR 21.902.
- Analysed 3rd party GSM/GPRS technology related patents and claim charts on request by Samsung IP team and reported on their value and standards essentiality.
- Line managed 3 engineers, ensuring that the group provided expert support for SERI SW and HW developers in terms of standards interpretation and system requirements, particularly with respect to the Radio Access Network.

## Project Manager 04/00 – 04/02

Mission: To establish and manage development of a dual mode GSM/UMTS modem platform.

Key tasks:

- Defined and managed work relating to core technology development for Samsung's 3G handsets.
- Determined major technical architecture and parameters for the platform producing high level system requirements specification and project development plan.
- As a technical authority on UMTS, supported the project in terms of requirements specification and interpretation (L1, MAC/RLC, RRC, and NAS specifications), and contributed towards the training of UMTS project team members.
- Acting in a consultative capacity, interfaced with other departments in Samsung and with external customers/suppliers on issues relating to 2G and 3G technologies
- Responsible for the overall planning, work allocation and co-ordination of engineers for the project, as well as being involved in recruitment – during this period the number of engineers working on the project increased from 10 to over 40.
- Instigated, defined and managed a feasibility study involving HW and SW engineers, as essential preparation for the development of a dual mode GSM/UMTS radio modem platform.

## Senior/Principal Standards Engineer 12/96 – 04/00

Mission: To support Samsung standards and development activities in ETSI and 3GPP.

Key Tasks:

- Gathered and disseminated information throughout Samsung concerning latest specifications and trends in telecommunications, providing advice to Senior Management on future strategies for telecommunications development.
- Acted as sole Samsung representative in ETSI TC SMG2 from December 1996 and during the selection phase for the UMTS Radio Acces Technology providing training for Samsung engineers on elaborated technologies
- Participated in 3GPP TSG RAN WG1 (UTRA Physical Layer), and RAN WG2 (L2/3) contributing specifically in areas related to FEC, Common Packet Channel, and Transmit Diversity
- In 3GPP TSG T WG2 I initiated and acted as rapporteur for the UE capabilities work item. I also acted as liaison officer between TSG T WG2, TSG RAN WG1 and TSG SA WG1 (Service Aspects) on issues of common interest
- Acted as main spokesperson for and advisor on Samsung strategic activities in, 3GPP TSG RAN from 3GPP's creation until April 2000
- Acted in a consultative capacity advising the company on technical, commercial and regulatory issues relating to 3rd generation telecommunications development and implementation.
- Developed and promoted programme to co-ordinate standards activities throughout Samsung. – Samsung Global Standards Strategy Group established in September 1998.
- Attended ETSI TCs, SMG1, SMG4, SMG5, SMG7, SMG9 and SMG11 as required by Samsung to keep abreast of developments prior to establishment of 3GPP

## Radiocommunications Agency 06/93 -11/96

## HPTO Spectrum Engineer

- Responsible for the management of spectrum for use by PMR and Wireless LAN technologies.
- Defined and instigated development of an improved assignment methodology for Private Mobile Radio (PMR) channels, promoting increased quality and spectrum efficiency.
- Managed research projects involving the assessment and selection of bids from external companies, submitted under competitive tender.
- Represented the Agency in the National and International fora associated with the use of Land Mobile Radio, acting as rapporteur for PMR voice and data standards in ETSI Sub-Technical-Committee RES02, and as chairman of a sub-working group under ITU WP8A drafting the recommendation for use of the radio spectrum by Radio LANs.
- Involved in CEPT Spectrum Engineering Project Teams, dealing with spectrum for Narrow band PMR technology and co-ordination between that technology and T-DAB transmissions in Band III.
- Dispensed technical advice both within the Agency and to external customers, on national and international PMR standards, assessing requests for additional frequencies, and providing technical justification for assignments and wider spectrum policy

## BBC Radio 11/89 – 05/93

**Radio Operations Engineer**

- Worked on projects requiring the design, development, maintenance and testing of equipment for use within the broadcasting chain.
- Responsible for acceptance testing of new studios for Radio 5, and in particular redesign of outside source circuits for the main sports continuity studio.
- Involved in acceptance testing for NICAM transmission routers. Designed and implemented modifications to synchronise transmission feeds, resulting in seamless switching between routers.

## Education

1. MSC in Computer Science from the University of Kent

   Awarded (with distinction): 07/2006

   Dissertation title: Roles Variables and Program Analysis – Received prize for outstanding achievement

2. B.Eng. (Hons) in Electronic Engineering from the Polytechnic of Central London

   Awarded: 07/1989

3. In house and external technical and management training including: Learning Tree courses on System Analysis and Design, User Requirements, UML, and Project Management.
4. On-line courses from: Cousera, Udemy, and Zenva courses covering Machine Learning, Python, Data Science, and Natural Language Processing

# Appendix 2

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# *THIRD GENERATION PARTNERSHIP PROJECT (3GPP)*

## *PARTNERSHIP PROJECT DESCRIPTION*

**During the meeting held in Copenhagen, 2 - 4 December 1998 ARIB, ETSI, T1, TTA and TTC agreed this Partnership Project Description.**



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# *Preamble*

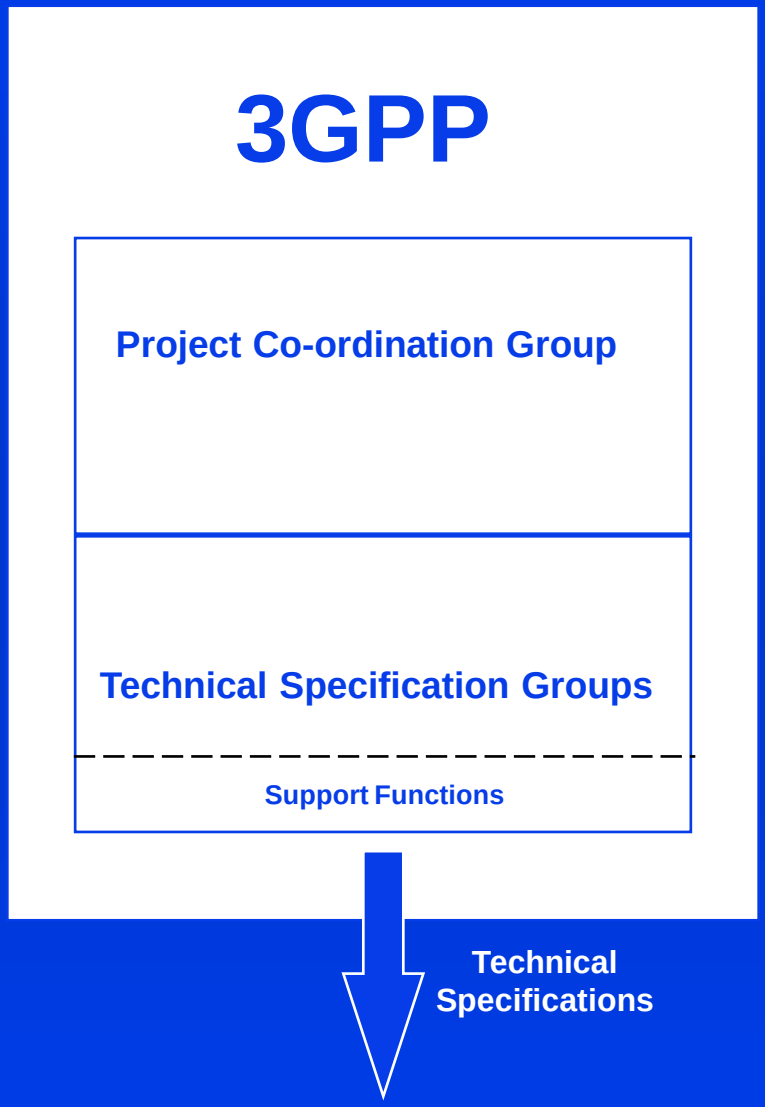
**Standards organizations and other related bodies have agreed to co-operate for the production of a complete set of globally applicable Technical Specifications for a 3rd Generation Mobile System based on the evolved GSM core networks and the radio access technologies supported by 3GPP partners (i.e., UTRA both FDD and TDD modes).**

**The Project is entitled the "Third Generation Partnership Project" and may be known by the acronym "3GPP".**

**3GPP has been established for the preparation and maintenance of the above mentioned Technical Specifications, and is not a legal entity.**


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# *3GPP Overview*






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## *Definition of the Third Generation Partnership Project*

**3GPP will provide globally applicable Technical Specifications for a 3rd Generation Mobile System based on the evolved GSM core network, and the Universal Terrestrial Radio Access (UTRA), to be transposed by relevant standardization bodies (Organizational Partners) into appropriate deliverables (e.g., standards).**



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# *Scope and objectives (1)*

**The Technical Specifications will be developed in view of global roaming and circulation of terminals.**

**The 3rd Generation Mobile System and its capabilities will be developed in a phased approach. Initially, 3GPP will elaborate, approve and maintain the necessary set of Technical Specifications for the first phase of a 3rd Generation Mobile System including:**

- **UTRAN (including UTRA; W-CDMA in Frequency Division Duplex (FDD) mode and TD-CDMA in Time Division Duplex (TDD) mode)**
- **3GPP Core Network (Third Generation networking capabilities evolved from GSM . These capabilities include mobility management and global roaming.)**
- **Terminals for access to the above (including specifications for a UIM)**
- **System and service aspects**


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## *Scope and objectives (2)*

**The set of global specifications for the first phase of the 3GPP core network and the specifications for the GSM core network should be common to the largest extent possible and should not be needlessly different.**

**The results of the 3GPP work will form the basis of member contributions to the ITU in accordance with existing procedures.**

**3GPP will take account of emerging ITU recommendations on interworking between IMT-2000 family members.**

**In the framework of agreed relationships, 3GPP will elaborate Technical Specifications that will form the basis of standards, or parts of standards, of the Organizational Partners.**


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# *Characteristics of 3GPP (1)*

**3GPP is characterized by the following attributes:**

- **Minimum production time for Technical Specifications from conception to approval**
- **Fast, electronic based approval process**
- **Maximum use of modern (electronic) working methods**
- **Minimum number of hierarchical levels with decision making taking place at the lowest appropriate levels**


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# *Characteristics of 3GPP (2)*

- **A Project Co-ordination function and a Technical Specification function**
- **Task oriented, ensuring that on completion of the tasks the future of the project is re-evaluated**
- **Cost effective use of financial/human resources provided by Partner Organizations (if required)**


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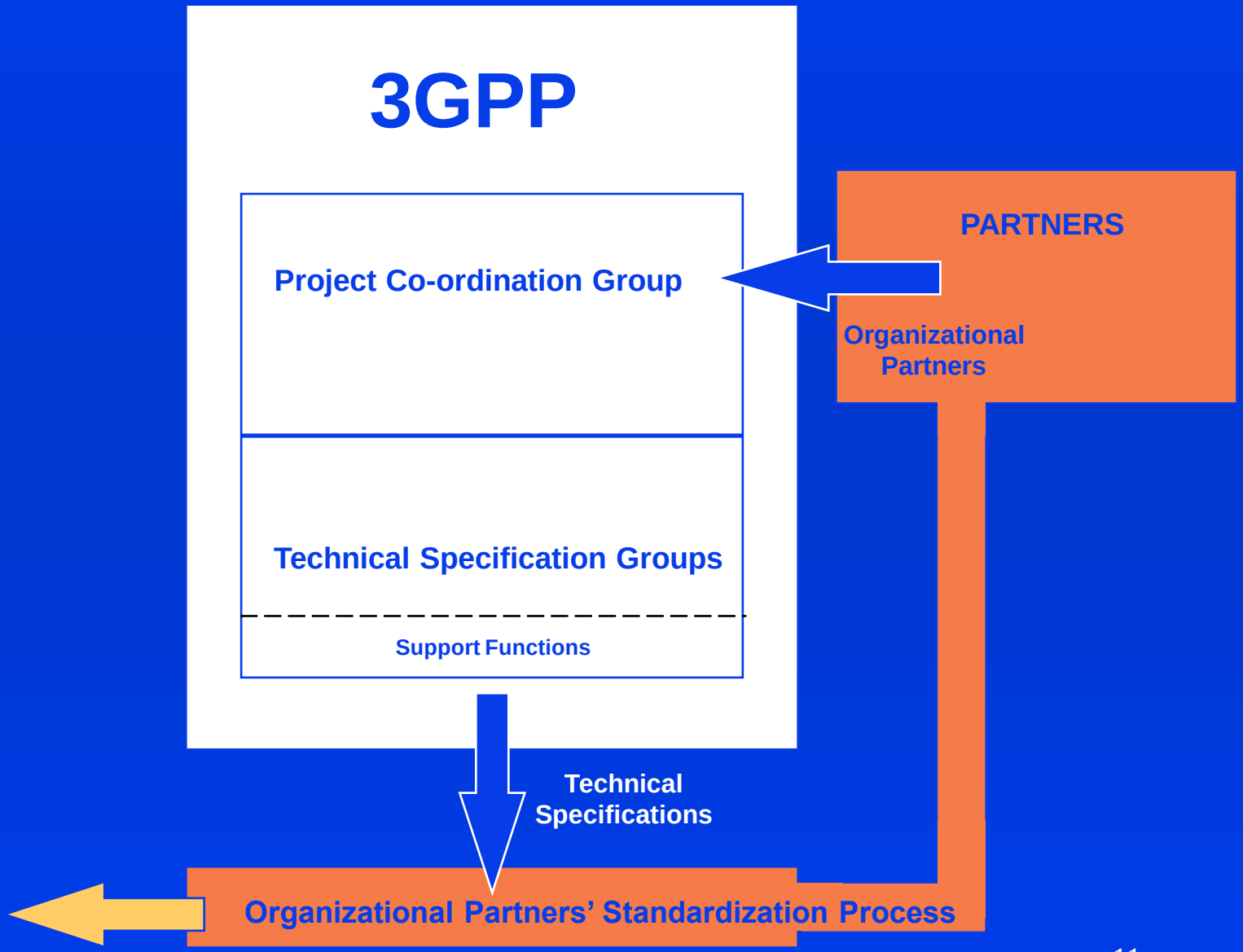
## *Partnership and Membership*

**3GPP comprises of:**

- **Partners:**
  - **Organizational Partners**
    - **3GPP is open to all standards organizations irrespective of the geographical location.**
  - **Market Representation Partners**
- **Individual Members**


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# Organizational Partners (1)






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## *Organizational Partners (2)*

**An Organizational Partner is:**

**An open standards organization with a national, regional or other officially recognized status (in their country or region)**

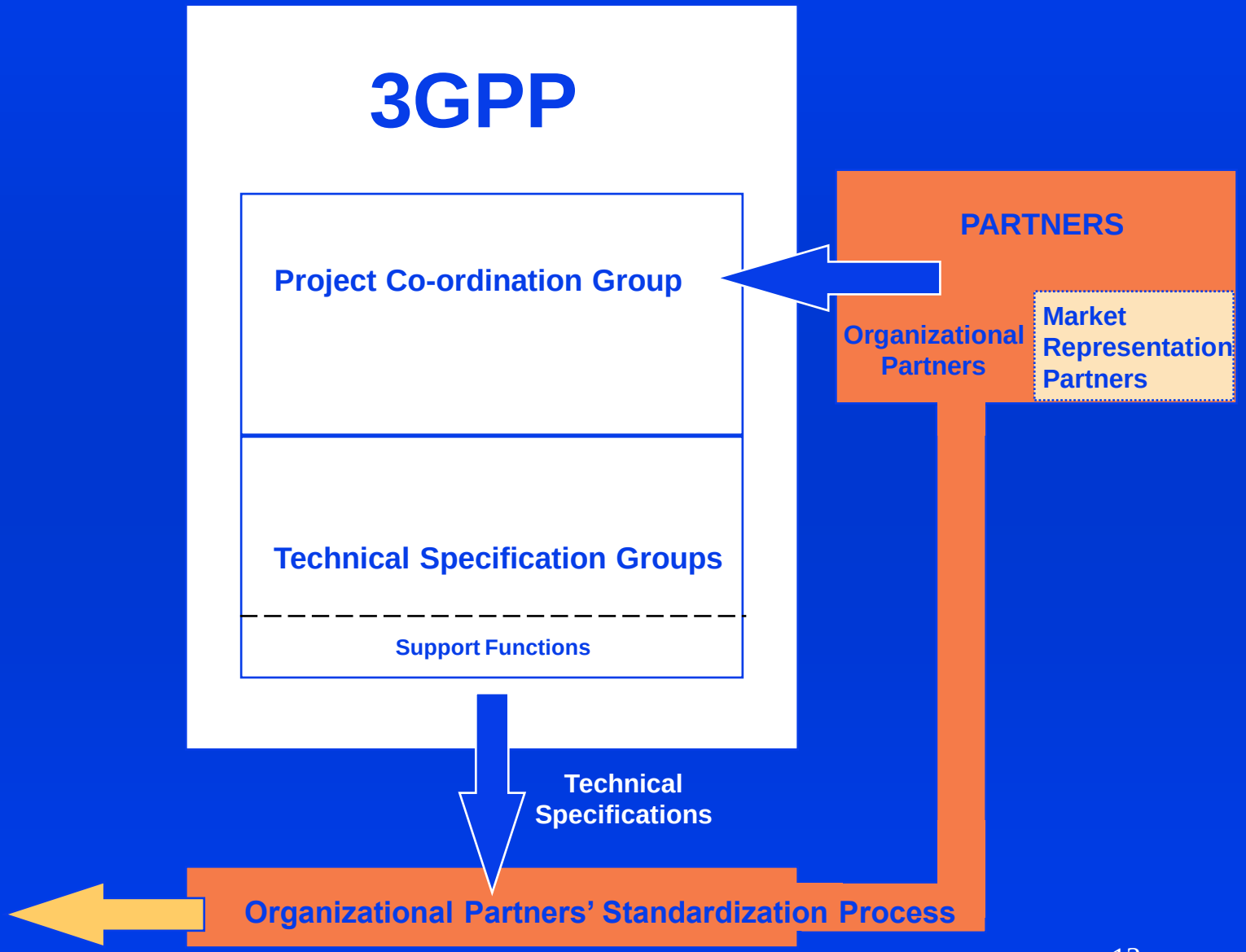
**that:**

- **has the capability and authority to define, publish and set standards nationally or regionally and**
- **has signed (or whose sponsor has signed) the Partnership Project Agreement**

**Organizational Partners will meet as approriate and make decisions by consensus.**


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# Market Representation Partners (1)






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# *Market Representation Partners (2)*

**Standardization should meet market needs.**

**In order to identify market requirements, the high competence of Market Representation Partners should be used.**

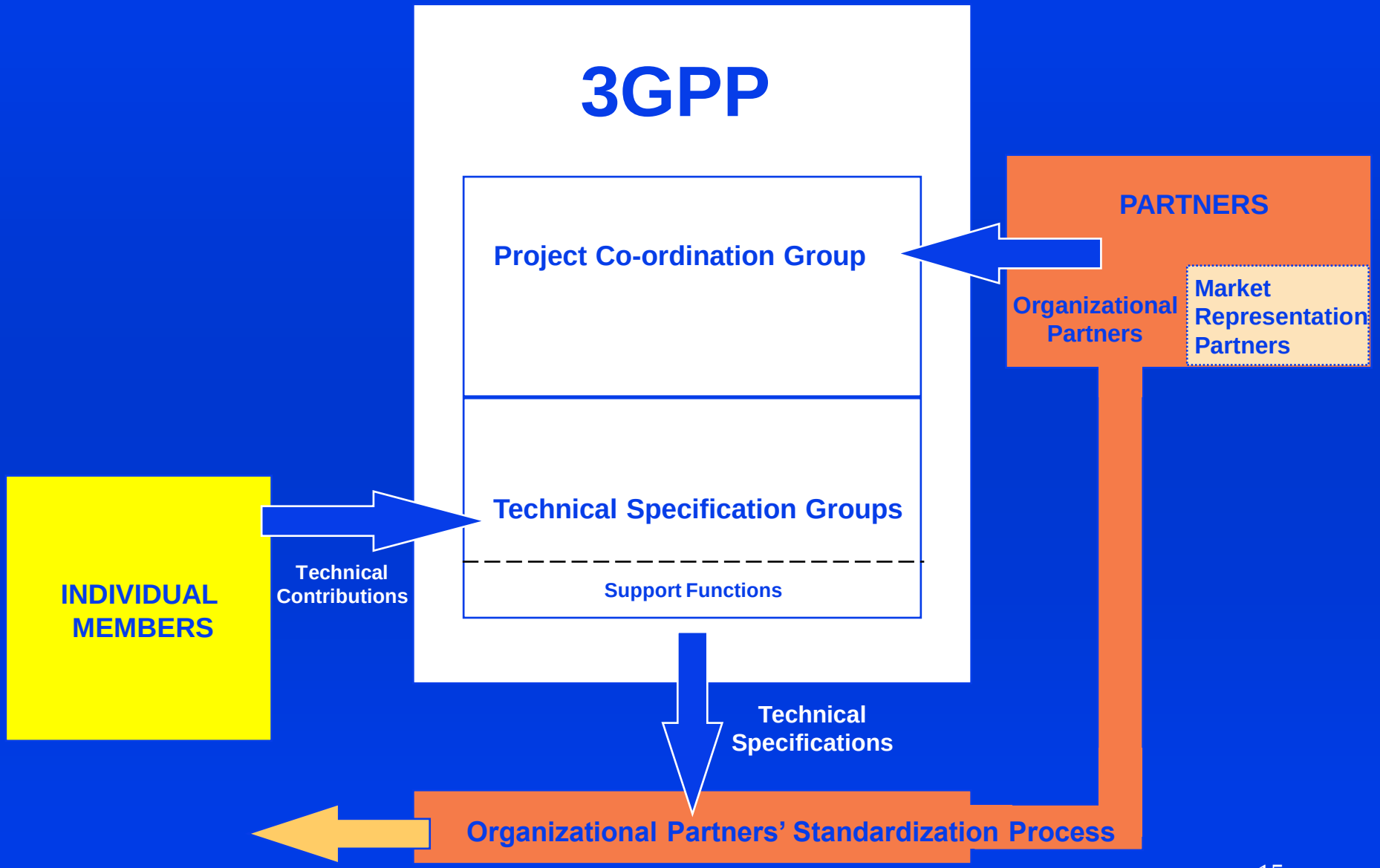
**A Market Representation Partner is an organization invited to participate by the Organizational Partners to offer market advice to 3GPP and to bring into 3GPP a consensus view of market requirements (e.g. services, features and functionality) falling within the 3GPP scope.**

**A Market Representation Partner:**

- **does not have the capability and authority to define, publish and set standards nationally or regionally**
- **has signed (or whose sponsor has signed) the Partnership Project Agreement**
- **has committed itself to the 3GPP scope**


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# Individual Members (1)






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# *Individual Members (2)*

**Membership in an Organizational Partner is a pre-requisite for Individual Membership in 3GPP.**

**Individual Membership is open to legal entities committed to support 3GPP and to:**

- **contribute technically or otherwise to one or more of the Technical Specification Groups within the 3GPP scope**
- **use the 3GPP results to the extent feasible**

**Individual Membership in 3GPP will be terminated by dissolution, abolition, resignation or expulsion from the related Organizational Partner.**


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# *Individual Members (3)*

**All entities registered as members of an Organizational Partner and eligible for participation in the technical work of that Partner, can become Individual Members of 3GPP. Individual members shall apply to their Organizational Partner to participate in 3GPP.**

**Individual Members act in the 3GPP in their own right; they carry the full responsibility for their contributions.**

**Individual Membership applicants residing in a country/area without an Organizational Partner can apply for membership in an Organizational Partner according to the rules of each Partner. (e.g. ETSI Associate Membership is available)**



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## *Observership*

**In order to ensure globally applicable Technical Specifications, the status of "Observer" may be granted by the Organizational Partners to an entity which has the qualifications to become a future Organizational Partner. The status of "Observer" includes obligations to:**

- **identify as early as possible any regulatory requirements that may lead to options within Technical Specifications**
- **make their IPR policy available for consideration**
- **contribute to the common objective of the 3GPP and avoid duplication of work related to the 3GPP**

**The participation rights of an Observer will be decided on a case by case basis.**



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## *Documentation for 3GPP*

**The following 3 documents describe 3GPP:**

- **The Partnership Project Agreement**
- **The Partnership Project Description (this present document)**
- **The Partnership Project Working Procedures**



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## *The Partnership Project Agreement (1)*

**The Partnership Project Agreement is a concise legal document signed by participating Partners (or their sponsor).**

**It contains the minimum legal text necessary for 3GPP to function correctly.**

**The Partnership Project Agreement refers to the Partnership Project Description and the Partnership Project Working Procedures.**



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## *The Partnership Project Agreement (2)*

**The Partnership Project Agreement includes obligations on Organizational Partners to commit themselves to the 3GPP scope:**

- **to encourage their members to contribute to the common set of Technical Specifications and to avoid duplication of work**
- **to convert / transpose / adopt all relevant Technical Specifications resulting from 3GPP into their own relevant deliverables through their normal processes**
- **to identify as early as possible, any national / regional regulatory requirements that may lead to options within the Technical Specifications**
- **to make their IPR Policy available for consideration**


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## *The Partnership Project Agreement (3)*

**The Partnership Project Agreement includes obligations on Market Representation Partners to identify market and service requirement of 3GPP and to contribute to:**

- **the promotion of 3GPP**
- **the definition of 3GPP System and Service scenarios**

**The Market Representation Partners should also encourage their members to contribute to the common objectives of 3GPP and to avoid duplication of work.**



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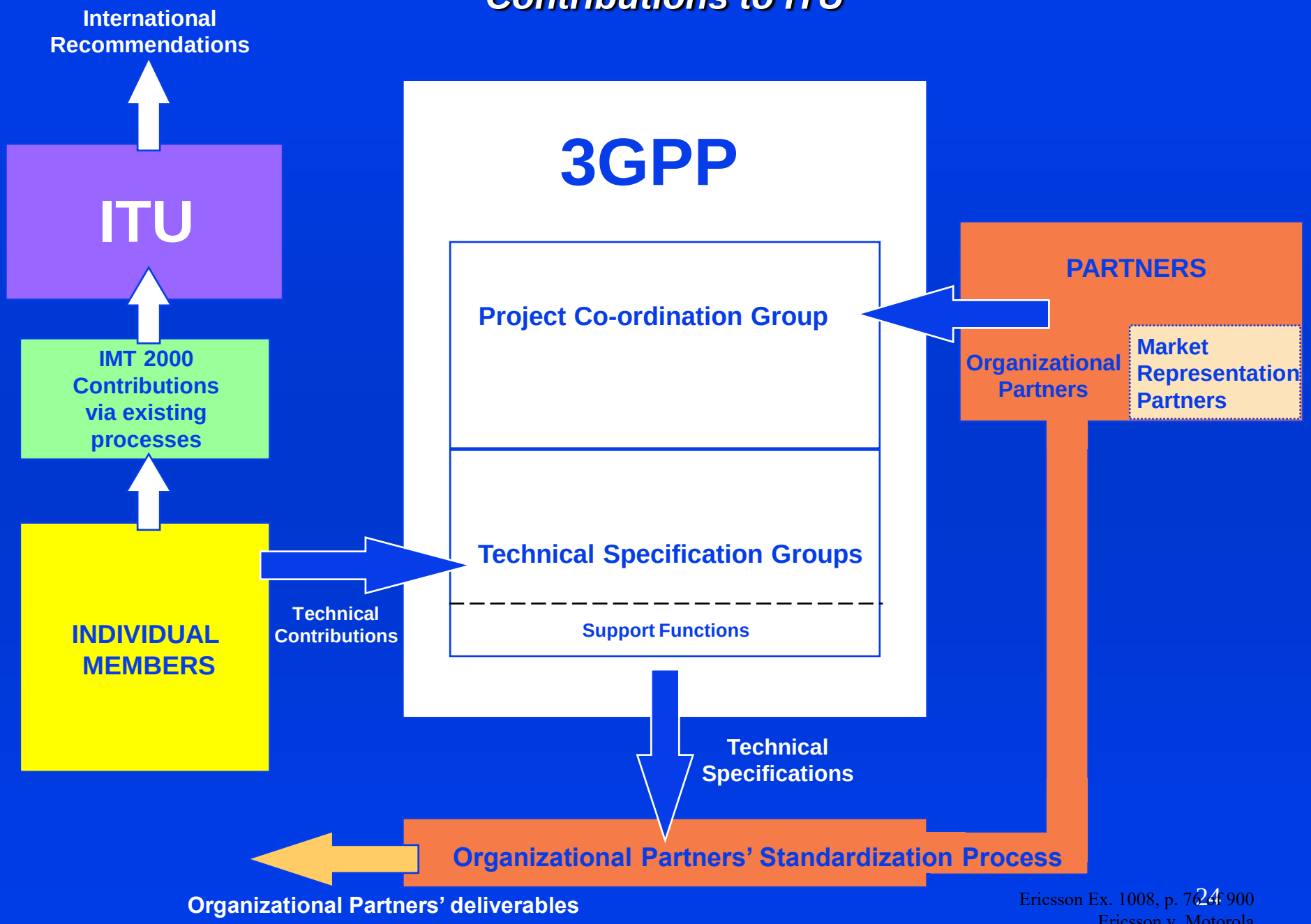
## *Ownership of the Partnership Project results*

**The Organizational Partners of 3GPP will have joint ownership (including copyright) of the Technical Specifications.**



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# Contributions to ITU






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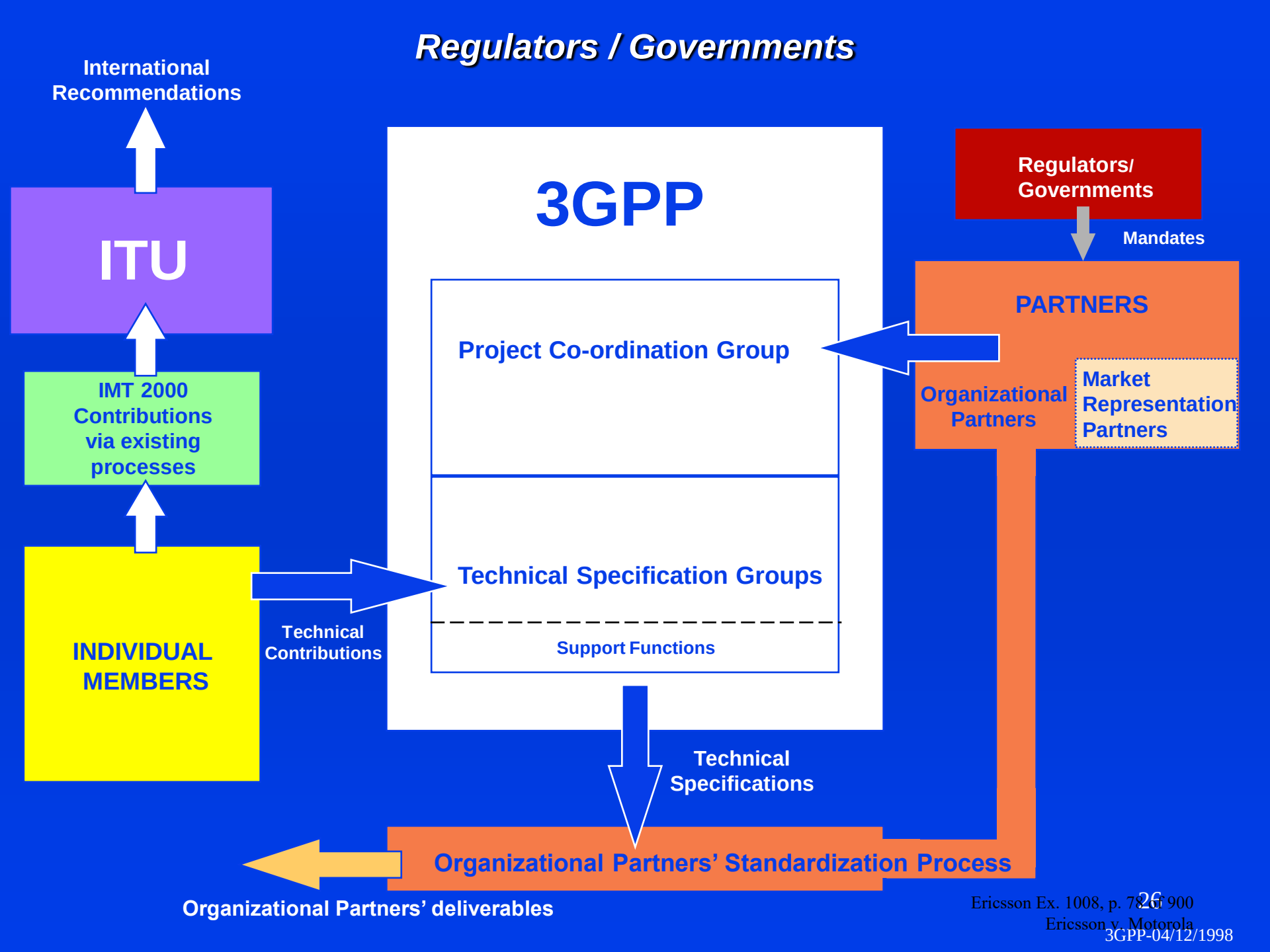
## *Submission of 3GPP results to ITU*

**3GPP will not contribute directly to the ITU.**

**Formal contributions to ITU Study Groups are made by ITU members following existing national/regional processes.**



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## *National / regional regulatory requirements*

**Variations imposed by national / regional regulatory requirements will be included in the Technical Specifications as defined by the Technical Specification Groups.**



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## *Resource requirements for establishing 3GPP*

**ETSI will absorb the initial cost of establishing the 3GPP, if required.**

**Thereafter, the costs will be shared by the Organizational Partners. There will be no direct 3GPP membership fee for Individual Members.**

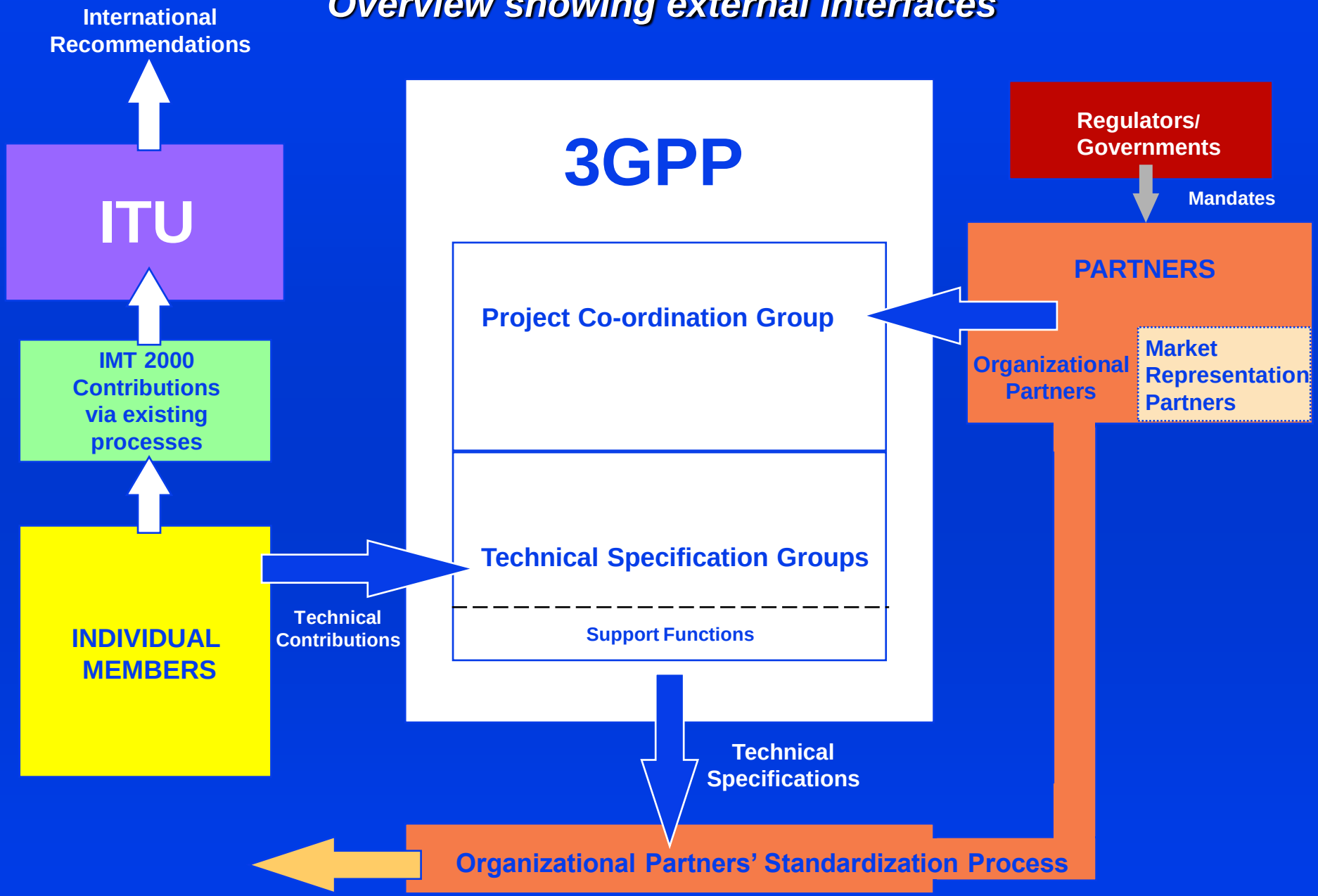
**Partners and Individual Members may provide support functions to the extent that they are able (eg hosting of meetings and provision of Secretariat support).**

**The longer term financial requirements are for further study.**



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# Overview showing external interfaces






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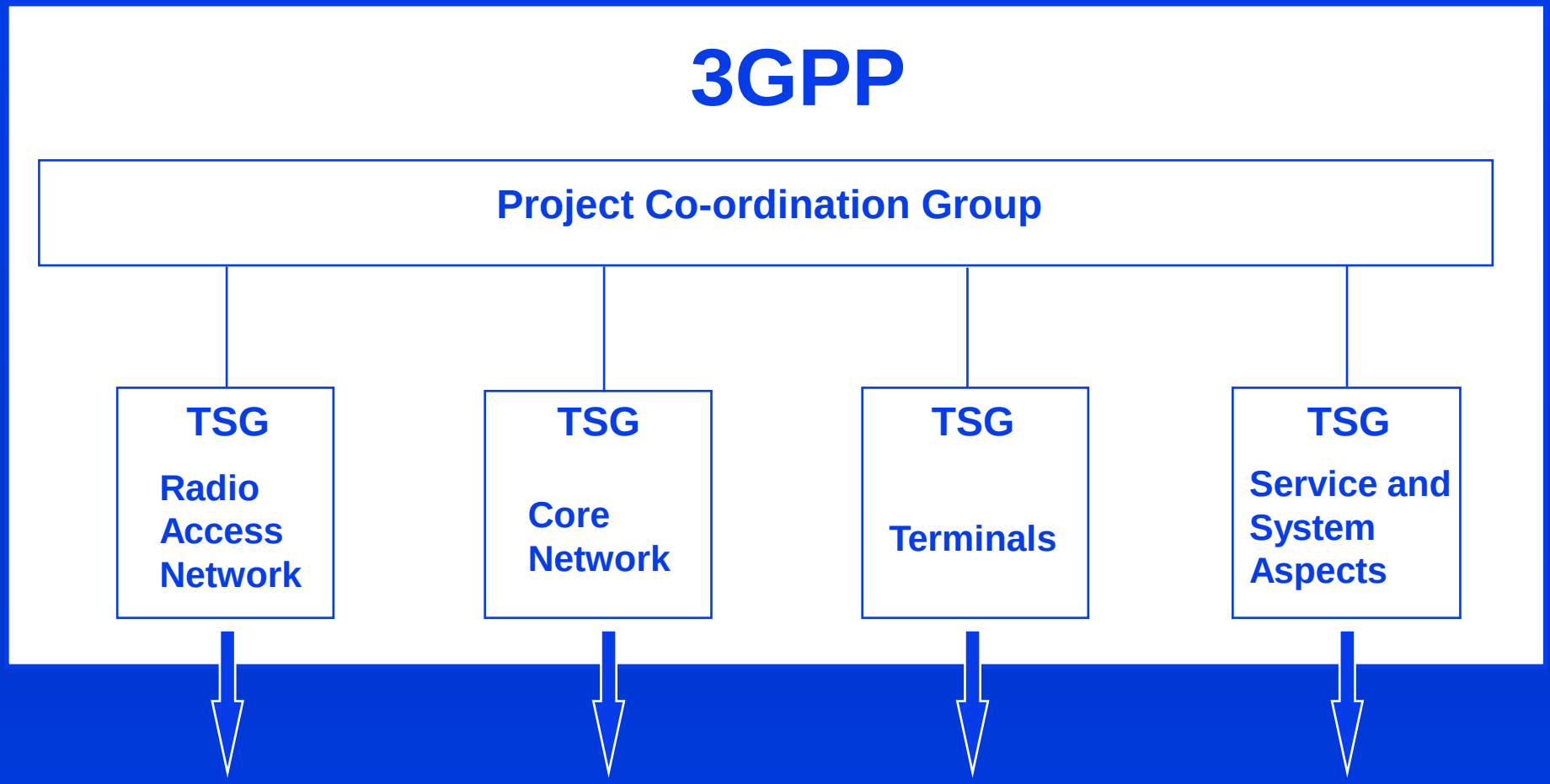
# *Internal structure of 3GPP (1)*

**3GPP consists of a Project Co-ordination Group (PCG) and Technical Specification Groups (TSGs).**

**To assist in the co-ordination of the technical activities, the TSGs are encouraged to meet at the same time and place, as and when appropriate (e.g. twice per year).**


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# *Internal structure of 3GPP (2)*






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## *Work areas to be covered by the Radio Access Network TSG*

- **Radio Layer 1 specification**
- **Radio Layer 2 specification**
- **Radio Layer 3 RR specification**
- **Iub specification**
- **Iur Interface**
- **Iu Interface**
- **UTRAN O&M requirements**
- **Base station radio performance specification**
- **Conformance test specification for testing of radio aspects of base stations**
- **Specifications for radio performance aspects from the system point of view**


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## *Work areas to be covered by the Core Network TSG*

- **Mobility management, call connection control signalling between the user equipment and the core network**
- **Core network signalling between the core network nodes. the signalling supports functionality such as user location information, subscription information and control of network services**
- **Definition of interworking functions between the core network and external networks**
- **Packet related questions such as mapping of QoS ( e.g. transparency for IP domain applications, general for bearer types, special for optimized applications such as Voice over IP)**
- **Core network aspects of the Iu interface**
- **Core network O&M requiremnents**


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## *Work areas to be covered by the Terminal TSG*

- **Service capability protocols**
- **Messaging**
- **Services end-to-end interworking**
- **USIM to Mobile Terminal interface**
- **Model/framework for terminal interfaces and services (application) execution**
- **Conformance test specifications of terminals, including radio aspects**


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# *Work areas to be covered by the Service and System Aspects TSG*

- **Service capabilities**
  - **Definition of services and feature requirements**
  - **Development of service capabilities and a service architecture for cellular, fixed (and cordless) applications**

- **Stage one and two descriptions for:**
  - **Charging and accounting**
  - **Network Management**
  - **Security Aspects**

- **Architecture**
  - **Definition, evolution, and maintenance of overall architecture, including assignment of functions to particular sub-systems and identification of key information flows**
  - **In co-operation with other TSGs, define required services, service capabilities and bearer capabilities offered by the different sub-systems**

- **Codec aspects**
  - **Principles for definition of end-to-end transmission**
  - **Definition, evolution and maintenance of relevant specifications**

- **Project co-ordination**
  - **High level co-ordination of the work performed in other TSGs and monitoring of progress**


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# *Primary responsibilities of PCG and TSGs (1)*

**The primary responsibilities of PCG, TSGs and Organizational Partners are given in the following tables:**

| | Function | Org Partners collectively | PCG | TSGs |
|---|---|---|---|---|
| 1 | Approval of new Partners for 3GPP | X | | |
| 2 | Approval of Organizational Partner funding requirements and contributions | X | | |
| 3 | Allocation of human and financial resources provided by Partners to PCG | X | | |
| 4 | Allocation of resources to TSGs | | X | |
| 5 | Allocation of resources within TSGs | | | X |


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# *Primary responsibilities of PCG and TSGs (2)*

| | Function | Org Partners collectively | PCG | TSGs |
|---|---|---|---|---|
| 6 | Allocation of voluntary human and financial resources by Market Representation Partners and Individual Members | | X | X |
| 7 | Handling of appeals from Individual Members on procedural matters | 2nd step | 1st step | |
| 8 | Handling of appeals from Individual Members on technical matters | | 2nd step | 1st step |
| 9 | Determine overall time frame and manage overall work progress | | X | |



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# *Primary responsibilities of PCG and TSGs (3)*

| | Function | Org Partner collectively | PCG | TSGs |
|---|---|---|---|---|
| 10 | Detailed time frame and manage detailed work progress | | | X |
| 11 | Approval of Technical Specifications | | | X |
| 12 | Proposal and approval of work items within the agreed scope and terms of reference | | | X |
| 13 | Final adoption of work items within the agreed scope and terms of reference | | X | |
| 14 | Management of work items | | | X |


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# *Primary responsibilities of PCG and TSGs (4)*

| | Function | Org Partners collectively | PCG | TSGs |
|---|---|---|---|---|
| 15 | Technical Co-ordination (System Aspects TSG will play a role here) | | | X |
| 16 | Appointment of Org Partners meeting Chairman (provided by host on a rotational basis) | X | | |
| 17 | Appointment of PCG Chairman (for one year term) | | X | |
| 18 | Election of TSG Chairman and Vice Chairmen | | | X |
| 19 | Creation of TSGs and approval of their terms of reference | X | | |


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# *Primary responsibilities of PCG and TSGs (5)*

| | Function | Org Partners collectively | PCG | TSGs |
|---|---|---|---|---|
| 20 | Creation of TSG working groups and approval of their terms of reference | | | X |
| 21 | Election of TSG Working Group Chairmen and Vice Chairmen | | | X |
| 22 | Confirmation of individual member participation rights | X | | |
| 23 | Approval of 3GPP scope and terms of reference | X | | |
| 24 | Maintain Partnership Project Agreement, Project Description and Working Procedures (consensus agreement by all Partners) | X | | |


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# *Participation rights in PCG and TSGs*

**The following have a right to participate in the PCG:**

- **Representatives of participating Organizational Partners**
- **Representatives of participating Market Representation Partners**
- **Chairman and Vice Chairmen of the TSGs, as ex-officio members**

**The following have a right to participate in the TSGs :**

- **Representatives of members of participating Organizational Partners (i.e. Individual Members)**
- **Representatives of participating Organizational and Market Representation Partners**


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## *Principles for decision making within 3GPP*

**Decision making within PCGs**

- **By consensus amongst the Organizational Partners**
- **By vote amongst the Organizational Partners in unavoidable cases**

**Decision making within TSGs**

- **By consensus amongst the Individual Members**
- **By vote amongst the Individual Members in unavoidable cases**

**The Organizational Partners will conduct a fairness review of the decision making process six months after 3GPP start-up, taking into account all concerns raised**

**(Note: voting will not be permitted on National/Regional regulatory requirements)**


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# *Principles for voting within TSGs*

**The following principles will be applied for voting within the TSGs**

- **One "Individual company Member", one vote**
- **Organizational Partners to interpret " Individual company Member" according to its own rules of membership**
- **The PCG will maintain a register of eligible voters for the TSGs**
- **Each Individual Member may carry the proxy for up to five other Individual Members**



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# *Working language for 3GPP*

**The working language for 3GPP shall be English**

- **Meetings of the PCG and TSGs shall be conducted in English**
- **3GPP Technical Specifications shall be prepared in English**



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## *Relationship with other groups*

**3GPP will establish and maintain good relationships with groups working on standards for other IMT-2000 family members.**



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## *Intellectual Property Rights (IPR) Principles (1)*

**The Individual Members of 3GPP are bound by the IPR Policies of their respective Organizational Partner.**

**Individual Members are encouraged to declare at the earliest opportunity, any IPRs which they may have and believe to be essential, or potentially essential, to any work ongoing within 3GPP.**

**After comparing their respective IPR policies, ARIB, ETSI, T1, TTA and TTC have agreed that their IPR policies share common principles are quite similar and have agreed on the following additional principles to maximize the success of 3GPP.**


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## *Intellectual Property Rights (IPR) Principles (2)*

(i) **To encourage their respective members' declaration of willingness to grant licences on fair, reasonable terms and conditions on a non-discriminatory basis, and consistent with the respective Organizational Partners' IPR policies.**

(ii) **To encourage their respective members who may have IPR which they believe to be essential, or potentially essential, and are unwilling to license such IPR, that early indication of such unwillingness be provided to their respective Organizational Partners.**

(iii) **To understand that essential IPRs mean essential IPRs relative to any or all parts of the content of the 3GPP technical specifications.**

(iv) **A mechanism for exchanging information associated with the patent statement among the Organizational Partners will be introduced so that such information may be used when adopting relevant standards in each Partner Organization.**


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# Appendix 3

# Introducing 3GPP



The 3rd Generation Partnership Project (3GPP) unites seven telecommunications standard development organizations (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC), known as “Organizational Partners” providing their members with a stable environment to produce the Reports and Specifications that define 3GPP technologies.

3GPP specifications cover cellular telecommunications technologies, including radio access, core network and service capabilities, which provide a complete system description for mobile telecommunications. The 3GPP specifications also provide hooks for non-radio access to the core network, and for interworking with non-3GPP networks

## The Project’s Scope

The original scope of 3GPP (1998) was to produce Technical Specifications and Technical Reports for a 3G Mobile System based on evolved GSM core networks and the radio access technologies that they support (i.e., Universal Terrestrial Radio Access (UTRA) both Frequency Division Duplex (FDD) and Time Division Duplex (TDD) modes).

The scope was subsequently amended to include the maintenance and development of the Technical Specifications and Technical Reports for evolved 3GPP technologies, beyond 3G.

- The latest 3rd Generation Partnership Project Agreement (Annex 42).
- The discussions that led to the signing of the 3GPP Project Agreement were recorded in a series of slides called the “Partnership Project Description” that describes the basic principles and ideas on which the project is based. The document has not been maintained since its first creation, but the principles within do still remain valid.



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## Organizing the work

The 3GPP Working Procedures are the rule book of 3GPP, with sections covering:

- Description, Purpose, Scope and objectives
- Participation
- Structure
- Partners' collective responsibilities
- Project Coordination Group (PCG)
- Technical Specification Groups (Incl. Elections)
- Work Programme & technical co-ordination
- Deliverables (Technical Specifications and Technical Reports)
- Reporting

The 3GPP production of specifications and studies (TRs) are contribution-driven, by member companies, in Working Groups and at the Technical Specification Group (TSG) level. The Technical Specification Groups in 3GPP are:

- Radio Access Networks (RAN)
- Services & Systems Aspects (SA)
- Core Network & Terminals (CT)

The Working Groups, within the TSGs, meet regularly and come together for their quarterly TSG Plenary meeting, where their work is presented for information, discussion and approval. The last meeting of the week of TSG Plenary meetings is TSG SA, which also has responsibility for the overall coordination of the technical work and for the monitoring of its progress.

## Generational Approach

The 3GPP technologies from these groups are constantly evolving through Generations of commercial cellular / mobile systems (see table below). With LTE and 5G work, 3GPP has become the focal point for the vast majority of mobile systems beyond 3G.

Although these Generations have become an adequate descriptor for the type of network under discussion, real progress on 3GPP standards is measured by the milestones achieved in particular Releases. New features

are 'functionality frozen' and are ready for implementation when a Release is completed. 3GPP works on a number of Releases in parallel, starting future work well in advance of the completion of the current Release. Although this adds some complexity to the work of the groups, such a way of working ensures that progress is continuous & stable.

## Backward Compatibility

The major focus for all 3GPP Releases is to make the system backwards and forwards compatible where possible, to ensure that the operation of user equipment is uninterrupted.

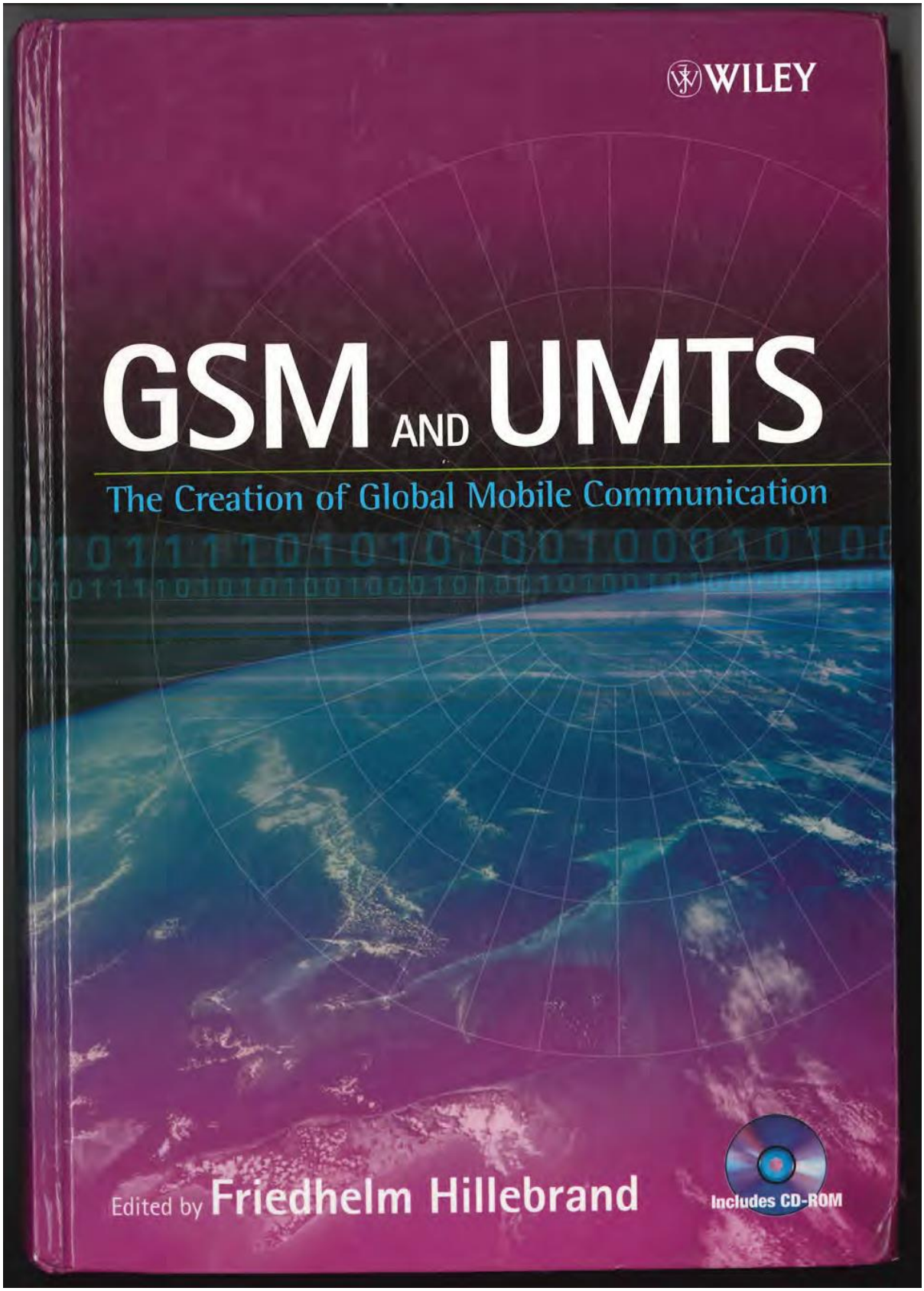
For 5G, many operators are starting with dual connectivity between LTE and 5G NR equipment – using the 'Non-Standalone' work completed early in Release 15. In the process of completing the early drop of 5G NR care has been taken to build 'forward compatibility' into Non-Standalone NR equipment, to ensure that it will be fit for use on Standalone 5G NR systems.

For details of the contents of each Release, see the appropriate 'Release Description' document or go to our dedicated Release page.

Details of all 3GPP Work Items are in the 3GPP Work Plan, which provides details of the cooperation between all of the 3GPP groups on "Features", defined as 'new or substantially enhanced functionality which represents added value to the existing 3GPP system'.

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# Appendix 4






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# GSM and UMTS

## The Creation of Global Mobile Communication

Edited by

**Friedhelm Hillebrand**
*Consulting Engineer, Germany*

With contributions from 37 key players involved in the work for GSM and UMTS



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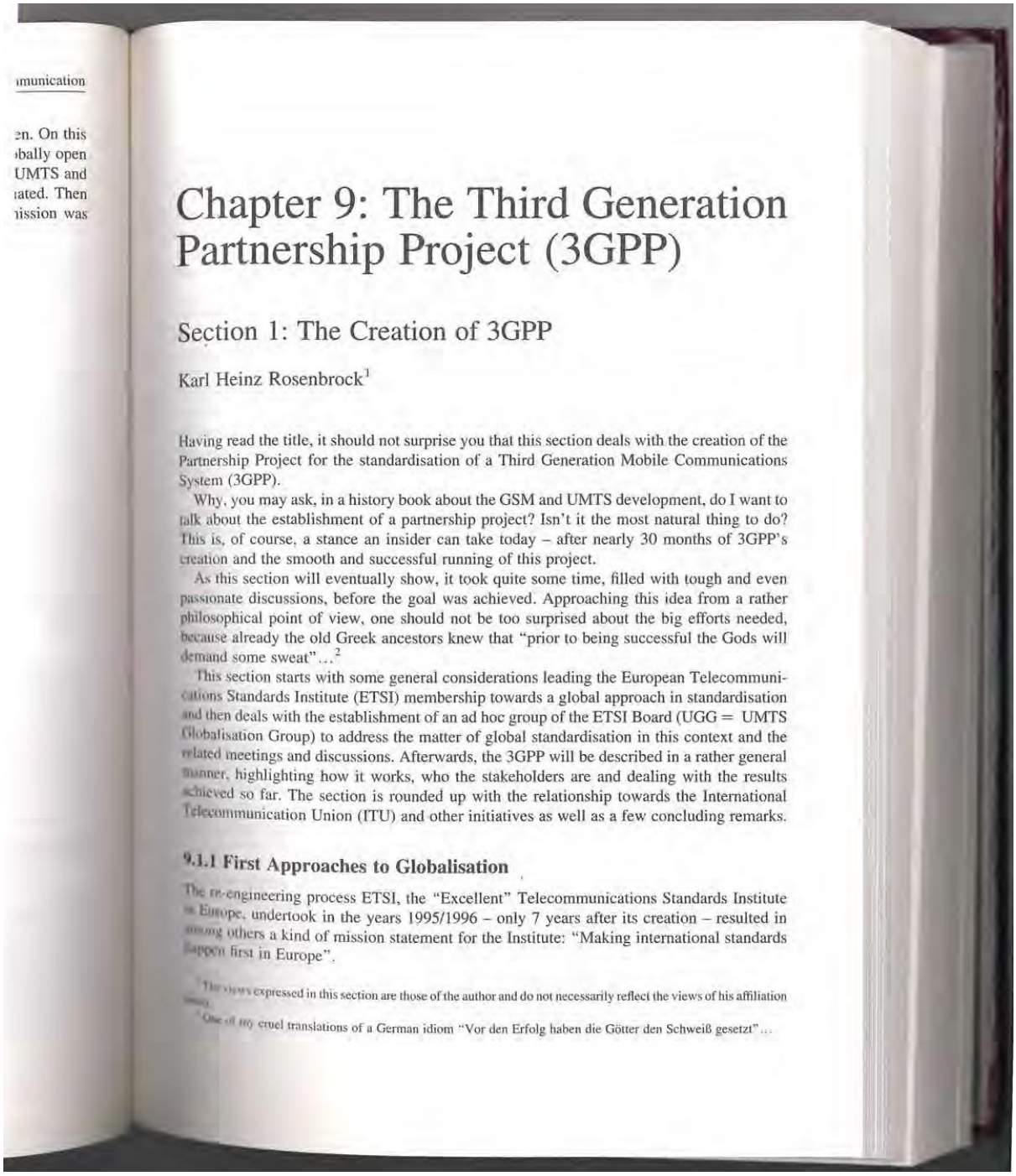
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# Chapter 9: The Third Generation Partnership Project (3GPP)

## Section 1: The Creation of 3GPP

Karl Heinz Rosenbrock[1]

Having read the title, it should not surprise you that this section deals with the creation of the Partnership Project for the standardisation of a Third Generation Mobile Communications System (3GPP).

Why, you may ask, in a history book about the GSM and UMTS development, do I want to talk about the establishment of a partnership project? Isn't it the most natural thing to do? This is, of course, a stance an insider can take today – after nearly 30 months of 3GPP's creation and the smooth and successful running of this project.

As this section will eventually show, it took quite some time, filled with tough and even passionate discussions, before the goal was achieved. Approaching this idea from a rather philosophical point of view, one should not be too surprised about the big efforts needed, because already the old Greek ancestors knew that "prior to being successful the Gods will demand some sweat"...[2]

This section starts with some general considerations leading the European Telecommunications Standards Institute (ETSI) membership towards a global approach in standardisation and then deals with the establishment of an ad hoc group of the ETSI Board (UGG = UMTS Globalisation Group) to address the matter of global standardisation in this context and the related meetings and discussions. Afterwards, the 3GPP will be described in a rather general manner, highlighting how it works, who the stakeholders are and dealing with the results achieved so far. The section is rounded up with the relationship towards the International Telecommunication Union (ITU) and other initiatives as well as a few concluding remarks.

### 9.1.1 First Approaches to Globalisation

The re-engineering process ETSI, the "Excellent" Telecommunications Standards Institute in Europe, undertook in the years 1995/1996 – only 7 years after its creation – resulted in among others a kind of mission statement for the Institute: "Making international standards happen first in Europe".

[1] The views expressed in this section are those of the author and do not necessarily reflect the views of his affiliation [illegible].

[2] One of my cruel translations of a German idiom "Vor den Erfolg haben die Götter den Schweiß gesetzt"...



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- unanimously requested the ETSI Board (through its UMTS Globalisation Group) to complete the negotiations with potential partners and to oversee the creation of the Partnership Project;
- unanimously requested the ETSI Board to agree and maintain on behalf of ETSI the final versions of the Partnership Project Description, the Partnership Project Working Procedures, and the Partnership Project Agreement;
- unanimously authorised the director-general to sign the Partnership Project Agreement.

#### 9.1.2.4.14 Happy End in Copenhagen

It was in Copenhagen where the last 3GPP preparatory meeting with all six OPs took place on 2–4 December 1998.

Here, the final fine-tuning of the 3GPP documentation was achieved. In addition, the 3GPP agreement[8] was signed (in a nice framework provided by the host, TeleDenmark) by the following OPs: ARIB, ETSI, T1, TTA, and TTC.

Unfortunately, the partners from CWTS (China) were not authorised to sign the 3GPP agreement yet. Furthermore, owing to the fact that the UMTS Forum was unable to participate in Copenhagen, they were prevented from co-signing the 3GPP agreement as a first Market Representative Partner (MRP).

During that Copenhagen meeting, another discussion ensued about the role the MRPs should play. Finally, it was concluded that the high competence of MRPs should be used in order to identify market requirements, thus enabling 3GPP standardisation to meet the needs of the market. An MRP is an organisation invited by the OPs to participate in 3GPP with the objective of offering market advice to 3GPP and to bring into 3GPP a consensus view of market requirements.

### 9.1.3 What is 3GPP?

The 3GPP is a global standardisation initiative created in December 1998. Its task was to develop a complete set of globally applicable Technical Specifications for a third generation (3G) mobile telecommunications system based on the evolved GSM core network and an innovative radio interface known as UTRA. The Project is based on a concept devised by ETSI aimed at facilitating better co-operation between regional standards organisations, fora and other industry groupings. 3GPP is a collaborative activity between officially recognised SDOs, with the participation of other industry groups and individual members.

Partnership in 3GPP is open to all national, regional or other SDOs, irrespective of their geographical location – within the project the participating SDOs are referred to as OPs. The OPs may invite MRPs to participate: these may be any organisation from anywhere in the world that can offer market advice to 3GPP and bring a consensus view of market requirements that fall within the project's scope. Individual membership is open to companies and organisations within the communications industry that are active members of one of the OPs. The truly global nature and the breadth of the market interest in the task of specifying this 3G system is evident from the identity of the 3GPP partners (see further in sub-paragraph 9.13.2) and all agree that 3GPP is proving a highly successful initiative.

[8] The 3GPP Agreement and the 3GPP Project Description can be found on the attached CD-ROM in



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The 3GPP has no legal status. Ownership (including copyright) of the specifications and reports it produces is shared between the partners. The 3GPP process includes a conversion (transposition) of the project's output into official standards and reports by one or more of the OPs.

The specifications being prepared by 3GPP are evolved in part from the enormously successful GSM standard, which is currently (February 2001) serving over 400 million subscribers in more than 140 countries. Building on this massive installed base, the system being specified by 3GPP will be an attractive upgrade path for existing operators and users. It also has an assured compatibility with GSM – good news for both operators and users who are unable, or unwilling, to upgrade to 3G.

Paramount among the 3GPP specifications is the definition of UTRA, the innovative radio access technology that is the key to the new system's high data rates and dramatically improved performance. UTRA is spectrum-efficient and supports FDD and TDD modes. This interface has been accepted by ITU as a member of the IMT-2000 family – or more correctly, as *two* family members: IMT-DS, the FDD mode; and IMT-TC, the TDD mode. IMT-2000 family membership requires the ability for users to roam globally and seamlessly, which implies interoperability with other family members: 3GPP thus co-operates closely with the 3GPP2 project which is specifying another family member, a 3G CDMA system based on an evolution of the ANSI-41 architecture.

### *9.1.3.1 How Does 3GPP Work?*

3GPP has been designed to minimise delays and inefficiencies. As a result, it has a "flat" organisational structure and a large degree of distributed autonomy. Overall project planning and co-ordination is the responsibility of the PCG, with input primarily from the OPs, guided by the MRPs. It is mainly at this level that regulatory requirements, provided by the telecommunications administrations and governments around the world, are taken into account.

The development of the specifications is performed by TSGs and their subordinate working groups. Here, the main participation is by technical experts from the individual members of the OPs. Individual members in their capacity as ITU members are also responsible for carrying the results of the 3GPP work to the ITU.

At the time of the creation, 3GPP had structured around four principal aspects of the 3G system being defined as TSGs:

- TSG CN: core network
- TSG RAN: radio access network
- TSG SA: services and systems aspects
- TSG T: terminals

Each TSG is authorised to develop and approve specifications and reports within its scope, and TSG SA also has a role of co-ordinating the work of the TSGs at a more detailed level than the PCG. The result is a process that is able to rapidly produce and approve specifications and reports in response to the needs of the market, although it is important to note that the deliverables do not have a formal status until they have been transposed by one or more of the OPs.

The formal status is necessary for regulatory and other purposes in the various regions, and all the OPs have committed themselves to complete this process rapidly. Each OP will apply



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its own procedures, appropriate to their respective regions. As the official European SDO within 3GPP, ETSI recognises the 3GPP output as ETSI Technical Specifications and ETSI Technical Reports without a need for any further endorsement within the Institute. This means that the 3GPP documents are published – within a matter of a few weeks – as identical text directly as ETSI deliverables. In addition, ETSI is transposing, i.e. adapting, a few of the initial 3GPP specifications into ENs for specific European regulatory requirements. This is happening in parallel with the publication of the initial Technical Specifications and will not impede the implementation of 3G in Europe.

#### 9.1.3.1.1 Electronic Working

3GPP has taken a leading role in changing the traditional ways of standards making. A very heavy dependence is now placed on electronic working, both outside and within meetings, advancing a trend that started in ETSI a year or two ago. This means that paper copies of draft documents have been almost entirely eliminated, saving time and expense, and making a significant contribution to the environment.

Given that 3GPP has participants from all over the world, the use of the Internet, e-mail exploders and other such facilities have proved invaluable for distributing and sharing information, working drafts and so on. Delegates to meetings had already become used to downloading working documents from the Internet and having updates to the documents distributed in meetings on CD-ROM. But in recent months, in meetings around the world participants have experienced the benefits of a local area network (LAN) solution as the latest step in improving working methods. ETSI's headquarters premises already have LANs in all its meeting rooms, but most other venues currently rely on temporary LANs (wired or radio), using equipment and support kindly donated by individual members.

Such facilities permit delegates to access all the meeting documents electronically from their laptop computers. As a result, the huge burden of producing paper copies (as many as 10 000 pages per delegate for some meetings) can be eliminated. Delegates can access new documents as soon as they are available, rather than having to wait for paper copies to be made or for the documents to be distributed by other means, such as diskette or CD-ROM.

#### 9.1.3.1.2 Project Support

For administrative and support purposes the 3GPP Partners have established a Mobile Competence Centre (MCC) which is hosted by ETSI at its premises in Sophia Antipolis, Southern France. The MCC was created in March 1999 to provide support not only to the 3GPP but also to ETSI's own studies in mobile technologies. A full description of MCC including the financing is given in Chapter 15, Section 3.

### *9.1.3.2 Who are the Stakeholders in 3GPP?*

3GPP has attracted a very strong commitment from organisations and companies around the world, reflecting the truly global nature of the project. There are currently six OPs (in alphabetical order):

- The Association of Radio Industries and Businesses (ARIB), Japan



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being TD-SCDMA, proposed by CWTS. A similar group, 3GPP2, is preparing the cdma2000 specifications, UWC-136 TDMA specifications are being developed principally by UWCC, and DECT specifications are defined by a set of ETSI standards (Figure 9.1.1).

Since the UWCC and ETSI are both partners in 3GPP (as an MRP and OP respectively), there is direct liaison between the Project and these two sources of specifications for other IMT-2000 family members.

When 3GPP and 3GPP2 were created it was felt that the interests of each group were sufficiently different to require them to remain separate but here again many of the OPs and MRPs are common to both groups, so there are natural channels for information exchange. Particular instances of formal co-operation between the groups were the two joint 3GPP-3GPP2 workshops held in 1999 to address the "Hooks and Extensions" issue aimed at ensuring interworking between the respective technologies.

In addition to all this, the 3GPP TSGs and their working groups are encouraged to liase directly with relevant technical bodies within the Project as well as among the Partners.

### 9.1.6 Conclusions

The attentive reader, and let's assume that you are one, may still be astonished to learn what big efforts have been necessary in order to establish 3GPP.

In the meantime, i.e. in the course of year 2000 nearly the whole work of the former ETSI TC SMG has been incorporated into 3GPP, to a large extent within the new TSG GERAN.

Well, our Japanese friends were not happy about this shift because they feared that it could result in delays in the 3G introduction in their country. They accepted this because a separate TSG for the GSM work was created.

Trying to recall the heated discussions within ETSI about the scope of 3GPP from 1998, one has to admit that such a move would have been violently rejected by a lot of ETSI members, maybe even by the majority. Using a philosophic approach, one can, of course, state that time helps healing (even wounds).

Today, i.e. February 2001, we can conclude from ETSI's point of view that all standardisation work related to further evolution of the second generation mobile system, i.e. GSM, and to UMTS is being done well within 3GPP. Thus, the objective to avoid parallel work within ETSI TBs and 3GPP has been fully achieved.

The ability of organisations and individuals around the world to co-operate and make available a full set of stable, agreed 3GPP specifications in 1 year is a remarkable achievement, one that is unprecedented in the world of standardisation. 3GPP meetings have taken place in many parts of the world, emphasising the strong commitment of the SDOs from China, Europe, Japan, Korea and the US. The MRPs have also lent very strong support to the work. Thanks to this widespread and determined commitment it has been possible to meet the very aggressive targets for 3G.

But Release 99 was only the first step – the workload has continued to intensify this year, as the initial specifications are refined and many new ones added, opening the path to full, seamless, global 3G services, changing forever the way that people communicate.

In the meantime, 3GPP has changed the designation of the releases and dropped to mention the year in order to avoid irritations and wrong expectations. Release 99 was first established in December 1999 and got its maturity in the course of year 2000. In 2000, more than 5700 change requests were implemented. The next big event will be Release #4 as a result of the



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series of TSG meetings scheduled for March 2001 in Palm Springs, US. This will obviously result in a further stabilisation and extension of the UMTS specifications.

3GPP is running very well. The individual members from the six OPs seem to be very satisfied with this arrangement – and the production line is in full swing.

Without exaggeration, one can give 3GPP the attribute of a success story. One may quote again here Mr Ed Roney who even addressed the 3GPP concept – prior to its realisation – as a "paradigm shift".

As the results of the GSM and UMTS related standardisation work represent a great part of ETSI's deliverables, it might be justified to note here that during the year 2000, ETSI published more than seven new deliverables each working day (Monday through Friday), i.e. one deliverable per hour!

Further information may be found on the 3GPP website at http://www.3gpp.org.



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# Chapter 9: The Third Generation Partnership Project (3GPP)

## Section 2: UMTS in 3GPP (December 1998–May 2001)

Niels Peter Skov Andersen[1]

### 9.2.1 A Change of Environment

In the period 1982 until end of 1998 the work on the GSM standard, and in the later part of the period on UMTS, had been performed in the same environment, starting under CEPT and later transferred into ETSI. The Technical Committee GSM, during this period renamed to SMG, and its working groups (Sub Technical Committees) had continuously existed and evolved. The same was the case for the working methods and procedures used within the work. Over time with the success of the GSM system more and more interested parties became involved in the work including parties from outside the original CEPT area. However, this was all a relatively slow evolution and no major revolutions in the organisation or the working methods occurred in this period.

After all these years of continuity in the work the discussions around the creation of 3GPP and the decision to establish 3GPP for the initial phase of UMTS[2] naturally created some uncertainty amongst the members of SMG. Especially the resulting split of the GSM standardisation, with the responsibility for the GSM core network transferred to 3GPP, but the responsibility for the GSM radio access Network maintenance remained in ETSI in SMG. This caused some concern amongst many delegates. Also the internal structure for the technical work within 3GPP was different from the well-known structure in SMG. SMG was based on a technical plenary with a number of working groups (SMG1, SMG2, ..., SMG12) performing the detailed technical work. The SMG plenary was the approving authority for the results of the work performed by the working groups. Also the plenary was the group responsible for approval of all new work items and the content of the releases. The structure for the work in 3GPP, as agreed by the partners, was quite different. The project

[1] The views expressed in this section are those of the author and do not necessarily reflect the views of his affiliation company.

[2] The term UMTS is throughout this section used to keep consistency of terminology with the other chapters and sections. The term UMTS do not appear in the in 3GPP agreement, which defines the system as a third generation mobile system based on an evolved GSM core network and UTRAN (including UTRAN (FDD and TDD modes)).



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was organised with four equal Technical Specification Groups (TSGs), who had complete autonomy for their area of responsibility, i.e. they were responsible for approval of new work items and final approval of deliverables. The four technical groups originally defined were:

| | |
|---|---|
| TSG CN | Responsible for the core network development |
| TSG-RAN | Responsible for the radio access network based on UTRAN (FDD and TDD modes) |
| TSG-SA | Responsible for services and system aspects |
| TST-T | Responsible for Terminal and UIM |

In addition to the technical groups the 3GPP organisation has a Project Coordination Group (PCG). However, the role of this PCG cannot be compared to the role the SMG plenary played. The SMG plenary was an open technical group with the approving authority in all technical questions including approval of new work items. The 3GPP PCG is a closed group with a defined membership consisting of a limited number representative of each of the partners (SDOs, MRPs) and the leadership (chairman and two vice-chairmen) of each TSG. Thus as a closed group the role of the PCG becomes more like a board overlooking the overall well being of the project.

This structure made many long-term SMG delegates concerned about how the overall coordination of the project could be ensured. This new structure was not introduced to overcome known deficits of the SMG organisation, but in my opinion, by political considerations to ensure than no single individual, individual member, organisational partner could obtain a controlling position in the project.

### 9.2.2 The First Two TSG Meetings

The inauguration meeting of the 3GPP TSGs was held in December 1998 in Sophia Antipolis, France. In the process of creation of 3GPP this was the first time that the 3GPPs real work force – the technical experts – met. The main objectives for this first meeting was to get the work started. One of the elements of the meeting was a presentation from the different partners on the status of their work on the third generation mobile system, the work, which they now were in the process of handing over to 3GPP.

Listening to the presentations and the discussions during the breaks it was very obvious that the background for standardization amongst the delegates was quite different. As an example, I remember that during the coffee break just after I, as chairman of ETSI SMG2, had presented the status of the UMTS radio work in ETSI, and had ended my presentation by stating that the UMTS radio work would only be on the agenda of one more meeting of ETSI SMG2. This was in order to complete the documentation to be handed over to 3GPP and then the work on UMTS radio in ETSI would cease, a small group of non-ETSI delegates came to me and asked "if all work on UMTS radio in ETSI ceases, how do the Europeans then co-ordinate their views on 3GPP?" Coming from the ETSI SMG background this was a completely unexpected question, as the working procedures for 3GPP were very similar to those of ETSI, it was clear to me that the contributions to 3GPP in general should come from the individual members – the companies, regulators etc. – in their own name and not as regional contributions. I explained this, but I also understood that for delegates with a background in international standardization from, e.g. ITU this was the normal way of thinking. During the



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# Annex 2: Organisation Evolution of the Technical Groups

## Section 3: 3GPP

Adrian Scrase[1]

### A2.3.1 December 1998 to Mid-1999

During the preparatory talks that led to the creation of 3GPP, many discussions took place to find the optimum organizational structure. The ETSI TC SMG model had worked well for many years and it was very tempting to adopt a similar structure and just widen the sphere of participation. However, some voices called for a more radical approach in order to streamline the structure and to reduce the time taken for specifications production. As a result of these discussions, the following key principles were established on which 3GPP was structured:

- Minimum number of hierarchical levels;
- Large degree of distributed autonomy;
- Clear separation of technical activities from political and administrative activities.

When 3GPP was created, four Technical Specification Groups (TSGs) were formed to undertake the preparation of technical specifications. The four TSGs were as follows:

- TSG CN – core network
- TSG RAN – radio access network
- TSG SA – services and system aspects
- TSG T – terminals

Each of the TSGs was authorized to develop and approve specifications and reports within its terms of reference. This represented a departure from the more traditional approach where a single entity (i.e. a plenary) within a project has the authority to approve a project's output. It was believed that by distributing the approval authority, the time taken to produce specifications would be reduced since this effectively removes one level of hierarchy from the approval procedure. However, it was apparent from the outset that distributing the approval of specifications would lead to a greater requirement for technical co-ordination and thus TSG SA was tasked to perform a co-ordination role across all TSGs. This co-ordination role

[1] The views expressed in this section are those of the author and do not necessarily reflect the views of his affiliation entity.



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# Appendix 5



# Third Generation Partnership Project

# 3GPP

## Working Procedures

20 October 2016

# Foreword

These Working Procedures of the Third Generation Partnership Project (3GPP) are effective from 31 December 2014.

An electronic version of these Partnership Project Working Procedures is available from the following address:

http://www.3gpp.org

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# SECTION A: GENERAL

## Article 1: Description

The Partnership Project is not a legal entity but is a collaborative activity between the following recognized Standards Development Organizations:

ARIB (Japan)

CCSA (China)

ETSI (Europe)

ATIS (US)

TTA (Korea)

TTC (Japan)

TSDSI (India)

The Partnership Project is entitled the "THIRD GENERATION PARTNERSHIP PROJECT" and may be known by the acronym "3GPP".

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## Article 2: Purpose

The purpose of 3GPP is to prepare, approve and maintain globally applicable Technical Specifications and Technical Reports for

- a 3rd Generation Mobile System based on the evolved GSM core network, and the Universal Terrestrial Radio Access (UTRA),
- further development of radio technologies such as LTE, coupled with evolution of core network elements such as the Evolved Packet Core (EPC),
- continuing evolution of the 2nd generation GSM/EDGE Radio Access Network (GERAN),

to be transposed by the Organizational Partners into appropriate deliverables (e.g., standards).

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## Article 3: Scope and objectives

The 3rd Generation Mobile System and its capabilities shall be developed in a phased approach. Initially, 3GPP shall prepare, approve and maintain the necessary set of Technical Specifications and Technical Reports for a 3rd Generation Mobile System including:

- UTRAN (including UTRA; in Frequency Division Duplex (FDD) and Time Division Duplex (TDD) modes);
- 3GPP Core Network (Third Generation networking capabilities evolved from GSM. These capabilities include mobility management, global roaming, and utilisation of relevant Internet Protocols);
- Terminals for access to the above (including specifications for a UIM); and
- System and service aspects.

3GPP shall prepare, approve and maintain the necessary set of Technical Specifications and Technical Reports for:

- the Global System for Mobile communication (GSM) including GSM evolved radio access technologies (e.g., General Packet Radio Service (GPRS) and Enhanced Data rates for GSM Evolution (EDGE)).

3GPP shall consider the long term evolution.

The Technical Specifications and Technical Reports shall be developed in view of global roaming and circulation of terminals.

The set of 3GPP Technical Specifications and Technical Reports for the 3GPP core network and the specifications for the GSM core network should be common to the greatest extent possible and should not be unnecessarily different.

Options in the form of a regulatory requirement particular to one or more regions / nations shall be included in 3GPP specifications. TSGs should not debate the inclusion or rejection of such options.

The results of the 3GPP work shall form the basis of member contributions to the ITU in accordance with existing procedures.

3GPP shall take account of emerging ITU recommendations on interworking between IMT-2000 family members.

In the framework of agreed relationships, the 3GPP Technical Specifications and Technical Reports will form the basis of standards, or parts of standards, of the Organizational Partners.

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# SECTION B: PARTICIPATION

## Article 4: Categories

Participation in 3GPP shall be classified into one of the following categories:

- Partners;
- Individual Members;
- ITU Representatives;
- Observers;
- Guests.

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## Article 5: Partnership

Partners in 3GPP shall be classified into one of the following two categories:

- Organizational Partners;
- Market Representation Partners.

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## Article 6: Organizational Partnership

Organizational Partnership is open to any Standards Organization, irrespective of its geographical location, which has:

- a national, regional or other officially recognized status and the capability and authority to define, publish and set standards within the 3GPP scope, in that nation or region;
- an Intellectual Property Rights (IPR) Policy which is compatible with those of the Organizational Partners;
- committed itself to all or part of the 3GPP scope;
- signed the Partnership Project Agreement.

Standards Organizations may apply to become an Organizational Partner by writing to any of the existing Organizational Partners.

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# Article 7: Market Representation Partnership

The Organizational Partners may invite Market Representation Partners to take part in 3GPP.

An invitation for Market Representation Partnership is open to any organization, irrespective of its geographical location, which:

- has the ability to offer market advice to 3GPP and to bring into 3GPP a consensus view of market requirements (e.g., services, features and functionality) falling within the 3GPP scope;
- does not have the capability and authority to define, publish and set standards within the 3GPP scope, nationally or regionally;
- has committed itself to all or part of the 3GPP scope;
- has signed the Partnership Project Agreement.

Organizations may apply to become Market Representation Partners by writing to any of the existing Partners. Further guidance for MRP applicants can be found in annex E.

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# Article 8: Individual Membership

Membership in an Organizational Partner is a pre-requisite for Individual Membership of 3GPP. All entities registered as members of an Organizational Partner and eligible for participation in the technical work of that Organizational Partner, can become Individual Members of 3GPP if they are committed to support 3GPP and:

- to contribute technically or otherwise to one or more of the Technical Specification Groups within the 3GPP scope;
- to use the 3GPP results to the extent feasible.

An Individual Member has the right to participate in the work of 3GPP by attending meetings of the Technical Specification Groups and subtending groups.

Applications for Individual Membership of a Technical Specification Group shall be made in writing to the relevant Organizational Partner using the form given at annex C. Applications may also be made on-line using the template available at http://www.3gpp.org.

Individual Members act in 3GPP in their own right and carry the full responsibility for their contributions.

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## Article 9: Termination of Individual Membership

Individual Membership of 3GPP may be terminated by dissolution, abolition, resignation or expulsion from the related Organizational Partner.

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## Article 10: Observers and Guests

The status of Observer may be granted by the Organizational Partners to an entity which has the qualifications to become a future Partner.

An Observer may send a single representative to an Organizational Partners or PCG meeting. An Observer may also have representatives at TSG meetings. Representatives of Observers may receive documents and contribute documents for information, but shall not submit documents that propose changes to the specifications, reports, work item descriptions, work plan, or any other document under the control of the TSG. Observers shall not take part in decision making or hold any leadership positions.

Additional participation rights of an Observer shall be decided by the Organizational Partners on a case-by-case basis.

The status of Guest may be granted for a limited period, by the Organizational Partners to an entity which has the qualifications to become a future Individual Member. The limited period shall be decided by the Organizational Partners on a case-by-case basis.

A Guest may have representatives at TSG and subtending group meetings. Representatives may receive documents but shall not take part in decision making, participate in discussions, contribute documents, or hold any leadership positions.

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# SECTION C: STRUCTURE

## Article 11: Structure of 3GPP

3GPP shall consist of a Project Co-ordination Group (PCG) and Technical Specification Groups (TSGs). The Technical Specification Groups may establish Working Groups if required.

The Organizational Partners may decide to call a meeting of the full 3GPP membership if required.

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# SECTION D: PARTNERS' COLLECTIVE RESPONSIBILITIES

## Article 12: Organizational Partners' Collective Responsibilities

The Organizational Partners shall determine the general policy and strategy of 3GPP.

In addition the Organizational Partners shall perform the following tasks:

- approval and maintenance of the 3GPP scope;

- maintenance the Partnership Project Description;
- taking decisions on the creation or cessation of Technical Specification Groups, and approving their scope and terms of reference;
- approval of Organizational Partner funding requirements;
- allocation of human and financial resources provided by the Organizational Partners to the Project Co-ordination Group;
- acting as a body of appeal on procedural matters referred to them;
- conduct compliance training at least annually for elected leadership, relevant Support Team personnel and interested parties on best practices to follow to
  - avoid issues with respect to antitrust/competition laws and regulations;
  - fulfil his or her leadership or support role with impartiality and in the interests of 3GPP.

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## Article 13: Collective responsibilities of all Partners

Organizational Partners and Market Representation Partners shall perform the following tasks:

- maintenance of the Partnership Project Agreement;
- approval of applications for 3GPP partnership;
- taking decisions relating to the dissolution of 3GPP.

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# SECTION E: PROJECT CO-ORDINATION GROUP (PCG)

## Article 14: PCG tasks

The PCG shall perform the following tasks:

- appointment of PCG Chairman and Vice Chairmen;
- allocation of human and financial resources provided by Organizational Partners to TSGs;
- allocation of voluntary human and financial resources provided by Market Representation Partners and Individual Members;
- management of the 3GPP Support Team;
- handling of appeals from Individual Members on procedural matters referred to them;
- propose and approve modifications to the Partnership Project Working Procedures;
- handling of appeals from Individual Members on technical matters referred to them;
- determination of the overall time frame and manage overall work progress;
- final adoption of new and stopped work items proposed by the TSGs within the agreed 3GPP scope and objectives;

- when a work item is outside the scope of the 3GPP, and where a common global solution is desired, recommend how to achieve a global solution;
- appointment or dismissal of TSG Chairmen and Vice Chairmen, as proposed by TSGs based on election results. (The proposed candidate shall be appointed unless there are extraordinary reasons that prevent such an appointment, e.g., severe company or geographical imbalance within 3GPP. In such cases the TSG shall be requested to elect an alternative candidate. The decision not to appoint a candidate shall be made by consensus.);
- authorizing requests from the TSGs for approval to liaise with external organizations, and maintain a list of approved requests;
- maintenance of the register of Individual Members eligible to participate in 3GPP;
- maintenance of the register of IPR declarations relevant to 3GPP, received by the Organizational Partners.

The PCG may decide to call a meeting of the full 3GPP membership if required.

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# Article 15: PCG participation

The following shall have a right to participate in the PCG:

- Typically, a maximum of five representatives of each Organizational Partner (not counting the Chairman and Vice-Chairmen);
- A maximum of three representatives of each Market Representation Partner. (MRPs are however urged to limit their participation to one representative wherever possible.);
- The Chairmen and Vice Chairmen of the TSGs as ex-officio members;
- A maximum of three ITU representatives;
- One representative of each Observer.

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# Article 16: PCG appointment of Chairman and Vice Chairman

The PCG shall appoint their Chairman and Vice Chairmen from amongst the Organizational Partner representatives.

The Chairman and Vice Chairmen shall be appointed for a one year term of office.

The Chairman and Vice Chairmen shall normally serve one term of office. If no other candidates are available, the Chairman or Vice Chairmen may be appointed for a further term.

Successive Chairmen and Vice Chairmen should not be from the same Organizational Partner, the same region or from the same group of companies, unless no other candidate is available.

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# Article 17: PCG Chairman and Vice Chairman Responsibilities

The PCG Chairman is responsible for the overall management of the co-ordination work within 3GPP.

The Chairman has the overall responsibility to ensure that the Partnership Project Agreement, Partnership Project Description and Partnership Project Working Procedures are followed.

The Chairman may nominate officials to assist in the work.

The Chairman may be assisted by the Support Team.

The Chairman may delegate tasks to the Vice Chairmen.

In performing their leadership role, the Chairman and Vice Chairmen shall maintain impartiality and act in the interests of 3GPP.

At the commencement of each meeting of the PCG, the group shall be reminded that:

(i) compliance with all applicable antitrust and competition laws is required; and

(ii) the leadership will conduct the meeting with impartiality and in the interests of 3GPP.

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## Article 18: PCG meetings

A meeting of the PCG shall be held at least twice per year.

At least thirty days before the due date, a calling notice, draft agenda and supporting documents shall be issued.

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## Article 19: PCG decision making

In any meeting of the PCG, the quorum required for decision making shall be 50% of the total number of Organizational Partners. Proxies shall not be permitted.

The PCG shall endeavour to reach consensus on all issues. The views and opinions of the Market Representation Partners and the Chairmen and Vice Chairmen of the TSGs shall be taken into account during the consensus building process. If consensus cannot be achieved, the Chairman can decide to take a vote. The vote may exceptionally be performed by a secret ballot if decided by the PCG.

Each Organizational Partner shall have one vote. A proposal shall be deemed to be approved if 71% of the votes cast are in favour. Abstentions or failure to submit a vote shall not be included in determining the number of votes cast.

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# SECTION F: TECHNICAL SPECIFICATION GROUPS

## Article 20: TSG tasks

The TSGs shall prepare, approve and maintain the 3GPP Technical Specifications and Technical Reports taking into account the market requirements provided by Market Representation Partners.

The TSGs shall also perform the following tasks:

- Propose to the PCG for appointment TSG Chairman and Vice Chairmen based on election results;
- Creation of TSG Working Groups and approval of their terms of reference;
- When a new Working Group is created, the appointment of TSG Working Group Convenor;

- Allocation of resources within the TSG;
- Allocation of voluntary human and financial resources provided by Market Representation Partners and Individual Members;
- Handling of appeals from Individual Members on technical matters;
- Preparation of a detailed time frame and management of detailed work progress;
- Management of work items;
- Technical Co-ordination;
- Proposal and approval of work items within the agreed scope and terms of reference of the TSG;
- Where a work item is outside the scope of the 3GPP, but a common global solution is desired, recommend an approach to the PCG;
- Assignment of work to Partners. (Specification development may be accomplished using various methods, including the assignment of work to Partners.);
- Maintenance of the list of Individual Members eligible to vote within the TSG (Voting Members).

top

# Article 21: TSG participation

The following shall have a right to participate in the TSGs:

- Representatives of members of participating Organizational Partners (i.e. Individual Members);
- Representatives of Organizational Partners;
- Representatives of Market Representation Partners;
- Representatives of Observers;
- Representatives of Guests.

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# Article 22: TSG and WG election of Chairman and Vice Chairman

## 22.1 TSG elections

Regular TSG elections shall be held every two years in the first semester of odd numbered years.

The TSG Chairman and Vice Chairmen shall be elected by the Technical Specification Group from amongst the Individual Member representatives. Each TSG shall elect a maximum of three Vice Chairmen.

A candidate for election to a TSG Chairman or Vice Chairman position shall provide a letter of support from the Individual Member that he/she represents. The support letter from the Individual Member shall indicate that the candidate will avail or has availed themselves of 3GPP supplied antitrust and competition law training in order to comply with all applicable antitrust/competition laws and regulations while acting in his or her capacity as TSG Chairman or Vice Chairman.

Nominations may be made up to the point when an election takes place.

The Chairman and the Vice Chairmen shall be elected for a two year term of office. The Chairman and Vice Chairmen may offer themselves for election for a second consecutive term. The term "consecutive" is taken to mean terms one after the other without another person being elected to the position in the interim. Exceptionally, they may offer themselves for further consecutive terms, subject to the following:

- A two week deadline that expires at noon Central European Time on the Friday which falls between 20 and 14 days prior to the first day of the meeting at which elections are due to be held shall be established.
- A Chairman is not permitted to stand for another consecutive term if another candidate is announced via the 3GPP web site or via the relevant 3GPP email reflector prior to this deadline.
- A Chairman is not permitted to stand for another consecutive term until after this deadline.
- A Vice Chairman is not permitted to stand for another consecutive term in a Vice Chairman position for which there is a candidate announced via the 3GPP web site or via the relevant 3GPP email reflector prior to this deadline.
- A Vice Chairman is not permitted to stand for another consecutive term until after this deadline. If, by the deadline, the number of candidatures is less than the number of Vice Chairman positions, then any incumbent Vice Chairman may put forward his candidature.

There is no restriction on a Vice Chairman whose term of office is due to expire offering himself for the position of Chairman; neither is there any restriction on a Chairman whose term of office is due to expire offering himself as a Vice Chairman. There is no restriction of a retiring Chairman or Vice Chairman of one TSG offering himself for election as either Chairman or Vice Chairman of any other TSG (or WG).

Should the office of Chairman or Vice Chairman of a TSG become vacant for reasons other than expiration of term of office, a special election shall be conducted to fill the unexpired term. This special election shall be conducted at a meeting of the TSG, and shall be announced in the agenda according to the provisions of article 32.

When such a special election is held to fill the office of Chairman, and one or more of the Vice Chairmen of the TSG intends to stand for election to that position, the announcement shall also indicate that there will be an election to fill the position of Vice Chairman in the event that a Vice Chairman be elected to the office of Chairman. If at the special election the Vice Chairman is elected to the office of Chairman, that individual shall become Chairman immediately, and, the position of Vice Chairman thus being vacant, an election shall be held for the office of Vice Chairman.

Similarly, if an incumbent Chairman intends to stand for election to the position of Vice Chairman, the same applies, with the necessary changes to the text above.

If a Chairman or Vice Chairman changes the Individual Member that he/she represents (e.g., job change, merger or acquisition) during his/her term of office, a new letter of support shall be provided. In order to provide a new letter of support, a Chairman or Vice Chairman may request a grace period allowing their term to be extended the lesser of 6 weeks or until the day before the next scheduled regular term (e.g., every 2 years) election. Although the term is extended, under the rules of article 22, the chair or vice-chair can only chair meetings when representing an Individual Member. This rule continues to apply during the grace period. If the change of company affiliation is due to a move to another company, then the decision for the Chairman or Vice Chairman to continue in office to the end of the present term shall be made by consensus of the TSG. If consensus cannot be achieved, a special election shall be held for the office. The incumbent Chairman or Vice Chairman is permitted to offer their candidacy in a special election even if they have held the position for 2 terms or more.

The term of office for a Chairman or Vice Chairman elected at a special election is a partial term lasting until the end of the current term. If a new Chairman or Vice Chairman is elected at a special election then the partial term of office does not count towards the two consecutive term limit. If the previous Chairman or Vice Chairman is re-elected at a special election then the entire term (of two parts) is considered as a single term and does count towards the two consecutive term limit.

Chairman and Vice Chairmen should not be from the same region, Organizational Partner, or from the same group of companies, unless no other candidate is available.

Successive Chairmen should not be from the same Organizational Partner, the same region or from the same group of companies, unless no other candidate is available. This does not apply to special elections or to regular elections for a second or subsequent consecutive term of office .

When a new TSG is established, the Organizational Partners shall appoint a convenor for the first two TSG meetings. The election for TSG Chairman and Vice Chairmen shall take place at the second TSG meeting. If the election takes place other than at the normal time for TSG elections (see above), the elected Chairman and Vice Chairman shall serve until the next regular TSG election. This partial term of office does not count towards the two consecutive term limit. The provisions of this paragraph may be overridden by consensus of the PCG where a new TSG is formed by the merger of existing TSGs; under these circumstances, the PCG shall establish a set of ad hoc rules for the creation of the new TSG.

Following election by the TSG, the TSG Chairman and Vice Chairmen shall be appointed by the PCG on the proposal of the TSG.

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## 22.2 WG elections

The provisions concerning the election of WG Chairmen and Vice Chairmen shall be as for TSG Chairmen and Vice Chairmen as defined in 22.1 above, changing TSG to WG wherever TSG is mentioned, with the following differences.

Each WG shall elect a maximum of two Vice Chairmen.

WG elections shall be held when the corresponding terms of office expire or when an existing Chairman or Vice Chairman resigns. WG elections need not be synchronized within the WG (i.e. elections for Chairman and each Vice Chairmen may occur at different times), across different WGs of the same or other TSGs, nor with the regular TSG elections.

WG Chairmen and Vice Chairmen are always elected for a period of two years (and not, as is the case with special elections in TSGs, for the unexpired period of the present term of office). An exception to this is where the previous Chairman or Vice Chairman is re-elected in the special election. In this case the Chairman or Vice Chairman continues for the unexpired period of the present term of office.

Note: For this reason, elections for WG Chairmen and Vice Chairmen are likely to become spread over a period of time, rather than being grouped like the TSGs' regular elections.

When a new WG is established, the parent TSG is responsible for appointing a convenor for the first two meetings.

Following election by the WG, the Chairman and Vice Chairman hold office immediately, without need of appointment by TSG or PCG.

top

# Article 23: TSG and WG Chairman and Vice Chairman responsibilities

The TSG Chairman is responsible for the overall management of the technical work within the TSG and its Working Groups. The Chairman has an overall responsibility to ensure that the activities of the TSG follow the Partnership Project Working Procedures.

The WG Chairman is responsible for the overall management of the technical work within the WG and its sub-groups.

The Chairman may nominate officials to assist in the work.

The Chairman may delegate tasks to the Vice Chairmen.

The Chairman may be assisted by the Support Team.

The Chairman shall form a Management Team, including the Vice Chairmen and Support Team, in order to assist in discharging his duties.

Recognizing the need to balance the requirement of rapid specification development with the limited resources of delegates, the Chairman should encourage a minimum number of meetings, especially parallel meetings, and maximize the use of electronic means to advance the work.

In performing their leadership role, the Chairman and Vice Chairmen shall maintain impartiality and act in the interests of 3GPP.

At the commencement of each meeting of a TSG or WG, the group shall be reminded that:

(i) compliance with all applicable antitrust and competition laws is required;

(ii) timely submissions of work items in advance of TSG or WG meetings are important to allow for full and fair consideration of such matters; and

(iii) the leadership will conduct the meeting with impartiality and in the interests of 3GPP.

top

# Article 24: TSG and WG Chairman and Vice Chairmen dismissal

A secret ballot shall be taken for the proposal to dismiss a TSG or WG Chairman or Vice Chairman because of a failure to effectively perform their duties, if requested by 30% of the TSG or WG membership list. 71% of the votes cast are required to recommend dismissal.

The PCG shall dismiss a Chairman or Vice Chairman on the proposal of the TSG.

top

# Article 25: TSG and WG decision making

TSGs and WGs shall endeavour to reach consensus on all issues, including decisions on Technical Specifications and Technical Reports. Informal methods of reaching consensus are encouraged (e.g., a show of hands). If consensus cannot be achieved, the Chairman can decide to take a vote. The vote may exceptionally be performed by a secret ballot if decided by the TSG or WG. A vote may be conducted during a TSG or WG meeting or by correspondence.

A proposal shall be deemed to be approved if 71% of the votes cast are in favour. Abstentions or failure to submit a vote shall not be included in determining the number of votes cast.

It is the responsibility of the Chairman to ensure that questions to be voted upon are phrased in a positive yes/no manner, with 71% required to approve the question. Questions should not be phrased as the TSG shall not do something. Examples of appropriate questions are; Shall the TSG approve the Specification and send it to the SDOs? Shall the liaison be approved? Shall the new WI be approved? Shall the existing WI be stopped? If the issue is to choose option A or B, the question should be split into two questions, with the Chairman selecting the order. First, shall the TSG take option A as the way forward? If this question fails the second question is, shall the TSG take option B as the way forward?

Contributions on which decisions will be based should be made available in good time before each meeting. TSGs may establish informal guidelines for dealing with late contributions.

Working Agreements may be used to establish tentative agreements in cases where consensus cannot be obtained. The working agreement process is described in annex G.

top

# Article 26: TSG and WG voting during a meeting

The following procedures apply for voting during a TSG or WG meeting:

- before voting, a clear definition of the issues shall be provided by the Chairman;
- Voting Members shall only be entitled to one vote;

- if a Voting Member has more than one representative present, only one representative may vote;
- each Voting Member may only cast the vote once;
- each Voting Member may carry proxy votes for up to five other Voting Members. All proxy votes shall be accompanied by a letter of authority from the authorising Voting Member. Proxies will not be taken into account when determining the quorum;
- the quorum required for voting during a TSG or WG meeting shall be 30% of the total number of Voting Member companies on the TSG or WG voting list;
- the result of the vote shall be recorded in the meeting report.

For the determination of the quorum, see annex H.

top

# Article 27: TSG or WG voting by correspondence

The following procedures apply for voting by correspondence:

- before voting, a clear definition of the issues shall be provided by the Chairman and disseminated to all on the TSG or WG membership list;
- Voting Members shall only be entitled to one vote;
- each Voting Member may only cast the vote once within the voting period;
- the voting period shall be 30 days;
- there are no quorum requirements;
- The result of the vote should be disseminated to the TSG or WG.

- top

# Article 28: TSG or WG voting for the election of TSG or WG Chairman and Vice Chairman

In the case where there is more than one candidate for TSG or WG Chairman or Vice Chairman, a secret ballot shall be used. For interpreting the result of the secret ballot the following procedure shall apply:

When, in the first ballot, no candidate has obtained 71% of the votes cast, a second ballot shall be held. In the second ballot, in cases where there are only two candidates, the candidate obtaining the higher number of votes is elected. In cases where there are more than two candidates, if none of them has obtained 71% of the votes, a third and final ballot shall be held among the two candidates who have obtained the highest number of votes in the second ballot. The candidate obtaining the higher number of votes in the third ballot is then elected.

The TSG or WG Chairman shall be responsible for the voting process and shall ensure that confidentiality is maintained.

top

# Article 29: TSG or WG appeal process

An Individual Member of 3GPP who opposes a Chairman's ruling on a vote taken within a TSG or WG may submit its case to the PCG for decision. In such cases the Individual Member shall also inform the relevant TSG or WG Chairman.

When a TSG or WG Chairman has made a ruling, his decision shall be taken as the basis for future operations, unless or until overturned by the PCG.

If an Individual Member in a TSG or WG believes that a Chairman or Vice Chairman of any such group is acting without impartiality and not in the interests of 3GPP, such Individual Member may object to such actions within the relevant group, and may request that such objection be recorded in the minutes of the applicable group meeting and it shall be so recorded. The objecting Individual Member may ultimately take its objection to the PCG for consideration. In such cases the Individual Member shall also inform the relevant TSG or WG Chairman.

top

# Article 30: TSG and WG meetings

TSGs and WGs shall meet as necessary to complete their work within the prescribed timeframe. TSGs should endeavour to hold their meetings at the same time and place to assist in the overall co-ordination of the work.

Meeting locations should reflect the geographical diversity of the TSG and WG delegates.

Further information on meetings is given in annex F.

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# Article 31: TSG and WG meeting invitation

The invitation to a TSG or WG meeting and the necessary logistical information should be disseminated as soon as practically possible, taking into account the need to obtain travel documentation. It shall be disseminated at least 28 days before the meeting to all on the TSG or WG membership list.

top

# Article 32: TSG and WG meeting agenda

The draft agenda for a TSG or WG meeting shall be disseminated by the responsible Chairman to all on the TSG or WG membership list at least 21 days before a meeting. The draft agenda should indicate subject matters where voting may be required. The draft agenda shall indicate elections to be held (including known candidates).

top

# Article 33: TSG and WG meeting registration

Every delegate shall register on arrival at each TSG or WG meeting. Each delegate who represents an Individual Member shall declare the precise name of that Individual Member. A delegate may only register to represent one Individual Member.

top

# Article 34: TSG and WG meeting document and file naming

Documents for a TSG or WG meeting shall follow a consistent numbering system as shown in the following example:

**xminnzzzz**

This numbering system has six logical elements:

1) **x**: a single letter corresponding to the TSG;

   where x : **R** (Radio Access Network)

   **N** (Core Network) [TSG closed March 2005]

   **S** (Service and System Aspects)

   **T** (Terminals) [TSG closed March 2005]

   **G** (GSM/EDGE Radio Access Network)

   **C** (Core network and Terminals)

2) **m** A single character corresponding to the Working Group identity (typically 1, 2, 3, etc) or, in the case of the TSG itself, the letter "**P**".

3) **i**: Normally the hyphen character "-". May take on other values depending on the nature of the meeting at which the document is presented, eg the identity of a subgroup.

4) **nn**: two digits to indicate the year, i.e. 99, 00, 01, etc;

5) **zzzz**: unique number of the document

No provision is made for the use of revision numbers. Documents which are a revision of a previous version should indicate the document number of that previous version.

The filename of documents shall be the document number. Documents may be compressed to .Zip files (and thus bear a file extension ".zip"). For example, document **S1-060357** will be contained in file **S1-060357.zip**.

top

# Article 35: TSG and WG Voting Membership List

## 35.1 Voting list

Each TSG and WG shall maintain a list of Individual Members eligible to vote in that group.

The voting list shall be used to establish quorum and for determining those eligible to take part in a vote.

NOTE 1: The term "membership list" has no particular significance in the context of TSG and WG meetings. The term "attendance list" is used for a list of individuals who attend a given meeting representing an Individual Member or other entity entitled to participate in meetings – see annex F.

For the determination of the quorum, see annex H.

top

## 35.2 On creation of new TSG or WG

When a new TSG or WG is formed an Individual Member is added to the voting list at the first meeting at which it is represented, and may vote at the second meeting where it is represented.

Exceptionally, if inadequate notice (less than the period of time given in article 31) had been given for the first meeting of the new group, an Individual Member shall be added to the voting list on its delegate's attending the second meeting (the election meeting) and vote at that meeting even if it had not been represented at the group's first meeting.

Only an Individual Member that had been represented at the group's first meeting may provide a proxy for the second meeting.

top

## 35.3 Established TSGs and WGs

To qualify for the voting list it is necessary for at least one delegate of an Individual Member to attend at least two meetings of the group concerned, without being removed according to the provisions of article 35.4..

An Individual Member having been represented at at least two ordinary meetings of the group has the right to cast a vote by proxy (see article 26). Thus an Individual Member may not cast a vote by proxy during a meeting at which it is not represented unless it had already been represented at two or more qualifying meetings of the group.

top

## 35.4 Removal from and reinstatement to voting list

An Individual Member which is not represented at three consecutive meetings of the TSG or WG shall be removed from the voting list.

The right to vote is reinstated at the second meeting which a delegate of the Individual Member attends without missing the number of consecutive meetings mentioned in the previous paragraph (but see article 35.3 for eligibility to cast a proxy vote).

EXAMPLE 1: If Individual Member Z is represented at meeting K and K+3 (and is thus eligible to vote) but is not represented at meetings K+4, K+5 and K+6, it is removed from the voting list.

EXAMPLE 2: If Individual Member X, not previously having been represented at a meeting of the group, is represented at meetings N and N+3, it may cast a vote at meeting N+3.

NOTE: Individual Member X might choose to cast a vote by proxy at meeting N+3, even though its delegate is physically present. This is sometimes useful for coordinating company positions where one large company has several Individual Memberships, possibly via several different Organizational Partners.

EXAMPLE 3: If Individual Member Y, not previously having been represented at a meeting of the group, is represented at meeting N only, it may not cast a vote by proxy at meeting N+2.

top

## 35.5 Meetings other than ordinary meetings

Any group that wants to call an electronic meeting (audio, video, document distribution by posting or e-mail, etc) may do so, although this works best with smaller groups. Therefore, all electronic meetings are allowed but only ordinary meetings (see annex F) count towards attendance. However, if a meeting is designated as face-to-face, provision of bridge and speakerphone capabilities for those requesting it would be at the discretion of the host. Those participating by speakerphone are not to be counted toward quorum or attendance, and are not allowed to vote.

For the determination of the quorum, see annex H.

top

# Article 36: TSG Sub Working Groups

A Working Group may establish a Sub Working Group (SWG) with defined Terms of Reference. The Working Group shall appoint a SWG Chairman. The SWG shall work by consensus. The meeting notice requirements for a SWG meeting are the same as for TSGs and WGs.

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# SECTION G: WORK PROGRAMME AND TECHNICAL CO-ORDINATION

## Article 37: Work Programme

The 3GPP Work Programme shall consist of Work Items defined by the TSGs.

top

## Article 38: Work Items

A 3GPP Work Item is a specification task defined in terms of the following principal parameters:

- title;
- intended output (i.e. Technical Specifications or Technical Reports);
- impact on other Technical Specifications and Technical Reports;
- technical scope, including the field of application of the intended output;
- impact on other 3GPP Work Items;
- the schedule of tasks to be performed;
- the identities of the supporting Individual Members;
- the identity of the Work Item Rapporteurs.

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## Article 39: Work Item creation

Each proposed new Work Item shall be supported by at least four Individual Members, and their names shall be recorded in the Work Item definition prepared for the TSG approval. One or more persons shall be named as Rapporteur for the proposed Work Item, and the Rapporteur shall act as the prime contact point on technical matters and for information on progress throughout the drafting phases. The supporting Individual Members are expected to contribute to and progress the new work item throughout the drafting phases.

In addition to the above, TSGs shall approve new Work Items, giving all essential parameters. The proposal shall be entered into the 3GPP work programme, clearly marked as a new entry, for which a unique reference identity shall be allocated.

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## Article 40: Work Item adoption by PCG

The 3GPP work programme shall be made available to all Individual Members. A new Work Item shall remain flagged as "new" until the end of the month following the month during which the 3GPP work item was entered into the 3GPP work programme. A new Work Item shall be adopted by the PCG unless a substantial objection is received from an Individual Member or Partner during this period. At the end of the period, the "new" flag shall be removed (even if there is an objection) and it is the responsibility of any objecting Individual Member or Partner to discuss their objections with the TSG Chairman. If it is not possible to resolve the objection, it is the responsibility of the Individual Member or Partner to raise the issue with the PCG.

The TSGs shall ensure that the 3GPP Work Item details are maintained at regular intervals.

top

## Article 41: Work Item stopping

Prior to completion of the intended 3GPP output, the responsible TSG may conclude that a Work Item is no longer required. Any Work Item shall automatically be considered by a TSG for stopping, if no progress has been achieved in a given period of time, typically six months, e.g. due to a lack of contribution. In such cases, the Work Item shall be flagged as "stopped" in the Work Programme. The proposal to stop a Work Item shall be fully justified.

The Work Programme shall be updated accordingly, and shall show the Work Item as "stopped" until the end of the month following the month during which the Work Item was initially flagged.

The Work Item will be stopped by the PCG unless substantial objection is received from an Individual Member during this period. It is the responsibility of any objecting Individual Member to discuss their objections with the TSG Chairman. If it is not possible to resolve the objection, it is the responsibility of the Individual Member to raise the issue with the PCG.

top

## Article 42: Technical co-ordination

The PCG shall be responsible for determining the overall time frame and for managing the overall work progress. The System Aspects TSG shall have a particular responsibility for the technical co-ordination of work being undertaken within 3GPP, and for overall system architecture and system integrity. Problems encountered in performing this technical co-ordination role shall be reported immediately to the PCG.

top

# SECTION H: DELIVERABLES

## Article 43: Deliverable types

3GPP shall prepare, approve and maintain documents known as Technical Specifications and Technical Reports. Such documents shall be drawn up by the TSGs and shall, following approval at that level, be submitted to the participating Organizational Partners to be submitted to their respective standardization processes.

top

## Article 44: Approval process

Approval of Technical Specifications and Technical reports by a TSG shall normally be by consensus.

Where consensus cannot be achieved in the TSG a vote may be taken.

When Technical Specifications and Technical Reports become sufficiently stable, they shall be put under change control of the relevant TSG. The further elaboration of these Technical Specifications and Technical Reports shall be achieved by change requests to be approved by the TSG.

top

## Article 45: Drafting rules

The Technical Specifications and Technical Reports drafted by the TSGs shall follow the 3GPP drafting rules, using document processing facilities, format, languages and notations agreed by the Organizational Partners, and on a medium suited for electronic document handling and publishing.

top

## Article 46: Copyright and ownership

The Organizational Partners will have joint ownership (including copyright) of the Technical Specifications and Technical Reports produced by 3GPP.

top

## Article 47: Conversion by Organizational Partners

Organizational Partners shall use their best endeavours to convert the Technical Specifications and Technical Reports approved by the Partnership Project into national/regional deliverables in a timely manner through their normal processes.

The Organizational Partners are urged not to change the technical parts of the Technical Specifications and Technical Reports; they may add non-technical parts required by their own deliverable schemes and they may add descriptions of options selected.

Organizational Partners should ensure that all unresolved comments raised during their public enquiry and approval phases are delivered to the appropriate TSG.

top

# SECTION I: REPORTING

## Article 48: Chairman’s reporting obligations

A report shall be prepared by the Chairman following all PCG and TSG meetings.

top

## Article 49: Changes to structure and officials

The Chairman of each TSG shall inform the PCG of all organizational changes concerning Working Groups and their officials. An up to date record of the 3GPP structure shall be maintained.

top

## Article 50: Calendar of meetings

The PCG and TSGs shall maintain an up to date calendar of the dates and venues for future meetings.

top

# SECTION J: EXTERNAL RELATIONS

## Article 51: Relationship with the ITU

3GPP results should be submitted to the ITU as appropriate.

For working groups, the following handling of communications toward ITU shall apply:

1 Working groups shall send ITU submissions which are destined to become part of ITU deliverables to their parent TSG for review.

2 Working group communications towards the ITU which are NOT destined to become part of an ITU deliverable must be reviewed by the TSG chairman and the appropriate ITU sector convener (if one exists for the given ITU sector). The working group's TSG chairman and ITU sector convener will determine if such a communication should be sent to the parent TSG for review. If for some reason either the TSG chairman or ITU sector convener is not available, then it is sufficient for the remaining person to review the document and determine if it should be escalated to the TSG or not.

3 If the working group communication does not require TSG review, then it shall be conveyed to the ITU from the WG using one of the mechanisms described below.

For TSGs, the following handling of communications toward ITU shall apply:

1 TSGs shall send ITU submissions which are destined to become part of ITU deliverables to the PCG for review.

2 TSGs communications towards the ITU which are deemed sensitive by the TSG shall be sent to the PCG for review.

3 If the TSG does not judge the communication as sensitive, then it shall be conveyed to the ITU from the WG using one of the mechanisms described below.

To convey a communications towards the ITU, one of the following mechanisms shall be used based upon determination of the sending body (a body may determine a default mechanism).

a) The communication shall be sent from the OPs as a deliverable from their organizations (applicable to PCG reviewed communications only)

b) The communication shall be made by Individual Members who are also members of the ITU. In such a circumstance, the appropriate ITU sector convener will coordinate and handle the administrative matters for the submission. 3GPP Technical Specifications and Technical Reports may be taken as the technical content of such contributions (applicable to PCG reviewed communications or TSG reviewed communications).

c) The communication shall be sent directly from the 3GPP liaison coordinator to the appropriate ITU receiver in the ITU (applicable to TSG reviewed communications or WG reviewed communications).

Representatives of ITU-D, ITU-R and ITU-T are invited to participate in the Project Coordination Group for the efficient coordination and exchange of information.

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## Article 52: Relations with other groups

TSGs and WGs are encouraged to liaise directly with the relevant technical bodies within the 3GPP and Partners as appropriate.

A liaison statement shall clearly communicate what is expected from the receiver, i.e., which parts are for information, which questions are expected to be clarified and by whom (especially if there are multiple receivers), and also when an answer is needed, e.g., when is the next meeting of the group sending the liaison statement.

A TSG or any subtending Working Group may send individual liaisons to any external organization (other than ITU) without PCG approval, except if the statement is considered sensitive by the TSG Chairman, in which case PCG clearance is needed.

It is not necessary to have all external liaisons copied to the PCG and/or TSG SA. The liaison originating TSG should decide, at its own discretion, which should be copied. External liaisons that may have management implications such as schedules, organization, process, procedures, and policy shall be copied to the PCG, or approved by the PCG if sensitive.

Relations with the ITU are described in article 51.

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# SECTION K: MISCELLANEOUS

## Article 53: Resources

The resources for the operation of 3GPP shall be managed by the Organizational Partners. The resources are allocated to the TSGs by the PCG.

top

## Article 54: Support Team

The Partners shall provide logistical support to, and assist in the operation of, 3GPP. The support shall be in the form of a Support Team which shall operate under the overall management of the PCG and the day to day management of TSGs.

top

## Article 55: Intellectual Property Rights (IPR) Policy

Individual Members shall be bound by the IPR Policy of their respective Organizational Partner.

Individual Members should declare at the earliest opportunity, any IPRs which they believe to be essential, or potentially essential, to any work ongoing within 3GPP. Declarations should be made by Individual Members to their respective Organizational Partners.

Organizational Partners should encourage their respective members to grant licences on fair, reasonable terms and conditions and on a non-discriminatory basis.

The PCG shall maintain a register of IPR declarations relevant to 3GPP, received by the Organizational Partners.

top

## Article 56: Working language

The working language for 3GPP shall be English.

Meetings of the PCG and TSGs shall be conducted in English.

3GPP Technical Specifications and Technical Reports shall be prepared in English (as defined by the Shorter Oxford English Dictionary).

top

## Article 57: Duration

3GPP shall be task oriented and on completion of the tasks the future of 3GPP shall be re-considered. The continuation of 3GPP shall therefore be confirmed by the Organizational Partners on an annual basis.

top

## Article 58: Review of activities

An evaluation of the activities of 3GPP should be made by the Organizational Partners at regular intervals.

top

## Article 59: Dissolution, winding up

In the event of a voluntary dissolution of 3GPP, the Partners shall determine the terms of liquidation by consensus. All issues shall be documented and distributed at least 30 days prior to decisions being made.

top

## Article 59A: Exhaustion of appeal procedures

In connection with any claim or dispute of an Individual Member arising from or relating to any activity of any 3GPP meeting or action, including in connection with a TSG or WG meeting, such Individual Member shall, prior to commencing any such legal proceeding against 3GPP, its leadership, support staff, or one or more Organizational Partners in a court, an arbitral panel or other adjudicatory body, exhaust all appeal procedures provided in the 3GPP Working Procedures. Exhaustion of appeal procedures shall be diligently expedited by both the appealing party and the appeal body.

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## Article 60: Amendments to 3GPP Working Procedures

These Partnership Project Working Procedures may only be amended by decision taken by the PCG.

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# Annex A: Definitions

| | |
|---|---|
| Consensus: | General agreement, characterized by the absence of sustained opposition to substantial issues by any important part of the concerned interest and by a process that involves seeking to take into account the views of all parties concerned and to reconcile any conflicting arguments. (Note: consensus need not imply unanimity). |
| Conversion: | The transformation of a 3GPP output document into an Organizational Partners deliverable following the Organizational Partners' recognized processes. |
| Delegate: | An individual taking part in a TSG/WG meeting physically or by electronic means. |
| Drafting Rules: | A document approved by the Organizational Partners providing rules for the drafting of 3GPP Technical Specifications and Technical Reports. |
| Election: | The voting process used to identify an individual from a number of individuals. |
| Guest: | An entity fulfilling the criteria to become a future Individual Member, which has been granted temporary participation rights in the 3GPP |
| Individual Member: | A member of an Organizational Partner having participation rights within that Organizational Partner and which has registered to take part in 3GPP. |
| ITU Representative | Representatives of ITU-D, ITU-R and ITU-T invited to participate in the Project Coordination Group for the efficient coordination and exchange of information. |
| Leadership: | A Chairman, Vice-Chairman, or Convenor of an OP/PCG/TSG/WG/SWG/Ad-Hoc or any other 3GPP meeting. |
| Market Representation Partner: | A Partner invited by the Organizational Partners to participate in 3GPP to offer advice and to bring into 3GPP a consensus view of market requirements. |
| Observer: | An Organization fulfilling the criteria to become a future Partner which has been granted temporary participation rights in 3GPP. |
| Organizational Partner: | A recognized Standards Organization which has been accepted as a Partner in 3GPP. |
| Partner: | An Organizational Partner or a Market Representation Partner of 3GPP. |
| Partnership Project Agreement: | The document signed by 3GPP Partners defining their rights and obligations. |
| Partnership Project Description: | A document which describes the overall structure and operation of 3GPP. |
| Represent: | Attend on behalf of.<br>A person who attends a meeting on behalf of an Individual Member represents that Individual Member. The person is not necessarily employed by that Individual Member, but may be, for example, employed by a subsidiary company in the same group as the represented Individual Member; or the person may be an independent consultant under contract to the Individual Member. "Representation" sometimes influences the eligibility to vote – see article 35 and annexes A and F. |
| Sub Working Group | A subordinate body of a Working Group. |
| Support Team: | A number of persons dedicated to support 3GPP. |
| Technical Report: | A 3GPP output document containing mainly informative elements approved by a Technical Specification Group. |
| Technical Specification: | A 3GPP output document containing normative provisions approved by a Technical Specification Group. |
| Voting Member | An Individual Member who has voting rights within a TSG/WG. |
| Work Item: | The documented record of a specific technical activity of 3GPP. |
| Work Programme: | The documented record of the all technical activities of 3GPP. |

Working Group: A subordinate body of a Technical Specification Group.

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# Annex B: Abbreviations

| | |
|---|---|
| 3GPP | Third Generation Partnership Project |
| ARIB | Association of Radio Industries and Businesses |
| ATIS | Alliance for Telecommunications Industry Solutions (successor to T1) |
| CCSA | China Communications and Standards Association (successor to CWTS) |
| CDMA | Code Division Multiple Access |
| CWTS | China Wireless Telecommunications Standards Group (superseded by CCSA) |
| ETSI | European Telecommunications Standards Institute |
| FDD | Frequency Division Duplex |
| GSM | Global System for Mobile Communication |
| IMT-2000 | International Mobile Telecommunication |
| ITU | International Telecommunication Union |
| MRP | Market Representation Partner |
| PCG | Project Co-ordination Group |
| SWG | Sub Working Group |
| T1 | Standards Committee T1 (superseded by ATIS) |
| TDD | Time Division Duplex |
| TSDSI | Telecommunications Standards Development Society, India |
| TSG | Technical Specification Group |
| TTA | Telecommunications Technology Association |
| TTC | Telecommunication Technology Committee |
| UIM | User Identity Module |
| UTRA | Universal Terrestrial Radio Access |
| UTRAN | Universal Terrestrial Radio Access Network |
| WG | Working Group |

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# Annex C: Individual member application form

**APPLICATION FORM**
for INDIVIDUAL MEMBERSHIP
of the THIRD GENERATION PARTNERSHIP PROJECT
Please complete this form and return it to your Organizational Partner

COMPANY NAME .....

Please indicate below which ORGANIZATIONAL PARTNER you are a member of

| | |
|---|---|
| ARIB | |
| CCSA | |
| ETSI | |
| ATIS | |
| TSDSI | |
| TTA | |
| TTC | |

Please indicate below which Technical Specification Groups you wish to participate in:

| | |
|---|---|
| Radio Access Network | |
| | |
| | |
| Core Network and Terminals | |
| Service and System Aspects | |
| GSM EDGE Radio Access Network (GERAN) | |

Upon your approval as an Individual Member of the Third Generation Partnership Project you agree that you will be bound by the Working Procedures of the Third Generation Partnership Project then in effect and as they may be amended from time to time.

| | |
|---|---|
| Signed by (Authorized Representative) (See Note 1) | |
| Print name | |
| Position | |
| Date | |
| Telephone | |
| Fax | |
| Email | |
| Company Website URL | |

| | |
|---|---|
| Contact person's family name (See Note 2) | |
| Contact person's given name | |
| Job title | |
| Mailing address | |
| Telephone | |
| Fax | |

| | |
|---|---|
| Email | |

Note 1: Is either the official contact person or voting contact of a company.

Note 2: People attending meetings and who can also have signing authority.

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# Annex D: (Void)

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# Annex E: Guidance for MRP applicants

## E.1 Introduction

The conditions for the acceptance of Market Representation Partners (MRPs) in 3GPP are given in article 7 of these Working Procedures. This annex provides additional guidance to MRP Applicants.

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## E.2 Guidance

During the application process, the Organizational Partners will need to be assured that an Applicant:

(a) Has a field of interest directly or indirectly related to the work being undertaken by 3GPP;

(b) Has attained a demonstrable level of recognition within this field of interest;

(c) Has an understanding of the market requirements relevant to 3GPP;

(d) Is willing to actively contribute to the work of 3GPP and has sufficient resources for this purpose;

(e) Fully supports the goals and objectives of 3GPP and does not take part in activities that conflict with these goals and objectives.

In processing an application, the Organizational Partners will peruse openly available documentation published by an Applicant, including material posted on its Website, in order to confirm that the points listed above have been satisfied.

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# Annex F: Guidance on meeting organization

## F.1 Meeting classification

TSG and WG Meetings are classified either:

- ordinary; or
- ad hoc.

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## F.2 Ordinary meetings

Ordinary meetings are ones where the regular business of the TSG or WG is conducted. Such meetings are normally chaired by the Group's chairman or, if unavailable, a vice-chairman. Ordinary meeting should be announced at least six months prior to the opening day of the meeting.

TSG and WG ordinary meetings shall follow an incrementing number sequence. If an additional ordinary meeting is required between two ordinary meetings, the sequence may be preserved, even though this means renumbering subsequent meetings, or the additional meeting may be numbered using the 'bis' suffix as a numbering scheme.

Attendance at an ordinary meeting counts towards an Individual Member's eligibility to cast a vote in the Group (see articles 26 and 27). The Support Team shall record the participation in an ordinary meeting (each person and organization represented) and the attendance list shall be included in the meeting report.

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## F.3 Ad hoc meetings

An ad hoc meeting of a WG or a TSG is one called to address one or more particular topics. The ad hoc meeting shall be called by decision of the WG (or its parent TSG) or TSG concerned; the decision to hold any subsequent ad hoc meetings on the same topic may be made by the ad hoc meeting participants themselves without reference to the parent WG or TSG, although the parent WG or TSG shall review any ad hoc activity at every Ordinary meeting and determine to either continue or to close the ad hoc activity, even if the previous ad hoc meeting suggested a further meeting. The scope of each subsequent ad hoc meeting shall be indicated by the chairman at least 21 days before the meeting. The ad hoc meeting shall not expand or change the scope originally determined by the parent group. An ad hoc meeting is allowed to make decisions only within its pre-defined remit, and any such decisions shall be ratified by the parent WG or TSG unless, in the case of a WG, a decision was previously explicitly delegated by the WG to the ad hoc meeting.

An ad hoc meeting may be chaired as described for an ordinary meeting above, or, with the agreement of the WG or TSG concerned, by a Work Item rapporteur, or other appropriate person. Although open to all 3GPP Individual Members, ad hoc meetings may attract only a subset of Individual Member representatives who would normally participate in ordinary meetings.

Ad hoc meetings shall not be considered when calculating voting rights. That is, attendance at (or absence from) an ad hoc meeting shall not influence voting rights, which are determined solely by attendance at "ordinary" meetings.

No voting shall occur at ad hoc meetings.

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# F.4 Attendance register

## F.4.1 Face to face meetings

A delegate is deemed to have attended a given meeting if the individual confirms his or her participation by signing the attendance list made available by the group's secretary during the meeting. If a delegate does not sign the attendance sheet during the meeting, the secretary shall assume that the individual did not attend.

A delegate, having registered and begun to participate in a meeting, is not allowed to change the organization he represents during the course of that meeting. An individual delegate is not allowed to simultaneously represent two or more Individual Members at a meeting.

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## F.4.2 Electronic meetings

Electronic meetings such as audio / video conferences, email exchanges considered as meetings, etc, are encouraged where appropriate. For such events, the Secretary will establish the attendance list on the basis of those actually participating in the meeting (those dialling in to the conference bridge, those issuing and responding to emails, etc.) Nevertheless, advance registration is strongly encouraged.

Fully electronic meetings are to be considered as "ad hoc" as defined above.

Participation by Individual Member in fully electronic meetings, or electronic participation in a face to face meeting (eg by phoning in) is not considered for the accrual or loss of voting rights.

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# Annex G: Working agreements

"Working agreements" are tentative decisions reached by 3GPP groups in order to make progress on matters where consensus (as defined in annex A) cannot be reached. It is intended to be used in situations where there is a clear majority in favour of one approach, but a small minority has sustained opposition to that approach.

The working agreement process has the following steps:

- Consensus cannot be reached on an issue. A substantial majority of individual members prefer a given approach, but there is sustained opposition by a small minority of individual members, preventing consensus.
- The chair declares a working agreement. The working agreement is documented in the meeting report
- The approach agreed to by the majority and documented in the working agreement can continue unimpeded.
- The working agreement is entered into the 3GPP working agreements page on the 3GPP web site. The window for challenging the working agreement is now open.
- Working agreements may be challenged, resulting in a formal vote. This potential vote would be held at the next meeting of the WG or parent TSG (whichever comes first). If the next meeting is less than 14 days after the establishment of the working agreement, then that meeting is skipped in determining the next meeting. The meeting for potential voting is documented on the 3GPP working agreements page of the 3GPP web site (http://www.3gpp.org/TSG-Working-Agreements).
- The challenge cut-off date is established. This is 7 days before the start of the meeting for potential voting. The cut-off date is documented on the 3GPP working agreements page of the 3GPP web site.
- Organizations wishing to challenge the working agreement may do so until the challenge window closes. A challenge may be made by informing the chair of the group which will do the voting. Any received challenge is documented on 3GPP working agreements page of the 3GPP web site.
- The group which will be voting is informed of the intention to have a working agreement challenge vote and the specific voting question.
- If no challenge is received by the challenge cut-off date, then the working agreement is confirmed. The confirmation of the working agreement is documented on the 3GPP working agreements page of the 3GPP web site. The issue is closed.
- If a challenge is received, then a formal vote on the working agreement will occur at the designated meeting. Voting on working agreements is a standing part of meeting agendas. Voting is as described in articles 25 & 26 of the working procedures.
- If the challenge fails (at least 71% in favour of the working agreement), then the working agreement is confirmed. The confirmation of the working agreement is documented on the 3GPP working agreements page of the 3GPP web site. The issue is closed.
- If the challenge succeeds (less than 71% in favour of the working agreement), then the working agreement fails. All changes which were made based on the working agreement shall be reversed and the group must continue to search for consensus. The overturning of the working agreement is documented on the 3GPP working agreements page of the 3GPP web site.
- Organizations may withdraw a challenge at any time in the process. If the last challenge is withdrawn after the challenge cut-off, then the working agreement is confirmed. The confirmation of the working agreement is documented on the 3GPP working agreements page of the 3GPP web site. The issue is closed.

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# Annex H: Calculation of quorum in TSGs and WGs

Where calculation of a quorum is required in the context of a vote conducted in a TSG or a WG, the quorum shall be deemed to have been met if:

(B – P) / V >= Q

Where:

B is the number of ballot papers issued;

P is the number of proxy votes exercised (i.e. the number of ballot papers issued to delegates bearing authorization to cast votes by proxy);

V is the number of Individual Members having the right to vote at the meeting (including those with only the right to vote “in person” and not by proxy);

Q is the required quorum value given in article 26.

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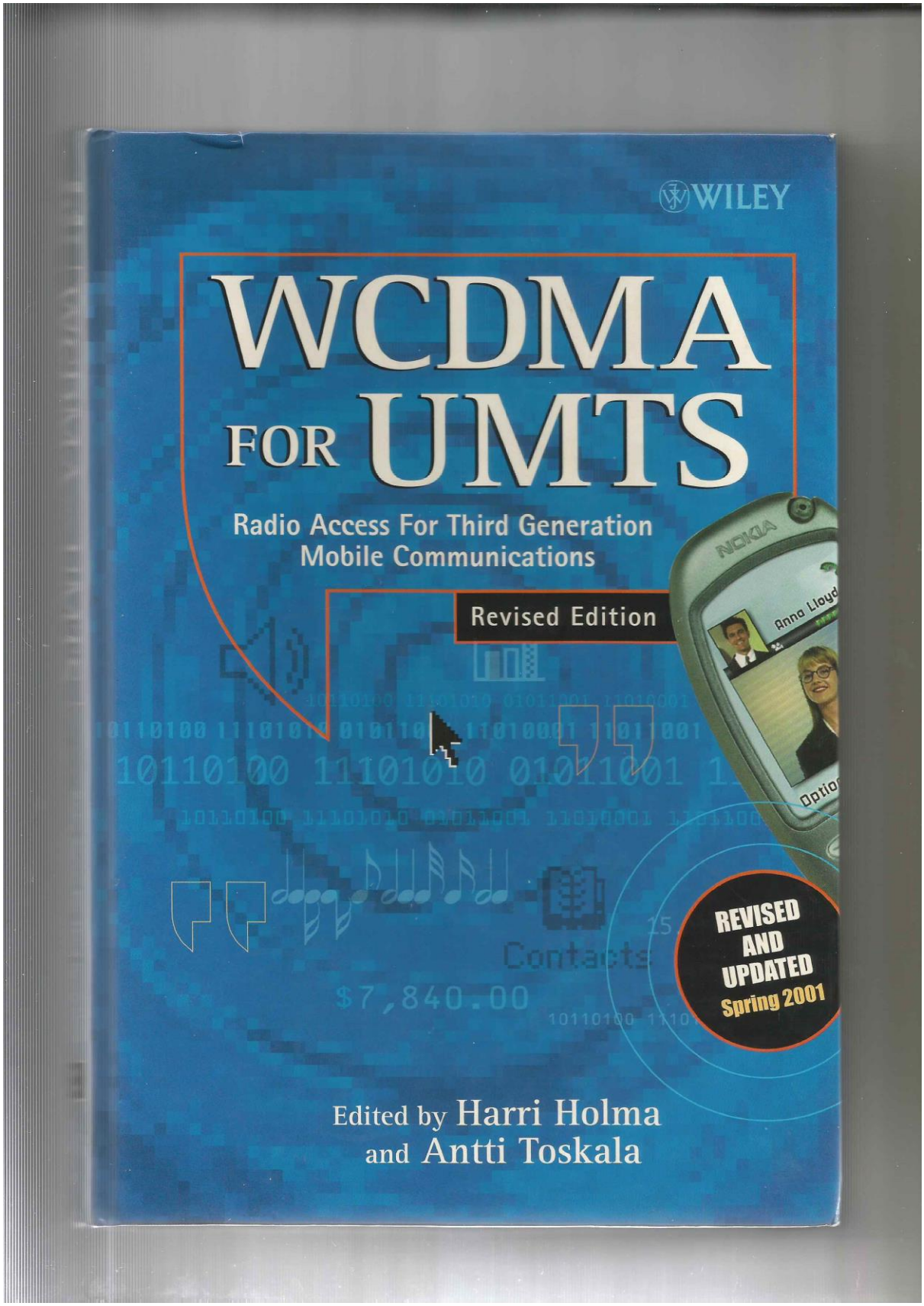
# Annex I: Change history

| Date | PCG # | PCG Doc. | CR | Rev | Subject/Comment |
|---|---|---|---|---|---|
| 2002-04-25 | 6 | | | | |
| 2005-03-01 | 13 | | | | Changes agreed at PCG meeting incorporated. [No formal change control system yet in place] |
| 2006-04-24 | 16 | PCG16_07 | 2 | | ETSI proposal: Article 10<br>Clarify the rights of observers and guests |
| | | | 3 | | ETSI proposal: Article 15<br>To allow leeway in the number of delegates representing each OP at PCG<br>(To reflect the decision already taken by PCG#14 on PCG participation) |
| | | | 9 | | ETSI proposal: Article 34<br>To cater for current TSG structure and to reflect common practice of Tdoc numbering |
| | | | 1 | 1 | Article 3<br>Reflect decision on regional options<br>(To incorporate PCG#7 decision) |
| | | | 4 | 1 | Article 22<br>Clarification and codification of the rights to stand for elected positions in TSGs and WGs |
| | | | 8 | | Article 30 & annex F<br>Inclusion of an annex giving guidance on meeting organization |
| 2006-10-27 | 17 | PCG17_15 r1 | 10 | | Article 35<br>Clarification of voting rights |
| 2009-05-18 | 22 | PCG22_18 | 11 | 5 | Changes resulting from the OP ad hoc group on improvements report and conclusions of OP#20.<br>Articles affected:<br>22<br>23<br>31<br>35<br>41<br>52<br>Annex D<br>plus sundry spelling corrections. |
| | | PCG22_19 | 12 | 2 | Rules on eligibility to cast votes at TSG and WG level. |
| | | PCG22_20 | 13 | | Bring statement of purpose of 3GPP up to date |
| | | PCG22_23 | 14 | | Adding Working Agreements to working procedures |
| | | PCG22_30 r3 | 15 | 3 | Change of ITU liaison process<br><br>Note: PCG meeting #22 approved contribution PCG22_30r1 but this was subsequently revised to r3 after the meeting with the apparent approval of the PCG. |
| | | | | | Decision PCG22/11: clause 22.1 changed wording from "in the March time frame in" to "in the first semester of". |
| 2009-08-12 | | | | | Editorial correction to implementation of CR15r3. (article 52). |
| 2010-04-23 | 24 | PCG24_11 | 16 | | TSG vs WG election |
| | | PCG24_12 | 17 | | Quorum |
| | | PCG24_13 | 18 | | Communication with ITU |
| | | PCG24_25 | 19 | | Attendance register for meetings |
| 2012-10-24 | | PCG29_17 | 20 | | Update to 3GPP Working Procedures article 22 |
| 2014-07-22 | 33 | PCG33_10 | 21 | | Anti-trust / competition law requirements<br>articles 12, 17, 22.1, 23, 29, 59A, annex C |
| 2014-12-31 | 34 | PCG34_14 | 22 | | Anti-trust recommendations v1.1. |
| | | | | | Addition of TSDSI to list of OPs in annexes B and C.<br><br>Minor formatting and spelling corrections, consistent capitalization. |

| | | | | | |
|---|---|---|---|---|---|
| 2016-11-15 | 35 | PCG37_14 | 22.1 | | Modification to clarify obligation on elected officials regarding antitrust/competition law training. |

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# Appendix 6






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# WCDMA FOR UMTS

Radio Access For Third Generation Mobile Communications

Revised edition

Edited by
**Harri Holma and Antti Toskala**
*Both of Nokia, Finland*

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### 4.5.3 *cdma2000*

The cdma2000 air interface proposal to ITU is the result of work in TR45.5 on the evolution of IS-95 towards the third generation. The cdma2000 proposal is based partly on IS-95 principles with respect to synchronous network operation, common pilot channels, and so on, but it is a wideband version with three times the bandwidth of IS-95. The ITU proposal contains further bandwidth options as well as the multi-carrier option for downlink. The cdma2000 proposal has a high degree of commonality with the Global CDMA 1 ITU proposal from TTA, Korea.

The cdma2000 multi-carrier option is covered in more detail in Chapter 13, as being currently standardised by 3GPP2.

### 4.5.4 *TR46.1*

The WIMS W-CDMA was not based on work derived from an existing second generation technology but was a new third generation technology proposal with no direct link to any second generation standardisation. It was based on the constant processing gain principle with a high number of multicodes in use, thus showing some fundamental differences but also a level of commonality with WCDMA technology in other forums.

### 4.5.5 *WP-CDMA*

WP-CDMA (Wideband Packet CDMA) resulted from the convergence between W-CDMA N/A of T1P1 and WIMS W-CDMA of TR46.1 in the US. The main features of the WIMS W-CDMA proposal were merged with the principles of W-CDMA N/A. The merged proposal was submitted to the ITU-R IMT-2000 process towards the end of 1998, and to the 3GPP process at the beginning of 1999. Its the most characteristic feature, compared with the other WCDMA-based proposals, was a common packet mode channel operation for the uplink direction, but there were also a few smaller differences.

## 4.6 Creation of 3GPP

As similar technologies were being standardised in several regions around the world, it became evident that achieving identical specifications to ensure equipment compatibility globally would be very difficult with work going on in parallel. Also, having to discuss similar issues in several places was naturally a waste of resources for the participating companies. Therefore initiatives were made to create a single forum for WCDMA standardisation for a common WCDMA specification.

The standardisation organisations involved in the creation of the 3rd Generation Partnership Project (3GPP) [9] were ARIB (Japan), ETSI (Europe), TTA (Korea), TTC (Japan) and T1P1 (USA) as shown in Figure 4.2. The partners agreed on joint efforts for the standardisation of UTRA, now standing for Universal Terrestrial Radio Access, as distinct from UTRA (UMTS Terrestrial Radio Access) from ETSI, also submitted to 3GPP. Companies such as manufacturers and operators are members of 3GPP through the respective standardisation organisation to which they belong.



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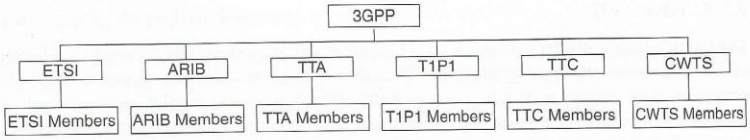



**Figure 4.2.** 3GPP organisational partners

Later during 1999, CWTS (the China Wireless Telecommunication Standard Group) also joined 3GPP and contributed technology from TD/SCDMA, a TDD-based CDMA third generation technology already submitted to ITU-R earlier.

3GPP also includes market representation partners: GSM Association, UMTS Forum, Global Mobile Suppliers Association, IPv6 Forum and Universal Wireless Communications Consortium (UWCC). In [9] there are up-to-date links to all participating organisations.

The work was initiated formally at the end of 1998 and the detailed technical work was started in early 1999, with the aim of having the first version of the common specification, called Release-99, ready by the end of 1999.

Within 3GPP, four different technical specification groups (TSG) were set up as follows:

- Radio Access Network TSG
- Core Network TSG
- Service and System Aspects TSG
- Terminals TSG

Within these groups the one most relevant to the WCDMA technology is the Radio Access Network TSG (RAN TSG), which has been divided into four different working groups as illustrated in Figure 4.3.

The RAN TSG will produce Release-99 of the UTRA air interface specification. The work done within the 3GPP RAN TSG working groups has been the basis of the technical description of the UTRA air interface covered in this book. Without such a global initiative, this book would have been forced to focus on a single regional specification, though with many similarities to those of other regions. Thus the references throughout this book are to the specification volumes from 3GPP.

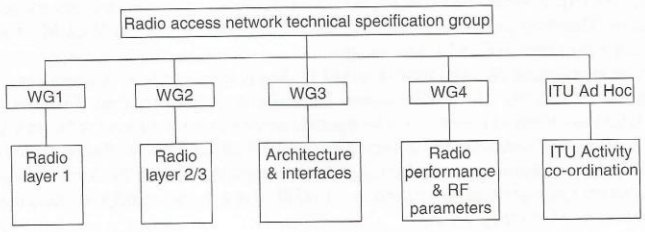



**Figure 4.3.** 3GPP RAN TSG working groups



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During the first half of 1999 the inputs from the various participating organisations were merged in a single standard, leaving the rest of the year to finalise the detailed parameters for the first full release, Release-99, of UTRA from 3GPP. The member organisations have undertaken individually to produce standard publications based on the 3GPP specification. Thus, for example, the Release-99 UMTS specifications from ETSI are identical to the Release-99 specifications produced by 3GPP. The latest specifications can be obtained from 3GPP [9].

During 2000, further work on GSM evolution was moved from ETSI and other forums to 3GPP, including work on GPRS and EDGE. A new TSG, TSG GERAN was set up for this purpose.

## 4.7 Creation of 3GPP2

Work done in TR45.5 and TTA was merged to form 3GPP2, focused on the development of cdma2000 Direct-Sequence (DS) and Multi-Carrier (MC) mode for the cdma2000 third generation component. This activity has been running in parallel with the 3GPP project, with participation from ARIB, TTC and CWTS as member organisations. Recently the main concentration has been on the MC mode work, due to decisions resulting from the global harmonisation efforts.

## 4.8 Harmonisation Phase

During the spring of 1999 several operators and manufacturers held series of meetings to seek further harmonisation and convergence between the CDMA-based third generation solutions, WCDMA and cdma2000. For the 3GPP framework the ETSI, ARIB, TTA and T1P1 concepts had already been merged to a single specification, while cdma2000 was still on its own in TR45.5. As a result of several meetings and telephone conferences, the manufacturers and operators agreed to adopt a harmonised global third generation CDMA standard consisting of three modes: Multi-Carrier (MC), Direct Spread (DS) and Time Division Duplex (TDD). The MC mode was based on the cdma2000 multi-carrier option, the DS mode on WCDMA (UTRA FDD), and the TDD mode on UTRA TDD. The agreement was to phase in a modular approach in which both core networks could be used with all air interface alternatives, as described in Figure 1.4 in Chapter 1.

The main technical impacts of these harmonisation activities were the change of UTRA FDD and TDD mode chip rate from 4.096 Mcps to 3.84 Mcps and the inclusion of a common pilot for UTRA FDD. The work in 3GPP2 focused on the MC mode, and the DS mode from cdma2000 was abandoned. The result is that globally there is only one Direct Spread (DS) wideband CDMA standard, WCDMA.

## 4.9 IMT2000 Process in ITU

In the ITU, recommendations have been developed for third generation mobile communications systems, the ITU terminology being called IMT-2000 [10], formerly FPLMTS. In the ITU-R, ITU-R TG8/1 has worked on the radio-dependent aspects, while the radio-independent aspects have been covered in ITU-T SG11.



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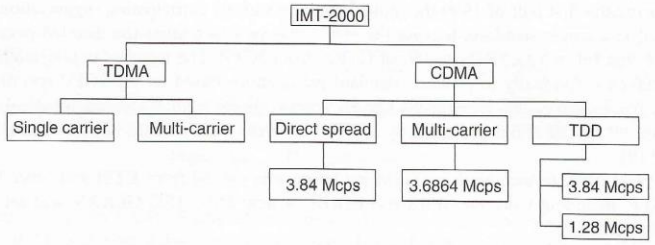



**Figure 4.4.** ITU-R IMT-2000 grouping

In the radio aspects, ITU-R TG8/1 received a number of different proposals during the IMT-2000 candidate submission process. In the second phase of the process, evaluation results were received from the proponent organisations as well as from the other evaluation groups that studied the technologies. During the first half of 1999 recommendation IMT.RKEY was created which describes the IMT-2000 multimode concept.

The ITU-R IMT-2000 process was finalised at the end of 1999, when the detailed specification (IMT-RSCP) was created and the radio interface specifications were approved by ITU-R [11]. The detailed implementation of IMT-2000 will continue in the regional standards bodies. The ITU-R process has been an important external motivation and timing source for IMT-2000 activities in regional standards bodies. The requirements set by ITU for an IMT-2000 technology have been reflected in the requirements in the regional standards bodies, for example in ETSI UMTS 21.01 [5], in order for the ETSI submission to fulfil the IMT-2000 requirements. The ITU-R interaction between regional standardisation bodies in the IMT-2000 process is reflected in Figure 4.5.

The ITU-R IMT-2000 grouping, with TDMA- and CDMA-based groups, is illustrated in Figure 4.4. The UTRA FDD (WCDMA) and cdma2000 are part of the CDMA interface, as CDMA Direct Spread and CDMA Multi-Carrier respectively. UWC-136 and DECT are part of the TDMA-based interface in the concept, as TDMA Single Carrier and TDMA Multi-Carrier respectively. The TDD part in CDMA consists of UTRA TDD from 3GPP and TD-SCDMA from CWTS. For the FDD part in the CDMA interface, harmonisation has been completed, and the harmonisation process is expected to continue for the CDMA TDD mode within 3GPP during 2000 and 2001.

## 4.10 Beyond 3GPP Release-99

Upon completion of the Release-99 specifications, work will concentrate on specifying new features as well as making the necessary corrections to Release-99. Typically such corrections arise as implementation proceeds and test systems are updated to include the latest changes in the specifications. As experience in various forums has shown, a major step forward in system capabilities with many new features requires a phasing-in period for the specifications. Fortunately, the main functions have been verified in the various test systems in operation since 1995, but only the actual implementation will reveal any errors and inconsistencies in the fine detail of the specifications.



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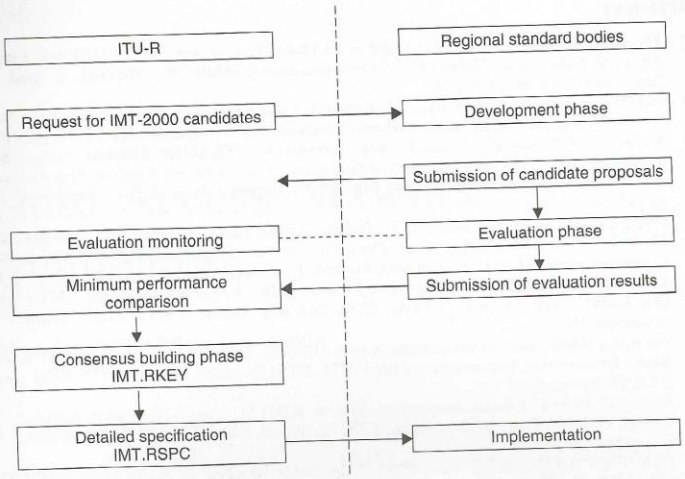



**Figure 4.5.** Relationship of ITU-R to the regional standards bodies

In 3GPP the next version of the specifications was originally considered as Release 2000, but since that the Release naming was adjusted so that next release is called Release 4 due to the 03/2001. Release 4 will contain only minor adjustment with respect to the Release'99. Bigger items are foreseen for inclusions in Release 5, including reaching for the data rates even up to the 10 Mbps in the downlink direction. Release 5 is due for the end of 2001. Release'99 specifications have a version number starting with 3 while Release 4 and 5 specifications have version number starting logically with 4 and 5 respectively.

During coming years, part of the process is to specify the extensions for connecting UTRA FDD to IS-41 based core networks. Work will be carried out on cdma2000 to allow connection to GSM-based core networks. This development will offer operators some degree of flexibility in selecting their third generation technology, assuming they are not aiming to launch such a service immediately, since Release-99 does not yet contain these options.

On the TDD side, further alignment is expected between the TDD mode in UTRA and the TDD mode from CWTS (China). This process is expected to continue after Release-99 is completed in 3GPP. 3GPP Release-4 is also planned to cover the lower chip rate (1.28 Mcps) TDD.

Other interesting developments are expected in the area of using IP based technology in UTRA. First step is going to be the IP based transport option in Release 4 and further releases are likely to see IP technology shaping the internal architecture of the UTRA Network (UTRAN). Also some of the protocols developed by the Internet Engineering Task Force (IETF) [12], such as robust IP header compression suitable for cellular transmission, are foreseen to be adopted as part the UTRA Rel'4 specifications.



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[11] ITU Press Release, ITU/99–22, 'IMT-2000 Radio Interface Specifications Approved in ITU Meeting in Helsinki', 5 November 1999.

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# Appendix 7

# MCC Activity Report

Source

Adrian Scrase



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- Workload
- 3GPP Membership
- Antitrust Compliance Training
- Summary and Outlook



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# Departures and Arrivals

At the beginning of November 2017,

## Kai-Erik Sunell



joined MCC as a “Project Manager without portfolio” to assist in the MCC duties relating, primarily, to the RAN working groups.

Kai-Erik acts as secretary to some parallel streams during meetings, moving from group to group as the need demands, and assists in implementing Change Requests after TSG plenaries. Kai-Erik will also be available to replace the regular MCC secretary of any 3GPP group in case of indisposition of the regular incumbent.

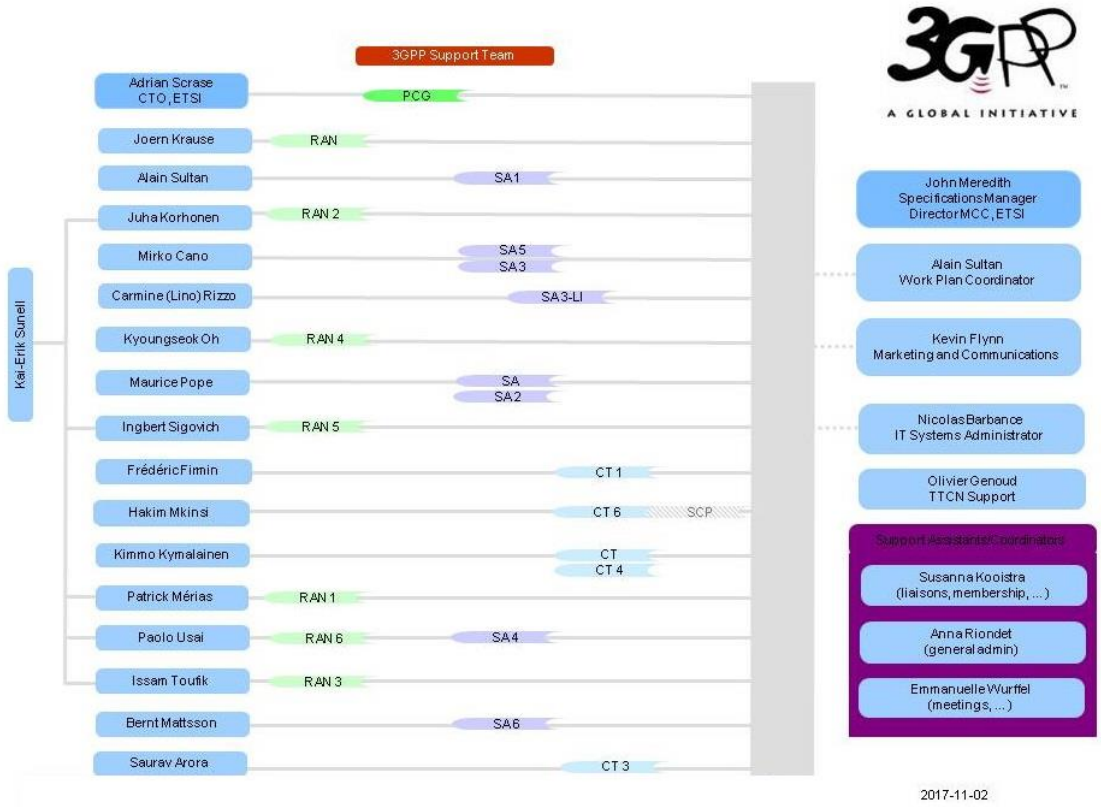
Find Kai-Erik’s MCC bio page here:
http://www.3gpp.org/people/1908-kai-erik-sunell



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# Resource Allocation






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# Workload: Change Requests

## Approved CRs per Release per Year

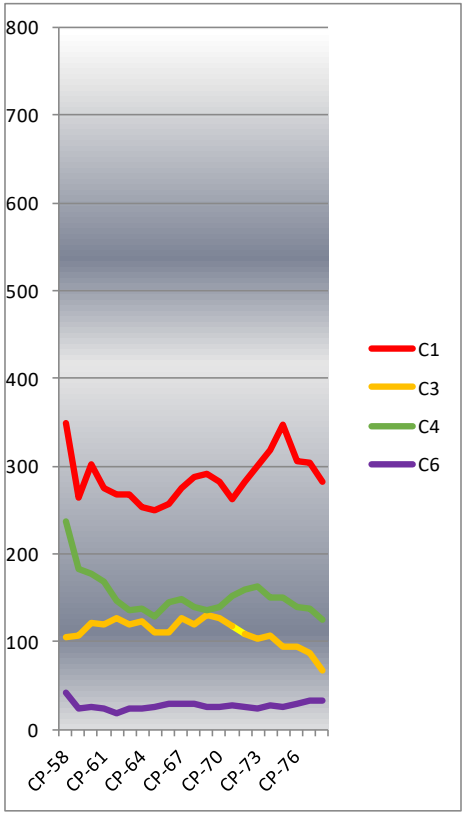
| Release | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| R99 | 1408 | 4398 | 2266 | 1004 | 581 | 512 | 111 | 42 | 23 | 5 | 5 | 1 | 0 | | | | | | | **10356** |
| Rel-4 | | 376 | 2828 | 1900 | 690 | 257 | 122 | 63 | 48 | 22 | 20 | 13 | 11 | 8 | 7 | 2 | | | | **6367** |
| Rel-5 | | 27 | 644 | 3274 | 2842 | 2162 | 1357 | 509 | 94 | 25 | 22 | 7 | 7 | 5 | 3 | 2 | | | | **10980** |
| Rel-6 | | | | 172 | 1088 | 2458 | 3721 | 2074 | 1078 | 212 | 74 | 19 | 17 | 10 | 4 | 4 | | | | **10931** |
| Rel-7 | | | | | 1 | 20 | 663 | 2529 | 3132 | 1262 | 492 | 176 | 91 | 43 | 25 | 15 | | | | **8449** |
| Rel-8 | | | | | | | | 49 | 777 | 4609 | 7073 | 2347 | 706 | 347 | 184 | 91 | 46 | 22 | 12 | **16263** |
| Rel-9 | | | | | | | | | | 49 | 2918 | 4991 | 3252 | 1366 | 376 | 165 | 70 | 26 | 23 | **13236** |
| Rel-10 | | | | | | | | | | | 47 | 1722 | 3800 | 3103 | 1636 | 584 | 267 | 50 | 21 | **11230** |
| Rel-11 | | | | | | | | | | | | 32 | 1152 | 4178 | 3525 | 2186 | 622 | 163 | 41 | **11899** |
| Rel-12 | | | | | | | | | | | | | 6 | 102 | 2254 | 5181 | 4287 | 1530 | 197 | **13557** |
| Rel-13 | | | | | | | | | | | | | | | 8 | 200 | 2648 | 5571 | 1681 | **10108** |
| Rel-14 | | | | | | | | | | | | | | | | | 24 | 2315 | 5865 | **8204** |
| Rel-15 | | | | | | | | | | | | | | | | | | 6 | 1246 | **1252** |
| Rel-16 | | | | | | | | | | | | | | | | | | 0 | 35 | **35** |
| Total | **1408** | **4801** | **5738** | **6350** | **5202** | **5409** | **5974** | **5266** | **5152** | **6184** | **10651** | **9308** | **9042** | **9162** | **8022** | **8430** | **7964** | **9683** | **9121** | **132867** |

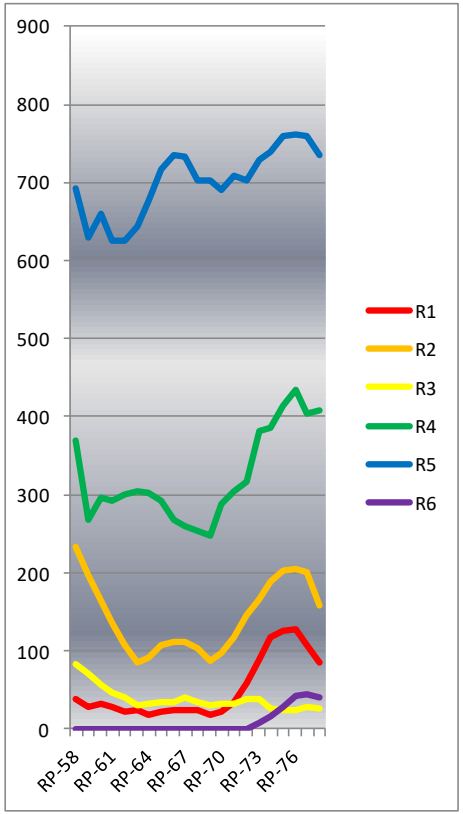


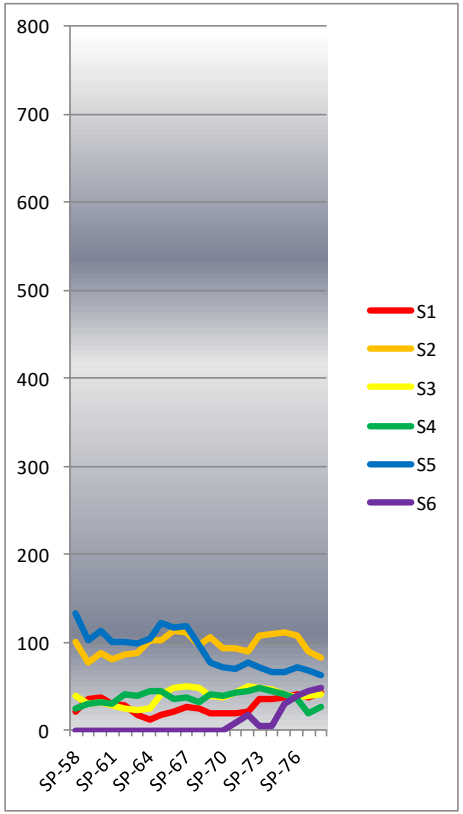
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# Approved CRs per WG per TSG meeting



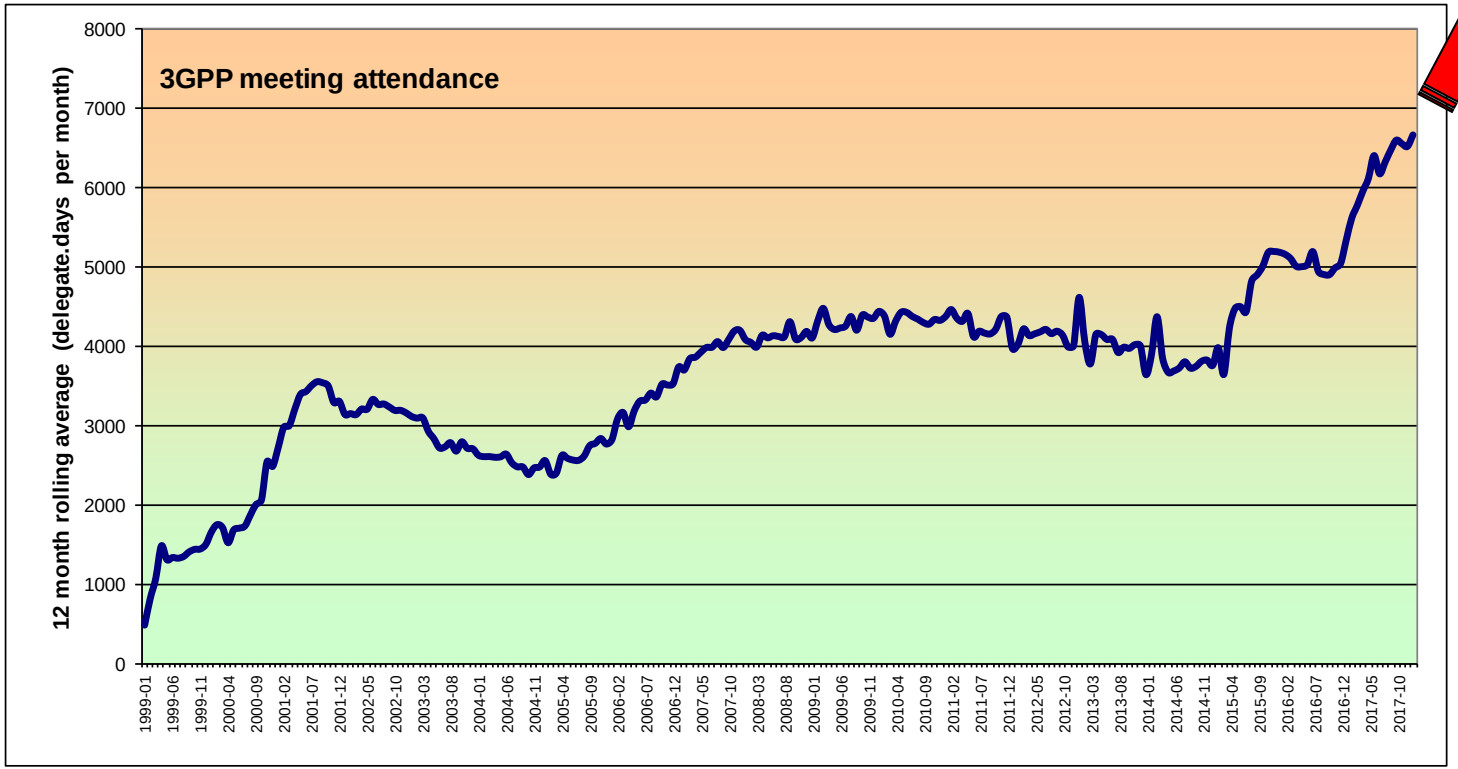





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# Workload: meeting attendance over time






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# Workload: Committee Support

2017 was an exceptionally busy year for 3GPP in general and for MCC in particular. The number of meetings supported and contributions processed enabled the 5G New Radio to be completed six months ahead of the original target. Throughout the year, a total of 75 000 delegate/days were spent in 3GPP groups which is an unprecedented level of activity for the project. More than 100 000 contributions were processed.

This peak workload would not be sustainable in the longer term without increasing the support resources. However, during the recent TSG meetings that took place in Chennai, distinct action was taken to try and limit the number of meetings that will occur from 2019 onwards. It still remains to be seen how many meetings will take place in 2018 but at least we seem to be heading in the right direction.

Two groups within 3GPP have a very low level of participation and activity (CT6 and RAN6). In consultation with the relevant TSG Chairman, consideration is being given reducing the level of support to back-office only. This will of course help to reduce support costs. Decisions are expected to have been taken by the time the PCG next meets.



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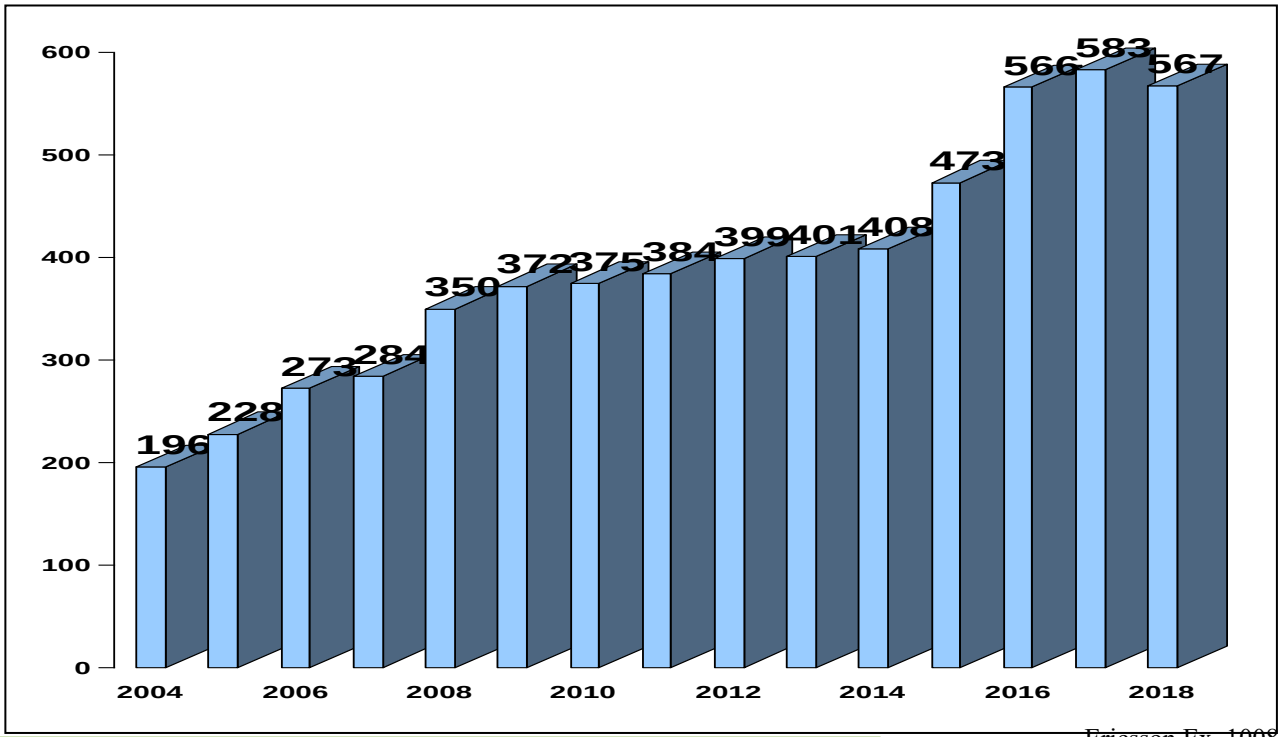
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# 3GPP Membership

3GPP Membership currently stands at 567 Individual Members. In addition, there are 21 companies having Guest Status, which are potential IMs

Number of Individual Members in 3GPP

3GPP Individual Members come from 45 Countries worldwide






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# 3GPP Member Territories

AUSTRALIA
AUSTRIA
BELGIUM
BOTSWANA
BRAZIL
CANADA
CHINA
CZECH REPUBLIC
DENMARK
FINLAND
FRANCE
GERMANY
HONG KONG
INDIA
INDONESIA
IRELAND
ISRAEL
ITALY
JAPAN
KOREA (REPUBLIC OF)
LEBANON
LUXEMBOURG
MALAYSIA
MEXICO
NETHERLANDS
NORWAY
POLAND
PORTUGAL
QATAR
ROMANIA
RUSSIAN FEDERATION
SERBIA
SINGAPORE
SLOVAKIA
SLOVENIA
SOUTH AFRICA
SPAIN
SWEDEN
SWITZERLAND
TAIWAN, PROVINCE OF CHINA
TURKEY
UNITED ARAB EMIRATES
UNITED KINGDOM
UNITED STATES

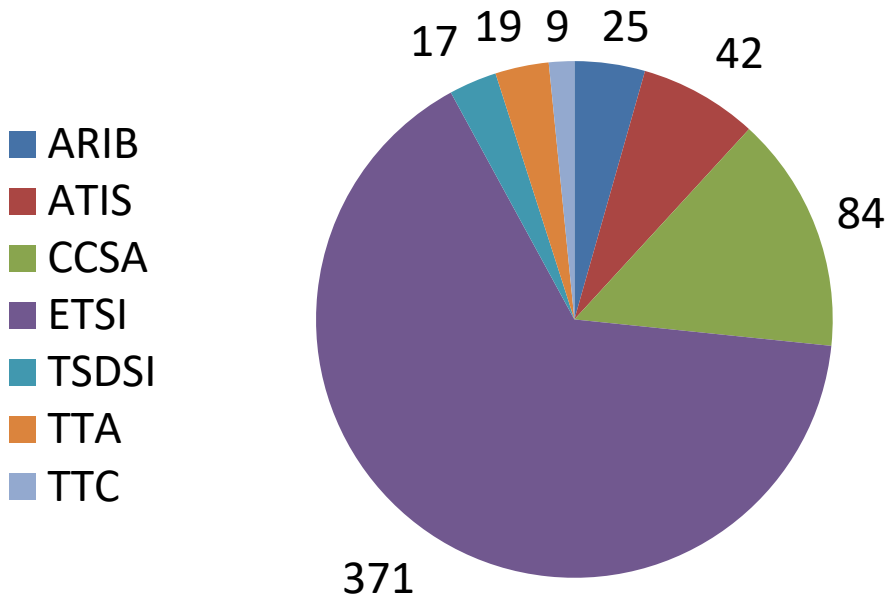
3GPP Individual Members come from 44 countries worldwide



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# 567 Individual Members in 3GPP






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# Some interesting industry participants…

- **Agricultural** machinery manufacturers (e.g., John Deere, Husqvana, etc)
- **Automotive** manufactures (e.g, Volkswagen, Volvo, Toyota)
- **Rail** (e.g., Internationale Union of Railways)
- **Factory Automation** companies (e.g., Siemens)
- **Energy** Sector (e.g., Legrand)
- **Environment** (e.g., Veolia)
- **Broadcasting** Community (e.g., EBU, BBC, TDF)
- **Satellite** Community (e.g., ESO, Inmarsat)
- **Aerospace** (e.g., Lockheed Martin, BAE)
- **Retail** Sector (e.g., Alibaba)
- **Social Media** (e.g., Facebook)
- **Advertising** (e.g., Google)



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# Anti-trust Compliance Training

- Four webinars targeted at elected officials and candidates took place in 2017, each timed to be convenient for those in one of the three regions (Americas, Europe, Asia).

- By decision of the PCG, these webinars are now open for participation by any delegate. For logistical reasons, we may have to limit the number of participants in any one webinar, and elected officials and candidates for election will take precedence.

- Companies are reminded that all personnel they offer for the chairmanship or vice-chairmanship of 3GPP committees must undergo formal training in anti-trust matters, and the letter of support for candidates for election must clearly state this.

- We are currently fixing the dates for 2018 webinars.



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# Summary and Outlook

3GPP has continued to strengthen its position as the place where the 5G system is being specified. It continues to attract significant interest from new entrants too.

The workload within the TSGs has increased dramatically in the build up to Release 15 and 16 delivery. This workload will be monitored in the coming months and support resources adjusted accordingly.



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# Appendix 8

# The 3G IP Multimedia Subsystem (IMS)

## Merging the Internet and the Cellular Worlds

Gonzalo Camarillo and Miguel A. García-Martín

Both of
*Ericsson, Finland*



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# Chapter 2

# The History of the IMS Standardization

In Chapter 1 we mentioned that the IMS uses Internet protocols. When the IMS needs a protocol to perform a particular task (e.g., to establish a multimedia session), the standardization bodies standardizing the IMS take the Internet protocol intended for that task and specify its use in the IMS. Still, no matter how simple this may sound the process of choosing protocols to be used in the IMS can sometimes get tricky. Sometimes, the Internet protocol that is chosen lacks some essential functionality, or does not even exist at all. When this happens the IMS standardization bodies contact the standardization body developing Internet protocols to work together on a solution. We will cover this collaboration in Section 2.5. Nevertheless, before jumping into that we will introduce in Section 2.1 all the standardization bodies involved in IMS development. We need to know who is who and which functions of the IMS each of them performs.

## 2.1 Relations between IMS-related Standardization Bodies

The ITU (International Telecommunication Union) IMT-2000 (International Mobile Telecommunications-2000) is the global standard for 3G (third generation) networks. IMT-2000 is the result of the collaboration between different standards bodies and aims at providing access to telecommunication services using radio links, which include satellite and terrestrial networks.

We will focus on two of the standard bodies involved in IMT-2000: 3GPP (Third Generation Partnership Project) and 3GPP2 (Third Generation Partnership Project 2). Still, they are not the only ones working within IMT-2000. Other bodies, such as the ITU-R (ITU-Radiocommunication Sector), for instance, are also involved in IMT-2000 but on different areas than the IMS.

Both 3GPP and 3GPP2 have standardized their own IMS (IP Multimedia Subsystem). The 3GPP IMS and the 3GPP2 IMS are fairly similar, but, nevertheless, have a few differences (Appendix A lists the most important differences).





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An important similarity between the 3GPP IMS and the 3GPP2 IMS is that both use Internet protocols, which have been traditionally standardized by the IETF (Internet Engineering Task Force). Consequently, both 3GPP and 3GPP2 collaborate with the IETF in developing protocols that fulfill their requirements. The following sections introduce the IETF, 3GPP, and 3GPP2 and provide a brief history of the IETF-3GPP/3GPP2 collaboration.

In addition to the standard bodies we have just mentioned, OMA (Open Mobile Alliance [144]) will play an important role in developing IMS services in the near future. While 3GPP and 3GPP have standardized (or are standardizing) a few IMS services, such as basic video calls or conferencing, from now on OMA will focus on service standardization for the IMS (of course, other standard bodies and third parties besides OMA may also develop services for the IMS).

## 2.2 Internet Engineering Task Force (IETF)

The Internet Engineering Task Force (IETF) is a loosely self-organized collection of network designers, operators, vendors, and research institutions that work together to develop the architecture, protocols, and operation of the public Internet. The IETF is body that is open to any interested individual. The IETF is not a corporation and, therefore, does not have a board of directors, members, nor dues.

The IETF is the standardization body that has developed most of the protocols that are currently used on the Internet. The IETF does not standardize networks, architectures combining different protocols, the internal behaviour of nodes, nor APIs (Application Programming Interface). The IETF is the protocol factory for IP-related protocols.

### 2.2.1 Structure of IETF

Work in the IETF is organized in working groups. Each working group is chartered to perform specific tasks, such as the delivery of a precise set of documents. Each working group has from one to three chairs, who take care that the working group completes its chartered tasks in time. Working groups have a temporary lifetime; so, once they have delivered their documents, either they are rechartered or they cease to exist. Figure 2.1 shows a few, but not all, of the working groups in the IETF; there are more than 100 active working groups in the IETF. The complete up-to-date list of active working groups is available at:

`http://www.ietf.org/html.charters/wg-dir.html`

Working groups get an acronym name that identifies the chartered task. For instance, SIPPING is the acronym of "Session Initiation Protocol Investigation", SIMPLE is the acronym of "SIP for Instant Messaging and Presence Leveraging Extensions" or AAA for "Authentication, Authorization and Accounting".

A collection of working groups form an Area Directorate. There are currently eight areas, as illustrated in Figure 2.1.

Each area has one or two area directors who, together with the IETF chairman, form the IESG (Internet Engineering Steering Group). The IESG is the technical



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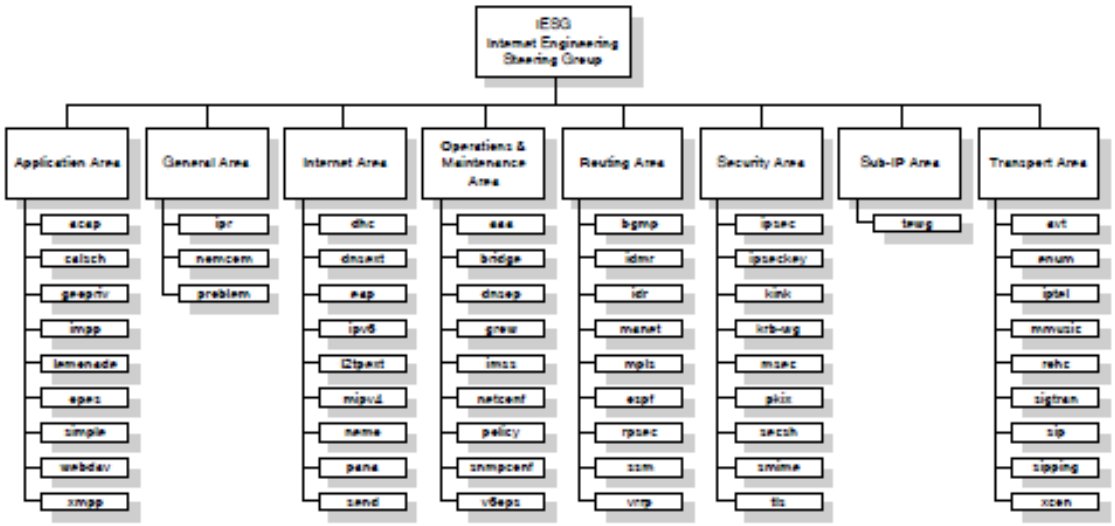



Figure 2.1: The structure of the IETF

management team of the IETF. They decide on which areas the IETF should work and review all the specifications that are produced.

The following web pages contain the complete list of the working groups of all areas and the charter of the SIPPING working group respectively.

`http://www.ietf.org/html.charters/wg-dir.html`
`http://www.ietf.org/html.charters/sipping-charter.html`

The IAB (Internet Architecture Board) is the body that provides technical leadership and handles appeals. Its web page is:

`http://www.iab.org/`

### 2.2.2 Working Group Operations

The technical work in the IETF is done within the working groups. Working groups do not have any kind of membership; they are formed by a number of volunteers that work as individuals. That is, they do not represent their companies when working for the IETF.

Most of the technical discussions within a working group take place in its mailing list. Even the decisions made at face-to-face meetings (held three times a year) have to be confirmed in the mailing list.

The technical documents used within the working groups are called Internet-Drafts. There are two types of them: individual submissions and working group items. Individual submissions are technical proposals submitted by an individual or individuals. If the working group decides that an individual submission is a good starting point to work on a particular topic, it becomes a working group item.



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Individual submissions and working group items can be distinguished by the name of the file where they are stored. Individual submissions start with:

```
draft-author's_name
```

while working group items start with:

```
draft-ietf-name_of_the_working_group
```

A list of all the Internet-Drafts can be found at:

```
http://www.ietf.org/internet-drafts/
```

When a working group feels that a working group item is ready for publication as an RFC the working group chairs send it to the IESG. The IESG may provide feedback to the working group (e.g., ask that working group to change something in the draft) and, eventually, decides whether or not a new RFC is published.

Although most of the Internet-Drafts that the IESG receives come from working groups an individual may also submit an Internet-Draft to the IESG. This usually happens with topics that are not large enough to grant the creation of a working group, but which, nevertheless, are of interest to the Internet community.

It is important to note that Internet-Drafts, even if they are working group items, represent work in progress and should only be referenced as such. Internet-Drafts are temporary documents that expire and cease to exist six months after they are issued. They can change at any time without taking into consideration backward compatibility issues with existing implementations. Only when a particular Internet-Draft becomes an RFC can it be considered a stable specification.

### 2.2.3 Types of RFCs

The technical documents produced by the IETF are called RFCs (Request For Comments). According to the contents of the document there are three main types of RFCs:

- Standards-track RFCs.
- Non-standards-track RFCs.
- BCP (Best Current Practise) RFCs.

Standards-track RFCs typically define protocols and extensions to protocols. According to the maturity of the protocol there are three levels of standards-track RFCs: proposed standard, draft standard, and Internet standard. Standards-track specifications are supposed to advance from proposed to draft and, finally, to Internet standard as they get more and more mature. An important requirement in this process is that a particular specification is implemented by several people to show that different independently built implementations that follow the same specification can successfully interoperate.

Nevertheless, in practise only a few RFCs reach the draft standard level and even fewer become Internet standards. At present, the specifications of many protocols that are used massively on the Internet are proposed standards.



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There are three types of non-standards-track RFCs: experimental, informational, and historical (which are called *historic* RFCs). Experimental RFCs specify protocols with a very limited use, while informational RFCs provide information for the Internet community about some topic, such as a requirements document or a process. When a standards-track RFC becomes obsolete, it becomes a historic RFC.

BCP RFCs record the best current practise known to the community to perform a particular task. They may deal with protocol issues or with administrative issues.

Figure 2.2 shows the relations between all the RFC types. A list of all the RFCs published so far and their status can be fetched from:

`http://www.ietf.org/iesg/1rfc_index.txt`

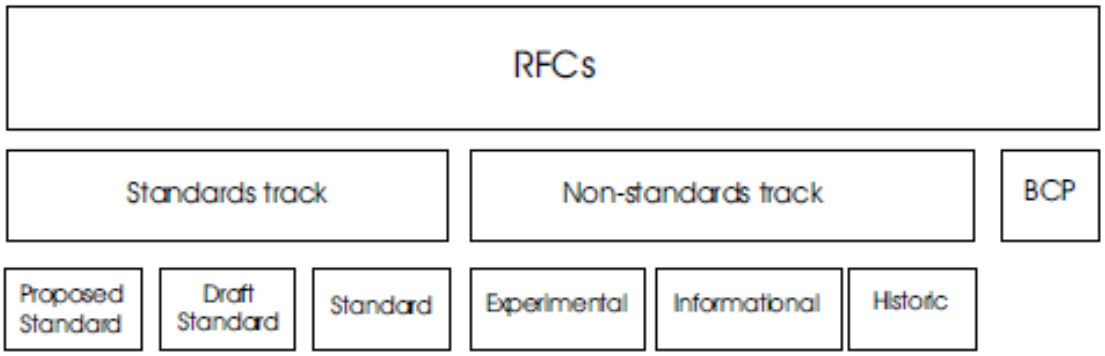



Figure 2.2: RFC types

RFCs can be downloaded from the following web page by just introducing the RFC number:

`http://www.ietf.org/rfc.html`

Additionally, the RFC Editor offers a web page that allows us to search for RFCs by title, number, author and keywords:

`http://www.rfc-editor.org/rfcsearch.html`

## 2.3 Third Generation Partnership Project (3GPP)

The Third Generation Partnership Project (3GPP) was born in 1998 as a collaboration agreement between a number of regional telecommunication standard bodies, known as *organizational partners*. The current 3GPP organizational partners are:

1. ARIB (Association of Radio Industries and Business) in Japan,

   `http://www.arib.or.jp/english/`

2. CCSA (China Communications Standards Associations) in China,

   `http://www.ccsa.org.cn/english/`



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3. ETSI (European Telecommunications Standards Institute) in Europe,

   `http://www.etsi.org/`

4. Committee T1 in the United States of America,

   `http://www.t1.org/`

5. TTA (Telecommunications Technology Association) of Korea

   `http://www.tta.or.kr/English/`

6. TTC (Telecommunication Technology Committee) in Japan,

   `http://www.ttc.or.jp/e/`

3GPP was originally chartered to develop globally applicable Technical Specifications and Technical Reports for a third-generation mobile system based on GSM. The scope has been reinforced to include maintenance and development of GSM specifications including the supported and evolved radio networks, technologies, and packet access technologies.

Besides the organizational partners, *market representation partners* provide the partnership with market requirements. Market representation partners include, among others, the UMTS Forum, 3G Americas, the GSM Association, the Global mobile Suppliers Association, the TD-SCDMA Forum, and the IPv6 Forum.

3GPP maintains an up-to-date web site at:

`http://www.3gpp.org/`

### 2.3.1 3GPP Structure

3GPP is organized in a Project Co-ordination Group (PCG) and Technical Specification Groups (TSGs), as illustrated in Figure 2.3. The PCG is responsible for the overall management of 3GPP, time plans, allocation of work, etc. The technical work is produced in the TSGs. At the moment there are five TSGs, responsible for the Core Network (CN), System and Services Aspects (SA), GSM EDGE Radio Access Network (GERAN), Radio Access Network (RAN), and Terminals (T). Each of the TSGs is further divided into Working Groups. Each of the Working Groups is allocated particular tasks. For instance, CN WG1 is responsible for all the detailed design of the usage of SIP and SDP in the IMS, CN WG3 for interworking aspects and CN4 for all the detailed design of the usage of Diameter. SA WG1 is responsible for the requirements, SA2 for the architecture, SA WG3 for the security aspects, SA WG4 for the codecs, and SA WG5 for the operation and maintenance of the network.

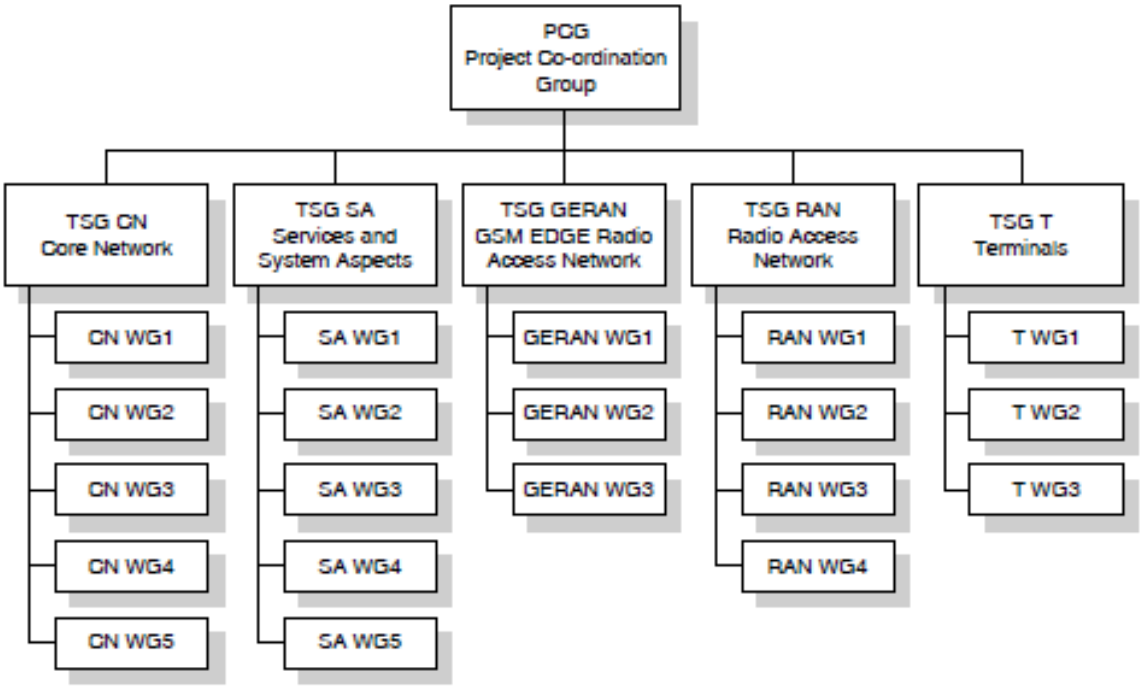



Figure 2.3: The structure of 3GPP

### 2.3.2 3GPP Deliverables

3GPP working groups do not produce standards. Instead, they produce Technical Specifications (TS) and Technical Reports (TR) that are approved by the TSGs. Once approved they are submitted to the organizational partners to be submitted to their respective standardization processes. The final part of the process is in the organizational partners' hands when they approve the TSs or TRs as part of their standards procedures. As a result, there is a set of globally developed standards that are ready to be used in a particular region.

3GPP TSs and TRs are numbered according to the sequence of four or five digits that follow the pattern "xx.yyy". The first two digits "xx" identify the series number, and the last two or three digits "yy" or "yyy" identify a particular specification within a series. For instance, 3GPP TS 23.228 [21] describes the architectural aspects of the IMS.

3GPP groups its specifications in what is called a *Release*. 3GPP Release 5 contains the first version of the IMS. 3GPP Release 6 contains enhancements to the IMS. The reader must note that the IMS is just a fraction of the 3GPP deliverables in a particular Release, as there are other non-IMS specifications included in a 3GPP Release. 3GPP TSs and TRs include a version number that follows the pattern "x.y.z", where "x" represents the 3GPP Release where the specification is published, "y" is the version number, and "z" is a sub-version number. So, 3GPP TS 23.228 version 5.8.0 means version 8.0 of the Release 5 version of TS 23.228.



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3GPP TSs and TRs are publicly available at the 3GPP web site at either of the following URIs:

`http://www.3gpp.org/specs/specs.htm`

`http://www.3gpp.org/ftp/Specs/archive/`

## 2.4 Third Generation Partnership Project 2 (3GPP2)

If 3GPP was born to evolve GSM specifications into a third-generation cellular system, the Third Generation Partnership Project 2 (3GPP2) was born to evolve North American and Asian cellular networks based on ANSI/TIA/EIA-41 standards and CDMA2000© radio access into a third-generation system. 3GPP2 like 3GPP is a partnership project whose members are also known as *organizational partners*. The current list of organizational partners include ARIB (Japan), CCSA (China), TIA (Telecommunications Industry Association) (North America), TTA (Korea), and TTC (Japan). Probably, the reader has noticed that most of them are also organizational partners of 3GPP.

Like 3GPP, 3GPP2 gets market requirements and advice from *market representation partners*. At the moment the list includes the IPv6 Forum and the CDMA Development Group.

### 2.4.1 3GPP2 Structure

The 3GPP2 structure mimics the structure of 3GPP, as illustrated in Figure 2.4. A Steering Committee (SC) is responsible for the overall standardization process and the planning. The technical work is done in Technical Specification Groups (TSGs). TSG-A is focused on the Access Network Interface, TSG-C on CDMA2000© technology, TSG-S on Service and System Aspects, and TSG-X in Intersystems Operations. TGS-X was born as a merger between the former TSG-N (Core Networks) and TSG-P (Packet Data) TSGs. The structure of TSN-X is not completely defined yet.

### 2.4.2 3GPP2 Deliverables

Like 3GPP, 3GPP2 does not produce standards but, instead, Technical Specifications (TSs) and Technical reports (TRs). The documents are created by the TSGs and approved by the SC. Then, they are submitted to the organizational partners to be submitted to their respective standardization processes.

3GPP2 TSs and TRs are numbered with a sequence of letters and digits that follows the scheme "A.Bxxxx-yyy-R" where "A" is a letter that represents the name of the TSG that delivers the document, "B" can be an "R" letter to indicate a TR or a requirements document, but it can also be an "S" letter to indicate a TS. "xxxx" is a sequential number allocated to the document. An optional "yyy" sequence of digits can further identify the chapter within a specification series. The "R" letter identifies the revision. The version number follows the specification and indicates a major and



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# Appendix 9

# 3GPP MEMBERSHIP

2024-08-12 Version 1.1

New Query

**Selected categories:**

- **Individual Members (all partners)**

Choose csv separator : , export to csv file

## INDIVIDUAL MEMBERS

| Organization | Country | Partner |
|---|---|---|
| 3in<br>(Industrial Internet Innovation Center (Shanghai) Co.,Ltd.) | CHINA | CCSA |
| 450connect GmbH<br>(450connect GmbH) | GERMANY | ETSI |
| A.S.T.R.I.D. SA/NV<br>(A.S.T.R.I.D. SA) | BELGIUM | ETSI |
| ABP, NRTA<br>(Academy of Broadcasting Planning, NRTA) | CHINA | CCSA |
| ABS<br>(Academy of Broadcasting Science, NRTA) | CHINA | CCSA |
| AccelerComm Ltd<br>(AccelerComm Ltd) | UNITED KINGDOM | ETSI |
| Acer Incorporated<br>(Acer Incorporated) | TAIWAN, PROVINCE OF CHINA | ETSI |
| adare GmbH<br>(adare GmbH) | GERMANY | ETSI |
| Airbus<br>(Airbus DS SLC) | FRANCE | ETSI |
| Ajou University<br>(Ajou University) | KOREA (REPUBLIC OF) | TTA |
| albis-elcon system GermanyGmbH<br>(albis-elcon system Germany GmbH) | GERMANY | ETSI |
| Alibaba (China) Group., Ltd.<br>(Alibaba (China) Group., Ltd.) | CHINA | CCSA |
| All Connected BV<br>(Rail Connected) | NETHERLANDS | ETSI |
| Allot Ltd<br>(Allot Ltd) | ISRAEL | ETSI |
| Altan Redes S.A.P.I. de C.V.<br>(Altan Redes S.A.P.I. de C.V.) | MEXICO | ETSI |
| Amazon Web Services<br>(Amazon Web Services EMEA SARL) | LUXEMBOURG | ETSI |
| Amdocs Software Systems Ltd<br>(Amdocs Software Systems Limited) | IRELAND | ETSI |
| Analog Devices, Inc.<br>(Analog Devices, Inc.) | UNITED STATES | ATIS |
| Anemone Technology<br>(Anemone Technology) | DENMARK | ETSI |
| Anritsu Corporation<br>(ANRITSU CORPORATION) | JAPAN | ARIB |
| Anritsu EMEA Ltd<br>(Anritsu EMEA Ltd) | UNITED KINGDOM | ETSI |
| Anterix<br>(Anterix) | UNITED STATES | ATIS |
| Apple | CHINA | CCSA |


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| | | |
|---|---|---|
| **(Apple Purchase Operation management)** | | |
| **Apple (Guizhou)**<br>**(Apple Technology Services (Guizhou) Ltd.)** | CHINA | CCSA |
| **Apple (UK) Limited**<br>**(Apple (UK) Limited)** | UNITED KINGDOM | ETSI |
| **Apple (Ulanqab)**<br>**(Apple Technology Services (Ulanqab) Ltd)** | CHINA | CCSA |
| **Apple AB Denmark**<br>**(Apple AB, filial AF Apple Aktiebolag, Sverige)** | DENMARK | ETSI |
| **Apple Benelux B.V.**<br>**(Apple Benelux B.V.)** | NETHERLANDS | ETSI |
| **Apple Benelux B.V. - Belgium**<br>**(Apple Benelux B.V. - Belgium Branch)** | BELGIUM | ETSI |
| **Apple Computer Trading Co. Ltd**<br>**(Apple Computer Trading (Shanghai) Co., Ltd.)** | CHINA | CCSA |
| **Apple Distribution Intl Ltd**<br>**(Apple Distribution International Limited)** | IRELAND | ETSI |
| **Apple France**<br>**(Apple France)** | FRANCE | ETSI |
| **Apple GmbH**<br>**(Apple GmbH)** | GERMANY | ETSI |
| **Apple Inc**<br>**(Apple Inc)** | UNITED STATES | ATIS |
| **Apple R&D**<br>**(Apple R&D)** | CHINA | CCSA |
| **Apple Solutions**<br>**(Apple Solutions Consulting Services (Beijing) Company Limited)** | CHINA | CCSA |
| **Apple Switzerland AG**<br>**(Apple Switzerland AG)** | SWITZERLAND | ETSI |
| **Apple Trading**<br>**(Apple Trading (Shanghai) Company Limited)** | CHINA | CCSA |
| **AQSACOM S.A.S.**<br>**(AQSACOM S.A.S.)** | FRANCE | ETSI |
| **Arriver Software AB**<br>**(Arriver Software AB)** | SWEDEN | ETSI |
| **ARTICLE19**<br>**(ARTICLE19)** | UNITED KINGDOM | ETSI |
| **ASELSAN**<br>**(ASELSAN Inc.)** | TÜRKIYE | ETSI |
| **AsiaInfo**<br>**(AsiaInfo Technologies (China), Inc.)** | CHINA | CCSA |
| **AsiaInfo Technologies Inc**<br>**(AsiaInfo Technologies Inc)** | CHINA | ETSI |
| **ASR**<br>**(ASR Microelectronics Co., Ltd.)** | CHINA | CCSA |
| **ASTRI**<br>**(Hong Kong Applied Science & Technology Research Institute)** | HONG KONG | ETSI |
| **Astrome Technologies Pvt Lt**<br>**(Astrome Technologies Pvt Lt)** | INDIA | TSDSI |
| **ASUSTEK COMPUTER (SHANGHAI)**<br>**(ASUSTEK COMPUTER (SHANGHAI) CO. LTD.)** | CHINA | CCSA |
| **AT&T**<br>**(AT&T)** | UNITED STATES | ATIS |
| **AT&T GNS Belgium SPRL**<br>**(AT&T Global Network Services Belgium SPRL)** | BELGIUM | ETSI |
| **AT&T Labs, Inc**<br>**(AT&T Labs, Inc)** | UNITED STATES | ATIS |
| **AT&T Services, Inc.**<br>**(AT&T Services, Inc.)** | UNITED STATES | ATIS |
| **ATEME**<br>**(ATEME SA)** | FRANCE | ETSI |
| **Avanti**<br>**(Avanti Communications Ltd)** | UNITED KINGDOM | ETSI |
| **Axyom.Core**<br>**(Axyom.Core Inc)** | UNITED STATES | ETSI |
| **BAE Systems AI Ltd** | UNITED KINGDOM | ETSI |

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|---|---|---|
| **(BAE Systems Applied Intelligence Limited)** | | |
| **Baicells Technologies Co. Ltd**<br>**(Baicells Technologies Co. Ltd)** | CHINA | CCSA |
| **BBC**<br>**(BRITISH BROADCASTING CORPORATION)** | UNITED KINGDOM | ETSI |
| **B-Com**<br>**(B-Com)** | FRANCE | ETSI |
| **BDBOS**<br>**(Federal Agency for Public Safety Digital Radio)** | GERMANY | ETSI |
| **BeammWave AB**<br>**(BeammWave AB)** | SWEDEN | ETSI |
| **Beijing Lenovo Software Ltd.**<br>**(Beijing Lenovo Software Ltd.)** | CHINA | CCSA |
| **BEIJING SAMSUNG TELECOM R&D**<br>**(BEIJING SAMSUNG TELECOM R&D CENTER)** | CHINA | CCSA |
| **Beijing Xiaomi Electronics**<br>**(Beijing Xiaomi Electronics)** | CHINA | CCSA |
| **Beijing Xiaomi Mobile Software**<br>**(Beijing Xiaomi Mobile Software Co., Ltd)** | CHINA | CCSA |
| **Beijing Xiaomi Mobile Software**<br>**(Beijing Xiaomi Mobile Software Co., Ltd.)** | CHINA | ETSI |
| **Beijing Xiaomi Software Tech**<br>**(Beijing Xiaomi Software Technology)** | CHINA | CCSA |
| **Bell Mobility**<br>**(Bell Mobility)** | CANADA | ETSI |
| **BfV**<br>**(Bundesamt für Verfassungsschutz)** | GERMANY | ETSI |
| **Bharti Airtel Limited**<br>**(Bharti Airtel Limited)** | INDIA | TSDSI |
| **BIFNC**<br>**(BRICS Institute of Future Network)** | CHINA | CCSA |
| **BIPT**<br>**(BIPT - Belgian Institute for Postal services & Telecommunications)** | BELGIUM | ETSI |
| **Bittium Wireless Ltd.**<br>**(Bittium Wireless Ltd.)** | FINLAND | ETSI |
| **BJTU**<br>**(Beijing Jiaotong University)** | CHINA | CCSA |
| **BKA**<br>**(Bundeskriminalamt)** | GERMANY | ETSI |
| **Bluetest AB**<br>**(Bluetest AB)** | SWEDEN | ETSI |
| **BMF**<br>**(Austrian Federal Ministry of Finance)** | AUSTRIA | ETSI |
| **BMW AG**<br>**(Bayerische Motoren Werke AG)** | GERMANY | ETSI |
| **BMWK**<br>**(Bundesministerium für Wirtschaft und Klimaschutz)** | GERMANY | ETSI |
| **BOCRA**<br>**(Botswana Communications Regulatory Authority)** | BOTSWANA | ETSI |
| **BOUYGUES Telecom**<br>**(BOUYGUES Telecom)** | FRANCE | ETSI |
| **Broadcom (EU)**<br>**(Broadcom Europe Ltd)** | UNITED KINGDOM | ETSI |
| **BSI (DE)**<br>**(Bundesamt für Sicherheit in der Informationstechnik)** | GERMANY | ETSI |
| **BSNL**<br>**(Bharat Sanchar Nigam Limited)** | INDIA | TSDSI |
| **BT plc**<br>**(British Telecommunications plc)** | UNITED KINGDOM | ETSI |
| **BTL Inc.**<br>**(BTL Inc.)** | CHINA | ETSI |
| **BTPDI**<br>**(Beijing Telecom Planning & Designing Institute Co.,LTD.)** | CHINA | CCSA |
| **BUPT**<br>**(Beijing University of Posts and Telecommunications)** | CHINA | CCSA |
| **Bureau Veritas ADT** | TAIWAN, PROVINCE OF CHINA | ETSI |

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|---|---|---|
| **(Bureau Veritas Consumer Products Services (Hong Kong) Limited, Taoyuan Branch)** | | |
| **Bytedance**<br>**(Bytedance (Nanjing) Technology Research and Development Co., Ltd.)** | CHINA | CCSA |
| **C Spire Wireless**<br>**(C Spire Wireless)** | UNITED STATES | ATIS |
| **CableLabs**<br>**(CableLabs)** | UNITED STATES | ETSI |
| **Cadence Design Systems Inc.**<br>**(Cadence Design Systems Inc.)** | UNITED STATES | ETSI |
| **CAICT.**<br>**(China Academy of Information and Communications Technology)** | CHINA | CCSA |
| **CALTTA**<br>**(CALTTA TECHNOLOGIES CO., LTD.)** | CHINA | CCSA |
| **Cambium Networks Limited**<br>**(Cambium Networks Limited)** | UNITED KINGDOM | ETSI |
| **CAMBRIDGE CONSULTANTS LTD**<br>**(CAMBRIDGE CONSULTANTS LTD)** | UNITED KINGDOM | ETSI |
| **CANON Research Centre France**<br>**(CANON Research Centre France SAS)** | FRANCE | ETSI |
| **CAPGEMINI**<br>**(CAPGEMINI TECHNOLOGY SERVICES INDIA LIMITED)** | INDIA | TSDSI |
| **Catapult**<br>**(Satellite Applications Catapult Ltd)** | UNITED KINGDOM | ETSI |
| **CATT**<br>**(China Academy of Telecommunications Technology (CATT))** | CHINA | ETSI |
| **CATT**<br>**(China Academy of Telecommunication Technology - (Datang Telecom Technology and Industry Group))** | CHINA | CCSA |
| **CBN**<br>**(China Broadcasting Network Group Corporation Ltd.)** | CHINA | CCSA |
| **CCU**<br>**(National Chung Cheng University)** | TAIWAN, PROVINCE OF CHINA | ETSI |
| **C-DAC**<br>**(Centre for Development of Advanced Computing)** | INDIA | TSDSI |
| **C-DOT**<br>**(C-DOT)** | INDIA | TSDSI |
| **CEA**<br>**(Commissariat à l'Energie Atomique et aux Energies Alternatives)** | FRANCE | ETSI |
| **Cellnex**<br>**(Cellnex Telecom)** | SPAIN | ETSI |
| **CENC**<br>**(CETC Network & Communications Group Co., Ltd.)** | CHINA | CCSA |
| **CEPRI**<br>**(China Electric Power Research Institute)** | CHINA | CCSA |
| **Ceragon Networks AS**<br>**(Ceragon Networks AS)** | NORWAY | ETSI |
| **CERTH**<br>**(CENTRE FOR RESEARCH AND TECHNOLOGY HELLAS)** | GREECE | ETSI |
| **cetecom advanced GmbH**<br>**(cetecom advanced GmbH)** | GERMANY | ETSI |
| **CEWiT**<br>**(Centre of Excellence in Wireless Technology (CEWiT))** | INDIA | TSDSI |
| **CGL**<br>**(CHAZAH GROUP LTD)** | UGANDA | ETSI |
| **Changeself**<br>**(Changeself Technology(Shenzhen)Co.,Ltd.)** | CHINA | ETSI |
| **Charter Communications, Inc**<br>**(Charter Communications, Inc)** | UNITED STATES | ATIS |
| **Chengdu OPPO Telecommunication**<br>**(Chengdu OPPO Mobile Telecommunications Corp., ltd.)** | CHINA | CCSA |
| **CHENGDU TD TECH LTD.**<br>**(CHENGDU TD TECH LTD.)** | CHINA | CCSA |
| **China Broadnet**<br>**(China Broadnet Mobile Communications Co., Ltd.)** | CHINA | CCSA |
| **China Mobile (Hangzhou) Inf.**<br>**(China Mobile (Hangzhou) Information Technology Co., Ltd.)** | CHINA | CCSA |
| **China Mobile (Suzhou) Software** | CHINA | CCSA |

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|---|---|---|
| **(China Mobile (Suzhou) Software Technology Co., Ltd.)** | | |
| **China Mobile Com. Corporation**<br>**(China Mobile Communications Corporation (CMCC))** | CHINA | CCSA |
| **China Mobile E-Commerce Co.**<br>**(China Mobile E-Commerce Co.)** | CHINA | CCSA |
| **China Mobile Group Device Co.**<br>**(China Mobile Group Device Co., Ltd)** | CHINA | CCSA |
| **China Mobile International Ltd**<br>**(China Mobile International Limited)** | CHINA | CCSA |
| **China Mobile M2M Company Ltd.**<br>**(China Mobile M2M Company Ltd.)** | CHINA | CCSA |
| **China Southern Power Grid Co.**<br>**(China Southern Power Grid Co., Ltd.)** | CHINA | CCSA |
| **China Telecom Corporation Ltd.**<br>**(China Telecom Corporation Ltd.)** | CHINA | CCSA |
| **China Telecommunications**<br>**(China Telecommunications Corporation)** | CHINA | ETSI |
| **China Telecomunication Corp.**<br>**(China Telecomunication Corporation)** | CHINA | CCSA |
| **China Unicom**<br>**(China Unicom)** | CHINA | CCSA |
| **Chinatelecom Cloud**<br>**(China Telecom Cloud Technology Co., Ltd)** | CHINA | CCSA |
| **Chongqing University**<br>**(Chongqing University)** | CHINA | CCSA |
| **CHTTL**<br>**(Chunghwa Telecommunication Laboratories, Chunghwa Telecommunication Co.)** | TAIWAN, PROVINCE OF CHINA | ETSI |
| **CICT**<br>**(China Information Communication Technologies Group)** | CHINA | ETSI |
| **CICT**<br>**(China Information Communication Technologies Group Corporation)** | CHINA | CCSA |
| **CICT Mobile**<br>**(CICT Mobile Communication Technology Co., Ltd.)** | CHINA | CCSA |
| **CICTCI**<br>**(CICT Connected and Intelligent Technologies Co., Ltd)** | CHINA | CCSA |
| **CIS**<br>**(Center for Internet Security)** | UNITED STATES | ETSI |
| **CISA ECD**<br>**(Cybersecurity and Infrastructure Security Agency (CISA) ECD)** | UNITED STATES | ATIS |
| **Cisco Systems**<br>**(Cisco Systems)** | UNITED STATES | ATIS |
| **Cisco Systems Belgium**<br>**(Cisco Systems Belgium)** | BELGIUM | ETSI |
| **Cisco Systems France**<br>**(Cisco Systems France)** | FRANCE | ETSI |
| **CITC**<br>**(CHINA INFORMATION TECHNOLOGY DESIGNING&CONSULTING INSTITUTE CO.,LTD.)** | CHINA | CCSA |
| **CKH IOD UK LIMITED**<br>**(CKH IOD UK LIMITED)** | UNITED KINGDOM | ETSI |
| **CMDI**<br>**(China Mobile Group Design Institute Co., Ltd)** | CHINA | CCSA |
| **CNC**<br>**(CLAP-N-CLANK)** | JAPAN | ETSI |
| **CNES**<br>**(CNES - Centre National d'Etudes Spatiales)** | FRANCE | ETSI |
| **Cobham SatCom A/S**<br>**(Thrane & Thrane A/S)** | DENMARK | ETSI |
| **Cognyte**<br>**(Cognyte Technologies Israel Ltd.)** | ISRAEL | ETSI |
| **Cohere Technologies**<br>**(Cohere Technologies)** | UNITED STATES | ATIS |
| **Collins Aerospace**<br>**(Collins Aerospace)** | UNITED STATES | ATIS |
| **Comba**<br>**(Comba Network Systems Company Limited)** | CHINA | CCSA |
| **Comcast** | UNITED STATES | ATIS |

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|---|---|---|
| **(Comcast)** | | |
| **Comprion GmbH**<br>**(Comprion GmbH)** | GERMANY | ETSI |
| **Comtech Telecommunications Cor**<br>**(Comtech Telecommunications Corp)** | UNITED STATES | ATIS |
| **Consort Digital**<br>**(Consort Digital Private Limited)** | INDIA | ETSI |
| **Continental Automotive**<br>**(Continental Automotive Technologies GmbH)** | GERMANY | ETSI |
| **Convida Wireless**<br>**(Convida Wireless, LLC)** | UNITED STATES | ETSI |
| **Cosmian**<br>**(Cosmian Tech SAS)** | FRANCE | ETSI |
| **CQUPT**<br>**(Chongqing University of Posts and Telecommunications)** | CHINA | CCSA |
| **Crosscall**<br>**(Crosscall)** | FRANCE | ETSI |
| **CSA**<br>**(Cyber Security Agency of Singapore)** | SINGAPORE | ETSI |
| **CSCN**<br>**(CHINA SATELLITE NETWORK GROUP CO., LTD.)** | CHINA | CCSA |
| **CSIRO**<br>**(Commonwealth Scientific and Industrial Research Organisation)** | AUSTRALIA | ETSI |
| **cstconsultancy**<br>**(CyberSecurity & Technology Consultancy LTD)** | UNITED KINGDOM | ETSI |
| **CTSI**<br>**(China Telecom System Integration Co., Ltd)** | CHINA | CCSA |
| **CTTC**<br>**(Centre tecnologic de Telecomunicacions de Catalunya)** | SPAIN | ETSI |
| **CU Digital Technology**<br>**(China Unicom Digital Technology Co., Ltd.)** | CHINA | CCSA |
| **CUC**<br>**(Communication University of China)** | CHINA | CCSA |
| **CUG**<br>**(China Unicom Global Limited)** | CHINA | CCSA |
| **Cybercore**<br>**(Beijinig Cybercore Technology Co., Ltd.)** | CHINA | CCSA |
| **Cygnusemi**<br>**(Cygnusemi)** | CHINA | CCSA |
| **Czech Telecommunication Office**<br>**(Czech Telecommunication Office)** | CZECH REPUBLIC | ETSI |
| **DAC-SSR-UPC**<br>**(D. Arquitectura de Computadores/GT Smart Sustainable Resources -Universidad Politecnica de Cataluna)** | SPAIN | ETSI |
| **DanKook University**<br>**(DanKook University)** | KOREA (REPUBLIC OF) | TTA |
| **DARS TELECOM S.L.**<br>**(DARS TELECOM S.L.)** | SPAIN | ETSI |
| **Datang Linktester Technology**<br>**(Datang Linktester Technology Co., Ltd.)** | CHINA | CCSA |
| **Datang Mobile Com. Equipment**<br>**(Datang Mobile Communications Equipment Co., Ltd)** | CHINA | CCSA |
| **DeepSig Inc**<br>**(DeepSig Inc)** | UNITED STATES | ATIS |
| **DEKRA**<br>**(DEKRA testing and Certification, S.A.U.)** | SPAIN | ETSI |
| **Dell Technologies**<br>**(Dell Technologies)** | UNITED STATES | ATIS |
| **DENSO CORPORATION**<br>**(DENSO CORPORATION)** | JAPAN | ARIB |
| **Department of Telecom**<br>**(Department of Telecommunications)** | INDIA | TSDSI |
| **Dept of Home Affairs**<br>**(Department of Home Affairs)** | AUSTRALIA | ETSI |
| **Deutsche Telekom AG**<br>**(Deutsche Telekom AG)** | GERMANY | ETSI |
| **DIGG** | SWEDEN | ETSI |

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|---|---|---|
| **(Agency for Digital Government)** | | |
| **DISA**<br>**(Defense Information Systems Agency)** | UNITED STATES | ATIS |
| **Dish Network**<br>**(Dish Network)** | UNITED STATES | ATIS |
| **DLR**<br>**(Deutsches Zentrum für Luft- und Raumfahrt e.V.)** | GERMANY | ETSI |
| **DOCOMO Beijing Labs**<br>**(DOCOMO Beijing Communications Laboratories Co., Ltd)** | CHINA | CCSA |
| **DOCOMO Communications Lab.**<br>**(DOCOMO Communications Laboratories Europe GmbH)** | GERMANY | ETSI |
| **Dolby France SAS**<br>**(Dolby France SAS)** | FRANCE | ETSI |
| **Dolby Germany GmbH**<br>**(Dolby Germany GmbH)** | GERMANY | ETSI |
| **Dolby Sweden AB**<br>**(Dolby Sweden AB)** | SWEDEN | ETSI |
| **Dolby Technology India Pvt Ltd**<br>**(Dolby Technology India Pvt Ltd)** | INDIA | TSDSI |
| **Douyin**<br>**(Beijing Douyin Information Service Co., Ltd.)** | CHINA | CCSA |
| **DP**<br>**(DigitalPlatforms SpA)** | ITALY | ETSI |
| **DSIT**<br>**(Department for Science, Innovation and Technology)** | UNITED KINGDOM | ETSI |
| **DTCY**<br>**(Deloitte Tohmatsu Cyber LLC)** | JAPAN | TTC |
| **DTS Licensing Limited**<br>**(DTS Licensing Limited)** | IRELAND | ETSI |
| **EA Consult Services Ltd**<br>**(EA Consult Services Ltd)** | UNITED KINGDOM | ETSI |
| **EBU**<br>**(EBU - European Broadcasting Union)** | SWITZERLAND | ETSI |
| **EchoStar**<br>**(EchoStar)** | UNITED KINGDOM | ETSI |
| **ECTL**<br>**(Enhanced Communications & Technologies Pvt Ltd)** | INDIA | TSDSI |
| **EDF Recherche et Développement**<br>**(EDF)** | FRANCE | ETSI |
| **EFORT**<br>**(Etudes et Formations en Telecommunication)** | FRANCE | ETSI |
| **Elbit Systems**<br>**(Elbit Systems C4I and Cyber Ltd)** | ISRAEL | ETSI |
| **Element Materials Technology**<br>**(Element Materials Technology Warwick Ltd)** | UNITED KINGDOM | ETSI |
| **Elena**<br>**(Elena Geo Systems Pvt Ltd)** | INDIA | TSDSI |
| **Embotech AG**<br>**(Embotech AG)** | SWITZERLAND | ETSI |
| **EMITE**<br>**(EMITE Ingenieria S.L.)** | SPAIN | ETSI |
| **ENENSYS**<br>**(ENENSYS Technologies SA)** | FRANCE | ETSI |
| **Ericsson (China)**<br>**(Ericsson (China) Communications, Co.Ltd)** | CHINA | CCSA |
| **Ericsson España S.A.**<br>**(Ericsson España S.A.)** | SPAIN | ETSI |
| **Ericsson France S.A.S**<br>**(Ericsson France S.A.S)** | FRANCE | ETSI |
| **Ericsson GmbH, Eurolab**<br>**(Ericsson GmbH, Eurolab - Unternehmensbereich Forschung und Entwicklung)** | GERMANY | ETSI |
| **Ericsson Hungary Ltd**<br>**(Ericsson Hungary Ltd)** | HUNGARY | ETSI |
| **Ericsson Inc.**<br>**(Ericsson Incorporated)** | UNITED STATES | ATIS |
| **Ericsson India Private Limited** | INDIA | TSDSI |

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|---|---|---|
| **(Ericsson India Private Limited)** | | |
| **Ericsson Japan K.K.**<br>**(Ericsson Japan K.K.)** | JAPAN | ARIB |
| **Ericsson Limited**<br>**(Ericsson Limited)** | UNITED KINGDOM | ETSI |
| **Ericsson LM**<br>**(Ericsson Telefonaktiebolaget LM)** | SWEDEN | ETSI |
| **Ericsson Telecomunicazioni SpA**<br>**(Ericsson Telecomunicazioni SpA)** | ITALY | ETSI |
| **Ericsson-LG Co., LTD**<br>**(Ericsson-LG Co., LTD)** | KOREA (REPUBLIC OF) | TTA |
| **Erillisverkot**<br>**(Suomen Erillisverkot Oy)** | FINLAND | ETSI |
| **ERNET India**<br>**(ERNET India)** | INDIA | TSDSI |
| **ESA**<br>**(ESA - European Space Agency)** | NETHERLANDS | ETSI |
| **E-SPACE**<br>**(E-SPACE SAS)** | FRANCE | ETSI |
| **ESSEN INNOVATION**<br>**(ESSEN INNOVATION COMPANY LIMITED)** | CHINA | CCSA |
| **E-surfing Digital**<br>**(E-surfing Digital Life Technology Co., Ltd)** | CHINA | CCSA |
| **Esurfing IoT**<br>**(Esurfing IoT Tech Co., Ltd)** | CHINA | CCSA |
| **ETELM**<br>**(Electronique Telematique ETELM)** | FRANCE | ETSI |
| **Etherstack Wireless Limited**<br>**(Etherstack Wireless Limited)** | UNITED KINGDOM | ETSI |
| **ETRI**<br>**(Electronics & Telecommunications Research Institute)** | KOREA (REPUBLIC OF) | TTA |
| **ETS-Lindgren Europe**<br>**(ETS-Lindgren Europe)** | FINLAND | ETSI |
| **EURECOM**<br>**(EURECOM)** | FRANCE | ETSI |
| **Eurofins KCTL**<br>**(Eurofins KCTL Co. Ltd)** | KOREA (REPUBLIC OF) | ETSI |
| **European Commission**<br>**(EC - European Commission)** | BELGIUM | ETSI |
| **European Patent Organisation**<br>**(European Patent Organisation)** | GERMANY | ETSI |
| **EUTC**<br>**(European Utilities Telecom Council (EUTC))** | BELGIUM | ETSI |
| **Eutelsat Group**<br>**(Eutelsat S.A.)** | FRANCE | ETSI |
| **EVE Compliancy Solutions**<br>**(EVE Compliancy Solutions)** | NETHERLANDS | ETSI |
| **Everactive**<br>**(Everactive)** | UNITED STATES | ATIS |
| **F5**<br>**(F5, Inc.)** | UNITED STATES | ETSI |
| **Fabasoft AG**<br>**(Fabasoft AG)** | AUSTRIA | ETSI |
| **Facebook Japan G.K.**<br>**(Facebook Japan G.K.)** | JAPAN | ARIB |
| **Fastweb S.p.A.**<br>**(Fastweb S.p.A.)** | ITALY | ETSI |
| **FAU**<br>**(Friedrich-Alexander-Universität Erlangen-Nürnberg)** | GERMANY | ETSI |
| **FBK**<br>**(Fondazione Bruno Kessler)** | ITALY | ETSI |
| **FCC**<br>**(Federal Communications Commission)** | UNITED STATES | ATIS |
| **Fiberhome Technologies Group**<br>**(Fiberhome Technologies Group)** | CHINA | CCSA |
| **FirstNet** | UNITED STATES | ATIS |

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| **(FirstNet)** | | |
| **FORCE Technology**<br>**(FORCE Technology)** | DENMARK | ETSI |
| **Ford**<br>**(Ford Motor Company)** | UNITED STATES | ETSI |
| **Fraunhofer FOKUS**<br>**(Fraunhofer Institute for Open Communication Systems FOKUS)** | GERMANY | ETSI |
| **Fraunhofer HHI**<br>**(Fraunhofer Institute for Telecommunications, Heinrich Hertz Institute)** | GERMANY | ETSI |
| **Fraunhofer IIS**<br>**(Fraunhofer Institut für Integrierte Schaltungen IIS)** | GERMANY | ETSI |
| **Frequentis AG**<br>**(Frequentis AG)** | AUSTRIA | ETSI |
| **Fujitsu Limited**<br>**(Fujitsu Limited)** | JAPAN | ETSI |
| **Fujitsu Limited**<br>**(Fujitsu Limited..)** | JAPAN | ARIB |
| **Fujitsu Limited**<br>**(Fujitsu Limited.)** | JAPAN | TTC |
| **Futurewei**<br>**(Futurewei Technologies Inc.)** | UNITED STATES | ETSI |
| **Futurewei Technologies**<br>**(Futurewei Technologies)** | UNITED STATES | ATIS |
| **G+D MS**<br>**(Giesecke+Devrient Mobile Security Germany GmbH)** | GERMANY | ETSI |
| **Gatehouse Satcom A/S**<br>**(Gatehouse Satcom A/S )** | DENMARK | ETSI |
| **GDCNI**<br>**(Guangdong Communications and Networks Institute)** | CHINA | CCSA |
| **GE Network Technologies, LLC**<br>**(GE Network Technologies, LLC)** | UNITED STATES | ATIS |
| **GEESPACE**<br>**(ZHE JIANG GEESPACE TECHNOLOGY CO., LTD.)** | CHINA | CCSA |
| **Gigaset Technologies**<br>**(Gigaset Technologies GmbH)** | GERMANY | ETSI |
| **Gilat**<br>**(Gilat Satellite Networks Ltd)** | ISRAEL | ETSI |
| **GIST**<br>**(Gwangju Institute of Science and Technology)** | KOREA (REPUBLIC OF) | TTA |
| **GLOBALSTAR Inc.**<br>**(GLOBALSTAR Inc.)** | UNITED STATES | ETSI |
| **GM - ATCI**<br>**(General Motors - ATCI)** | ISRAEL | ETSI |
| **Google Ireland Limited**<br>**(Google Ireland Limited)** | IRELAND | ETSI |
| **Group 2000**<br>**(Group 2000 Nederland B.V.)** | NETHERLANDS | ETSI |
| **GTRC**<br>**(Georgia Tech Research Corporation)** | UNITED STATES | ETSI |
| **GUANGDONG GENIUS TECHNOLOGY CO**<br>**(GUANGDONG GENIUS TECHNOLOGY CO., LTD. )** | CHINA | CCSA |
| **Guangdong OPPO Mobile Telecom.**<br>**(Guangdong OPPO Mobile Telecommunications Corp., Ltd)** | CHINA | CCSA |
| **GW**<br>**(Greenerwave)** | FRANCE | ETSI |
| **HA/ST**<br>**(HARTING Stiftung & Co. KG)** | GERMANY | ETSI |
| **Hanbat National University**<br>**(Hanbat National University)** | KOREA (REPUBLIC OF) | TTA |
| **Hangzhou Mengyuxiang**<br>**(Hangzhou Mengyuxiang Network Technology Corp., Ltd.)** | CHINA | CCSA |
| **Harman GmbH**<br>**(Harman Becker Automotive Systems GmbH)** | GERMANY | ETSI |
| **HEAD acoustics GmbH**<br>**(HEAD acoustics GmbH)** | GERMANY | ETSI |
| **Hewlett-Packard Enterprise** | FRANCE | ETSI |

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| **(Hewlett-Packard Enterprise)** | | |
| **HiSilicon Technologies Co. Ltd**<br>**(HiSilicon Technologies Co.Ltd)** | CHINA | CCSA |
| **HISPASAT SA**<br>**(HISPASAT SA)** | SPAIN | ETSI |
| **HOME OFFICE**<br>**(HOME OFFICE)** | UNITED KINGDOM | ETSI |
| **Honda Motor Co., Ltd**<br>**(Honda Motor Co., Ltd)** | JAPAN | ARIB |
| **Honor**<br>**(Honor Device Co., Ltd.)** | CHINA | CCSA |
| **Honor**<br>**(Honor Device Co., Ltd)** | CHINA | ETSI |
| **HTC Communications Co., Ltd.**<br>**(HTC Communications Co., Ltd.)** | CHINA | CCSA |
| **Huawei Device Co., Ltd**<br>**(Huawei Device Co., Ltd)** | CHINA | CCSA |
| **HUAWEI TECH. GmbH**<br>**(HUAWEI TECHNOLOGIES Duesseldorf GmbH)** | GERMANY | ETSI |
| **Huawei Tech.(UK) Co.. Ltd**<br>**(Huawei Technologies (UK) Co., Ltd.)** | UNITED KINGDOM | ETSI |
| **Huawei Technologies (Korea)**<br>**(Huawei Technologies (Korea))** | KOREA (REPUBLIC OF) | TTA |
| **HUAWEI TECHNOLOGIES Co. Ltd.**<br>**(Huawei Technologies Co. Ltd.)** | CHINA | ETSI |
| **HuaWei Technologies Co., Ltd**<br>**(HuaWei Technologies Co., Ltd)** | CHINA | CCSA |
| **Huawei Technologies France**<br>**(Huawei Technologies France)** | FRANCE | ETSI |
| **Huawei Technologies Japan K.K.**<br>**(Huawei Technologies Japan K.K.)** | JAPAN | TTC |
| **HUAWEI Technologies Japan K.K.**<br>**(HUAWEI Technologies Japan K.K.)** | JAPAN | ARIB |
| **Huawei Technologies R&D UK**<br>**(Huawei Technologies Research & Development (UK) Limited)** | UNITED KINGDOM | ETSI |
| **Huawei Technologies Sweden AB**<br>**(Huawei Technologies Sweden AB)** | SWEDEN | ETSI |
| **Huawei Telecommunication India**<br>**(Huawei Telecommunication (India) Co. Pvt. Ltd.)** | INDIA | TSDSI |
| **Husqvarna AB**<br>**(Husqvarna AB (publ))** | SWEDEN | ETSI |
| **Hytera Communications Corp.**<br>**(Hytera Communications Corporation Limited)** | CHINA | CCSA |
| **Hyundai Motor Company**<br>**(Hyundai Motor Company)** | KOREA (REPUBLIC OF) | TTA |
| **IBM Europe**<br>**(IBM Europe)** | GERMANY | ETSI |
| **ICS**<br>**(Institute for Communication Systems - University of Surrey)** | UNITED KINGDOM | ETSI |
| **IDEMIA**<br>**(IDEMIA)** | FRANCE | ETSI |
| **IDRBT**<br>**(Institute for Development and Research in Banking Technology)** | INDIA | TSDSI |
| **III**<br>**(Institute for Information Industry)** | TAIWAN, PROVINCE OF CHINA | ETSI |
| **IIIT Bangalore**<br>**(International Institute of Information Technology - Bangalore)** | INDIA | TSDSI |
| **IIIT Naya Raipur**<br>**(International Institute of Information Technology, Naya Raipur)** | INDIA | TSDSI |
| **IISc, Bangalore**<br>**(Indian Institute of Science, Bangalor)** | INDIA | TSDSI |
| **IIT Bhilai**<br>**(Indian Institute of Technology Bhilai)** | INDIA | TSDSI |
| **IIT Bombay**<br>**(Indian Institute of Technology Bombay)** | INDIA | TSDSI |
| **IIT Delhi** | INDIA | TSDSI |

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| **(Indian Institute of Technology Delhi)** | | |
| **IIT Gandhinagar**<br>**(Indian Institute of Technology Gandhinagar)** | INDIA | TSDSI |
| **IIT JODHPUR**<br>**(Indian Institute of Technology Jodhpur)** | INDIA | TSDSI |
| **IIT Kanpur**<br>**(Indidan Institute of Technology Kanpur)** | INDIA | TSDSI |
| **IIT Mandi**<br>**(Indian Institute of Technology Mandi)** | INDIA | TSDSI |
| **IIT Patna**<br>**(Indian Institute of Technology Patna)** | INDIA | TSDSI |
| **IIT, Kharagpur**<br>**(IIT, Kharagpur)** | INDIA | TSDSI |
| **IMDA**<br>**(Infocomm Media Development Authority)** | SINGAPORE | ETSI |
| **Imperial College London**<br>**(Imperial College of Science Technology and Medicine)** | UNITED KINGDOM | ETSI |
| **IMU**<br>**(Istanbul Medipol University)** | TÜRKIYE | ETSI |
| **Indian Institute of Tech (H)**<br>**(Indian Institute of Technology Hyderabad)** | INDIA | TSDSI |
| **Indian Institute of Tech (M)**<br>**(Indian Institute of Technology Madras)** | INDIA | TSDSI |
| **INFINEON TECHNOLOGIES**<br>**(Infineon Technologies)** | GERMANY | ETSI |
| **Inmarsat**<br>**(Inmarsat)** | UNITED KINGDOM | ETSI |
| **Institut Mines-Telecom**<br>**(Institut Mines-Telecom)** | FRANCE | ETSI |
| **Institute VEDECOM**<br>**(Institute VEDECOM)** | FRANCE | ETSI |
| **Intel**<br>**(Intel)** | UNITED STATES | ATIS |
| **Intel Belgium SA/NV**<br>**(Intel Belgium SA/NV)** | BELGIUM | ETSI |
| **Intel China Ltd.**<br>**(Intel China Ltd.)** | CHINA | CCSA |
| **Intel Corporation (UK) Ltd**<br>**(Intel Corporation (UK) Ltd)** | UNITED KINGDOM | ETSI |
| **Intel Corporation Italia SpA**<br>**(Intel Corporation Italia SpA)** | ITALY | ETSI |
| **Intel Corporation SAS**<br>**(Intel Corporation SAS)** | FRANCE | ETSI |
| **Intel Deutschland GmbH**<br>**(Intel Deutschland GmbH)** | GERMANY | ETSI |
| **Intel Ireland**<br>**(Intel Ireland Ltd)** | IRELAND | ETSI |
| **Intel Sweden AB**<br>**(Intel Sweden AB)** | SWEDEN | ETSI |
| **Intel Technology India Pvt Ltd**<br>**(Intel Technology India Pvt. Ltd.)** | INDIA | TSDSI |
| **Intel Technology Poland SP Zoo**<br>**(Intel Technology Poland SP Zoo)** | POLAND | ETSI |
| **Intellian Technologies**<br>**(Intellian Technologies)** | KOREA (REPUBLIC OF) | TTA |
| **Intelsat**<br>**(Intelsat)** | UNITED STATES | ATIS |
| **InterDigital Belgium. LLC**<br>**(InterDigital Belgium, LLC)** | BELGIUM | ETSI |
| **InterDigital Canada**<br>**(InterDigital Canada)** | CANADA | ATIS |
| **InterDigital Communications**<br>**(InterDigital Communications Corporation)** | UNITED STATES | ATIS |
| **InterDigital Finland Oy**<br>**(InterDigital Finland Oy)** | FINLAND | ETSI |
| **InterDigital France R&D, SAS** | FRANCE | ETSI |

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| **(InterDigital France R&D, SAS)** | | |
| **InterDigital New York**<br>**(InterDigital New York)** | UNITED STATES | ATIS |
| **InterDigital Pennsylvania**<br>**(InterDigital Pennsylvania)** | UNITED STATES | ATIS |
| **InterDigital, Europe, Ltd.**<br>**(InterDigital, Europe, Ltd.)** | UNITED KINGDOM | ETSI |
| **InterDigital, Inc.**<br>**(InterDigital, Inc.)** | UNITED STATES | ETSI |
| **Intersec**<br>**(Intersec SA)** | FRANCE | ETSI |
| **Intertek**<br>**(Intertek)** | UNITED KINGDOM | ETSI |
| **IPCom GmbH & Co.KG**<br>**(IPCom GmbH & Co.KG)** | GERMANY | ETSI |
| **IPLOOK**<br>**(IPLOOK Networks Co., Ltd.)** | CHINA | CCSA |
| **iQoo**<br>**(iQoo Software Technology (Shanghai) Co., Ltd.)** | CHINA | CCSA |
| **Iridium Satellite LLC**<br>**(Iridium Satellite LLC)** | UNITED STATES | ATIS |
| **IRT Saint Exupery**<br>**(Institut de recherche technologique Saint Exupery)** | FRANCE | ETSI |
| **ISED**<br>**(Innovation, Science and Economic Development Canada)** | CANADA | ETSI |
| **ISRO**<br>**(Indian Space Research Organisation)** | INDIA | TSDSI |
| **ISSDU**<br>**(Information Security Service Digital United Inc.)** | TAIWAN, PROVINCE OF CHINA | ETSI |
| **ITL**<br>**(Innovative Technology Lab Co., Ltd)** | KOREA (REPUBLIC OF) | TTA |
| **ITOCHU Techno-Solutions Corp**<br>**(ITOCHU Techno-Solutions Corporation)** | JAPAN | TTC |
| **ITRI**<br>**(Industrial Technology Research Institute)** | TAIWAN, PROVINCE OF CHINA | ETSI |
| **ITRON SAS**<br>**(ITRON SAS)** | FRANCE | ETSI |
| **Ittiam System Pvt Ltd**<br>**(Ittiam System Pvt Ltd)** | INDIA | TSDSI |
| **Japan Radio Co., Ltd**<br>**(Japan Radio Co., Ltd)** | JAPAN | ARIB |
| **Jetflow**<br>**(Jetflow Technologies Co., Ltd)** | CHINA | CCSA |
| **Jio**<br>**(Jio Estonia OÜ)** | ESTONIA | ETSI |
| **JMA Wireless**<br>**(JMA Wireless)** | UNITED STATES | ATIS |
| **John Deere GmbH & Co. KG**<br>**(John Deere GmbH & Co. KG)** | GERMANY | ETSI |
| **Johns Hopkins University APL**<br>**(Johns Hopkins University Applied Physics Laboratory)** | UNITED STATES | ATIS |
| **JSI GmbH**<br>**(JSI GmbH)** | GERMANY | ETSI |
| **Juniper Networks**<br>**(Juniper Networks)** | UNITED STATES | ETSI |
| **KAIST**<br>**(Korea Advanced Institute of Science and Technology)** | KOREA (REPUBLIC OF) | TTA |
| **Kapsch TrafficCom AG**<br>**(Kapsch TrafficCom AG)** | AUSTRIA | ETSI |
| **KDDI Corporation**<br>**(KDDI Corporation)** | JAPAN | TTC |
| **KDDI Corporation**<br>**(KDDI Corporation)** | JAPAN | ARIB |
| **Kepler**<br>**(Kepler Communications GmbH)** | GERMANY | ETSI |
| **Keysight Technologies UK Ltd** | UNITED KINGDOM | ETSI |

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| **(Keysight Technologies UK Ltd)** | | |
| **KIPO**<br>**(Korean Intellectual Property Office)** | KOREA (REPUBLIC OF) | TTA |
| **Kontron Transportation France**<br>**(Kontron Transportation France S.A.S)** | FRANCE | ETSI |
| **Kookmin University**<br>**(Kookmin University)** | KOREA (REPUBLIC OF) | TTA |
| **Korea Testing Laboratory**<br>**(Korea Testing Laboratory)** | KOREA (REPUBLIC OF) | TTA |
| **Korea University**<br>**(Korea University)** | KOREA (REPUBLIC OF) | TTA |
| **KPN N.V.**<br>**(Koninklijke KPN N.V.)** | NETHERLANDS | ETSI |
| **KRRI**<br>**(Korea Railroad Research Institute)** | KOREA (REPUBLIC OF) | TTA |
| **KT Corp.**<br>**(KT Corporation)** | KOREA (REPUBLIC OF) | TTA |
| **Kymeta Corporation**<br>**(Kymeta Corporation)** | UNITED STATES | ETSI |
| **Kyocera Corporation**<br>**(Kyocera Corporation)** | JAPAN | ARIB |
| **Kyonggi University**<br>**(Kyonggi University)** | KOREA (REPUBLIC OF) | TTA |
| **Kyoto University**<br>**(Kyoto University)** | JAPAN | ETSI |
| **L.M. Ericsson Limited**<br>**(L.M. Ericsson Limited)** | IRELAND | ETSI |
| **L3Harris Technologies**<br>**(L3Harris Technologies)** | UNITED STATES | ATIS |
| **Langbo**<br>**(Shanghai Langbo Communication Technology Co., Ltd.)** | CHINA | CCSA |
| **Lansus**<br>**(Lansus Technologies Inc.)** | CHINA | CCSA |
| **LEGRAND FRANCE**<br>**(LEGRAND FRANCE ISERE)** | FRANCE | ETSI |
| **Lekha Wireless Solutions**<br>**(Lekha Wireless Solutions Pvt Ltd)** | INDIA | TSDSI |
| **Lenovo (Beijing) Ltd**<br>**(Lenovo (Beijing) Ltd)** | CHINA | CCSA |
| **Lenovo Future Communications**<br>**(Lenovo Future Communications Technology (Chongqing) Co., Ltd.)** | CHINA | CCSA |
| **Lenovo Information Technology**<br>**(Lenovo (Beijing) Information Technology Co., Ltd.)** | CHINA | CCSA |
| **Leonardo SpA**<br>**(Leonardo SpA)** | ITALY | ETSI |
| **LG Electronics Deutschland**<br>**(LG Electronics Deutschland GmbH)** | GERMANY | ETSI |
| **LG Electronics Finland**<br>**(LG Electronics Finland Lab Oy)** | FINLAND | ETSI |
| **LG Electronics France**<br>**(LG Electronics France)** | FRANCE | ETSI |
| **LG Electronics Inc.**<br>**(LG Electronics Inc.)** | KOREA (REPUBLIC OF) | TTA |
| **LG Electronics Polska**<br>**(LG Electronics Polska Sp. z.o.o.)** | POLAND | ETSI |
| **LG Electronics UK**<br>**(LG Electronics UK Ltd)** | UNITED KINGDOM | ETSI |
| **LG Uplus**<br>**(LG Uplus)** | KOREA (REPUBLIC OF) | TTA |
| **Ligado Networks**<br>**(Ligado Networks)** | UNITED STATES | ETSI |
| **LKA Niedersachsen**<br>**(Landeskriminalamt Niedersachsen)** | GERMANY | ETSI |
| **Lockheed Martin**<br>**(Lockheed Martin)** | UNITED STATES | ATIS |
| **Logius** | NETHERLANDS | ETSI |

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| **(Logius)** | | |
| **Lynk Global**<br>**(Lynk Global)** | UNITED STATES | ATIS |
| **Magister Solutions Ltd**<br>**(Magister Solutions Ltd)** | FINLAND | ETSI |
| **Maketh Secure Limited**<br>**(Maketh Secure Limited)** | UNITED KINGDOM | ETSI |
| **Marquis Technologies**<br>**(Marquis Technologies Pvt Ltd)** | INDIA | TSDSI |
| **Marvell Technology, Inc.**<br>**(Marvell Technology, Inc.)** | UNITED STATES | ATIS |
| **MATRIXX Software**<br>**(MATRIXX Software, Inc.)** | UNITED STATES | ETSI |
| **Mavenir**<br>**(Mavenir Systems, Inc)** | UNITED STATES | ETSI |
| **MaxWave Micro**<br>**(MaxWave Microelectronics Ltd.)** | CHINA | CCSA |
| **MediaTek (Chengdu) Inc.**<br>**(MediaTek (Chengdu) Inc.)** | CHINA | CCSA |
| **MediaTek (Hefei) Inc.**<br>**(MediaTek (Hefei) Inc.)** | CHINA | CCSA |
| **MediaTek (Shenzhen) Inc.**<br>**(MediaTek (Shenzhen) Inc.)** | CHINA | CCSA |
| **MediaTek (Wuhan) Inc.**<br>**(MediaTek (Wuhan) Inc.)** | CHINA | CCSA |
| **MediaTek Beijing Inc.**<br>**(MediaTek Beijing Inc.)** | CHINA | CCSA |
| **MediaTek Finland**<br>**(MediaTek Wireless Finland Oy)** | FINLAND | ETSI |
| **MediaTek Germany GmbH**<br>**(MediaTek Germany GmbH)** | GERMANY | ETSI |
| **MediaTek Inc.**<br>**(MediaTek Incorporated)** | TAIWAN, PROVINCE OF CHINA | ETSI |
| **Mediatek India Technology Pvt.**<br>**(Mediatek India Technology Pvt. Ltd.)** | INDIA | TSDSI |
| **MediaTek Korea Inc.**<br>**(MediaTek Korea Inc.)** | KOREA (REPUBLIC OF) | TTA |
| **MediaTek Sweden AB**<br>**(MediaTek Sweden AB)** | SWEDEN | ETSI |
| **MediaTek UK**<br>**(MTK Wireless Ltd)** | UNITED KINGDOM | ETSI |
| **MeitY**<br>**(Ministry of Electronics & Information Technology)** | INDIA | TSDSI |
| **Meizu Technology**<br>**(Meizu Technology)** | CHINA | CCSA |
| **Mercedes-Benz AG**<br>**(Mercedes-Benz AG)** | GERMANY | ETSI |
| **Mesaqin.com s.r.o (Ltd.)**<br>**(Mesaqin.com s.r.o (Ltd.))** | CZECH REPUBLIC | ETSI |
| **Meta India**<br>**(Meta India Online Services Pvt Ltd)** | INDIA | TSDSI |
| **Meta Ireland**<br>**(Meta Platforms Ireland Ltd.)** | IRELAND | ETSI |
| **Meta USA**<br>**(Meta USA)** | UNITED STATES | ATIS |
| **Microchip Technology, Inc.**<br>**(Microchip Technology, Inc.)** | UNITED STATES | ATIS |
| **Microsoft Europe SARL**<br>**(Microsoft Europe SARL)** | FRANCE | ETSI |
| **MidWave Wireless**<br>**(MidWave Wireless)** | UNITED STATES | ATIS |
| **MIMIT**<br>**(Ministry of Enterprises and Made in Italy)** | ITALY | ETSI |
| **MinEA**<br>**(Ministry of Economic Affairs and Climate Policy)** | NETHERLANDS | ETSI |
| **MINISTERE DE L'INTERIEUR** | FRANCE | ETSI |

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| **(MINISTERE DE L'INTERIEUR)** | | |
| **Ministère Economie et Finances**<br>**(Ministère de l'Economie et des Finances)** | FRANCE | ETSI |
| **Ministry for Digital - Spain**<br>**(Ministry for Digital Transformation and of Civil Service)** | SPAIN | ETSI |
| **Ministry of Transport SR**<br>**(Ministry of Transport of the Slovak Republic)** | SLOVAKIA | ETSI |
| **MITRE Corporation**<br>**(MITRE Corporation)** | UNITED STATES | ETSI |
| **MITRE-FFRDC**<br>**(MITRE-FFRDC)** | UNITED STATES | ATIS |
| **Mitsubishi Electric Co.**<br>**(Mitsubishi Electric Co.)** | JAPAN | ARIB |
| **Mitsubishi Electric Corp**<br>**(Mitsubishi Electric Corporation)** | JAPAN | TTC |
| **Mitsubishi Electric RCE**<br>**(Mitsubishi Electric R&D Centre Europe)** | FRANCE | ETSI |
| **Motorola Mobile Com Technology**<br>**(MOTOROLA MOBILE COMMUNICATION TECHNOLOGY LTD.)** | CHINA | CCSA |
| **Motorola Mobility España SA**<br>**(Motorola Mobility España SA)** | SPAIN | ETSI |
| **Motorola Mobility France S.A.S**<br>**(Motorola Mobility France S.A.S)** | FRANCE | ETSI |
| **Motorola Mobility Germany GmbH**<br>**(Motorola Mobility Germany GmbH)** | GERMANY | ETSI |
| **Motorola Mobility UK Ltd.**<br>**(Motorola Mobility UK Ltd.)** | UNITED KINGDOM | ETSI |
| **Motorola Solutions Germany**<br>**(Motorola Solutions Germany GmbH)** | GERMANY | ETSI |
| **Motorola Solutions UK Ltd.**<br>**(Motorola Solutions UK Ltd.)** | UNITED KINGDOM | ETSI |
| **MTCC**<br>**(Mobile Technology Convergence Center)** | KOREA (REPUBLIC OF) | TTA |
| **Murata Manufacturing Co Ltd.**<br>**(Murata Manufacturing Co Ltd.)** | JAPAN | ARIB |
| **MVG Industries**<br>**(MVG Industries)** | FRANCE | ETSI |
| **Nanjing vivo Software Tech.**<br>**(Nanjing vivo Software Technology Co., Ltd.)** | CHINA | CCSA |
| **Nanjing Weibo**<br>**(Nanjing Weibo Software Technology Co., Ltd.)** | CHINA | CCSA |
| **National Instruments Corp.**<br>**(National Instruments Corporation)** | UNITED STATES | ETSI |
| **National Radio Research Agency**<br>**(National Radio Research Agency)** | KOREA (REPUBLIC OF) | TTA |
| **National Spectrum Consortium**<br>**(National Spectrum Consortium)** | UNITED STATES | ATIS |
| **National Technical Assistance**<br>**(National Technical Assistance Centre)** | UNITED KINGDOM | ETSI |
| **nbn co Limited**<br>**(nbn co Limited (ABN 86 136 533 741))** | AUSTRALIA | ETSI |
| **NCI Agency**<br>**(NATO Communication and Information Agency)** | NETHERLANDS | ETSI |
| **NCIS**<br>**(National Criminal Investigation Service)** | NORWAY | ETSI |
| **NCSC**<br>**(National Cyber Security Centre)** | UNITED KINGDOM | ETSI |
| **NDRE**<br>**(National Defence Radio Establishment)** | SWEDEN | ETSI |
| **NEC Corporation**<br>**(NEC Corporation)** | JAPAN | ARIB |
| **NEC Corporation**<br>**(NEC Corporation)** | JAPAN | ETSI |
| **NEC Corporation.**<br>**(NEC Corporation)** | JAPAN | TTC |
| **NEC Europe Ltd** | UNITED KINGDOM | ETSI |

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| **(NEC Europe Ltd)** | | |
| **NEC Telecom MODUS Ltd.**<br>**(NEC Telecom MODUS Ltd.)** | UNITED KINGDOM | ETSI |
| **NEMERGENT**<br>**(NEMERGENT SOLUTIONS SL)** | SPAIN | ETSI |
| **NERCDTV**<br>**(Shanghai National Engineering Research Center of Digital Television Co.,Ltd.)** | CHINA | CCSA |
| **Netherlands Police**<br>**(Netherlands Police, Division MDC)** | NETHERLANDS | ETSI |
| **Netscout Systems Inc.**<br>**(Netscout Systems Inc.)** | UNITED STATES | ETSI |
| **Network Rail**<br>**(Network Rail infrastructure limited)** | UNITED KINGDOM | ETSI |
| **New H3C Technologies Co., Ltd.**<br>**(New H3C Technologies Co., Ltd.)** | CHINA | CCSA |
| **NextNav**<br>**(NextNav)** | UNITED STATES | ATIS |
| **NHK**<br>**(NHK (Japan Broadcasting Corporation))** | JAPAN | ARIB |
| **NICT**<br>**(National Institute of Information and Communications Technology)** | JAPAN | ARIB |
| **Niral**<br>**(Niral Networks Private Limited)** | INDIA | TSDSI |
| **NIST**<br>**(National Institute of Standards and Technology)** | UNITED STATES | ATIS |
| **Nkom**<br>**(Norwegian Communications Authority)** | NORWAY | ETSI |
| **Nokia**<br>**(Nokia)** | UNITED STATES | ATIS |
| **Nokia Belgium**<br>**(Nokia Bell N.V.)** | BELGIUM | ETSI |
| **Nokia Corporation**<br>**(Nokia Corporation)** | FINLAND | ETSI |
| **Nokia Denmark**<br>**(Nokia Denmark A/S)** | DENMARK | ETSI |
| **Nokia France**<br>**(Nokia Networks France)** | FRANCE | ETSI |
| **Nokia Germany**<br>**(Nokia Solutions and Networks GmbH & Co. KG)** | GERMANY | ETSI |
| **Nokia Hungary**<br>**(Nokia Solutions and Networks Kft.)** | HUNGARY | ETSI |
| **Nokia Japan**<br>**(Nokia Japan)** | JAPAN | ARIB |
| **Nokia Korea**<br>**(Nokia Korea)** | KOREA (REPUBLIC OF) | TTA |
| **Nokia Poland**<br>**(Nokia Solutions and Networks Sp. z.o.o.)** | POLAND | ETSI |
| **Nokia Shanghai Bell**<br>**(Nokia Shanghai Bell Co., Ltd)** | CHINA | CCSA |
| **Nokia Solutions & Networks (I)**<br>**(Nokia Solutions and Networks India Pvt. Ltd.)** | INDIA | TSDSI |
| **Nokia UK**<br>**(Nokia UK Ltd.)** | UNITED KINGDOM | ETSI |
| **Nordic Semiconductor ASA**<br>**(Nordic Semiconductor ASA)** | NORWAY | ETSI |
| **NOVAMINT**<br>**(NOVAMINT)** | UNITED KINGDOM | ETSI |
| **NPL**<br>**(National Physical Laboratory Management Ltd)** | UNITED KINGDOM | ETSI |
| **NTIA**<br>**(National Telecommunications and Information Administration)** | UNITED STATES | ATIS |
| **NTPU**<br>**(National Taipei University)** | TAIWAN, PROVINCE OF CHINA | ETSI |
| **NTT**<br>**(Nippon Telegraph and Telephone Corporation (NTT))** | JAPAN | TTC |
| **NTT corporation** | JAPAN | ETSI |

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| **(Nippon Telegraph and Telephone Corporation)** | | |
| **NTT DOCOMO INC.**<br>**(NTT DOCOMO INC.)** | JAPAN | TTC |
| **NTT DOCOMO INC..**<br>**(NTT DOCOMO INC.)** | JAPAN | ARIB |
| **NTT-AT Corp.**<br>**(NTT Advanced Technology Corporation)** | JAPAN | TTC |
| **NTU**<br>**(National Taiwan University)** | TAIWAN, PROVINCE OF CHINA | ETSI |
| **Nubia Technology Co.,Ltd**<br>**(Nubia Technology Co.,Ltd)** | CHINA | CCSA |
| **NUFRONT**<br>**(Nufront (Beijing) Technology Co., Ltd.)** | CHINA | CCSA |
| **NVIDIA**<br>**(NVIDIA Corporation)** | UNITED STATES | ATIS |
| **NXP Semiconductors Netherlands**<br>**(NXP Semiconductors Netherlands B.V.)** | NETHERLANDS | ETSI |
| **NYCU**<br>**(National Yang Ming Chiao Tung University)** | TAIWAN, PROVINCE OF CHINA | ETSI |
| **Obvios**<br>**(Obvios)** | FRANCE | ETSI |
| **Odido**<br>**(Odido Netherlands B.V.)** | NETHERLANDS | ETSI |
| **Ofcom (CH)**<br>**(Ofcom (CH))** | SWITZERLAND | ETSI |
| **Ofcom (U.K.)**<br>**(Ofcom - Office of Communications (U.K.))** | UNITED KINGDOM | ETSI |
| **Oki Electric Industry Co. Ltd.**<br>**(OKi Electric Industry Co., Ltd)** | JAPAN | TTC |
| **Omnispace**<br>**(Omnispace)** | UNITED STATES | ATIS |
| **ONE Media 3.0 LLC**<br>**(ONE Media 3.0 LLC)** | UNITED STATES | ATIS |
| **one2many B.V.**<br>**(one2many B.V.)** | NETHERLANDS | ETSI |
| **OnePlus**<br>**(OnePlus (Shenzhen) Technology Co., LTD)** | CHINA | CCSA |
| **OPPO**<br>**(Guangdong OPPO Mobile Telecommunications Corp.,Ltd.)** | CHINA | ETSI |
| **OPPO (chongqing) Intelligence**<br>**(OPPO (chongqing) Intelligence Technology Limited)** | CHINA | CCSA |
| **OPPO Beijing**<br>**(Beijing OPPO Telecommunications Corp., ltd.)** | CHINA | CCSA |
| **OptM Media**<br>**(OptM Media Solutions Private Limited)** | INDIA | TSDSI |
| **OQTEC**<br>**(OQ TECHNOLOGY)** | LUXEMBOURG | ETSI |
| **Oracle Corporation**<br>**(Oracle Corporation)** | UNITED STATES | ETSI |
| **Orange**<br>**(Orange)** | FRANCE | ETSI |
| **Orange Romania**<br>**(Orange Romania)** | ROMANIA | ETSI |
| **Orange Spain**<br>**(France Telecom España S.A.U.)** | SPAIN | ETSI |
| **Orange UK**<br>**(Orange Brand Services Ltd)** | UNITED KINGDOM | ETSI |
| **ORS**<br>**(Österreichische Rundfunksender GmbH & Co KG)** | AUSTRIA | ETSI |
| **OTD_US**<br>**(OTD_US)** | UNITED STATES | ATIS |
| **OTE S.A**<br>**(OTE S.A)** | GREECE | ETSI |
| **P.I. WORKS**<br>**(P.I. WORKS TR BILISIM HIZMETLERI A.S.)** | TÜRKIYE | ETSI |
| **Pairpoint** | UNITED KINGDOM | ETSI |

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| **(DABCO Ltd)** | | |
| **Panasonic Holdings Corporation**<br>**(Panasonic Holdings Corporation)** | JAPAN | ARIB |
| **PANASONIC R&D Center Germany**<br>**(PANASONIC R&D Center Germany GmbH)** | GERMANY | ETSI |
| **PCCW Global B.V.**<br>**(PCCW Global B.V.)** | FRANCE | ETSI |
| **PCI**<br>**(Philips (China) Investment Co., Ltd.)** | CHINA | CCSA |
| **Peking University**<br>**(Peking University)** | CHINA | CCSA |
| **Pengcheng laboratory**<br>**(Pengcheng laboratory)** | CHINA | CCSA |
| **Peraton Labs**<br>**(Peraton Labs)** | UNITED STATES | ATIS |
| **Philips International B.V.**<br>**(Philips International B.V.)** | NETHERLANDS | ETSI |
| **PHY Wireless**<br>**(PHY Wireless)** | UNITED STATES | ATIS |
| **PIDS**<br>**(PIDS)** | NETHERLANDS | ETSI |
| **PKUSZ**<br>**(Peking university shenzhen graduate school)** | CHINA | CCSA |
| **Plan-S**<br>**(Plan S Uydu ve Uzay Teknolojileri A.S)** | TÜRKIYE | ETSI |
| **PML**<br>**(Purple Mountain Laboratories: Networking, Communications and Security)** | CHINA | CCSA |
| **Polaris Wireless**<br>**(Polaris Wireless)** | UNITED STATES | ATIS |
| **Polisen**<br>**(Polismyndigheten)** | SWEDEN | ETSI |
| **POST Luxembourg**<br>**(POST Luxembourg)** | LUXEMBOURG | ETSI |
| **Prasar Bharati**<br>**(Prasar Bharati)** | INDIA | TSDSI |
| **Proximus Plc**<br>**(Proximus Plc)** | BELGIUM | ETSI |
| **PSCE**<br>**(Public Safety Communication Europe Forum)** | BELGIUM | ETSI |
| **PT PORTUGAL SGPS SA**<br>**(PT Portugal SGPS SA)** | PORTUGAL | ETSI |
| **PTS**<br>**(Swedish Post and Telecom Authority)** | SWEDEN | ETSI |
| **Public Safety Canada**<br>**(Public Safety Canada)** | CANADA | ETSI |
| **Qihoo 360**<br>**(Qihoo 360 Technology Co., Ltd.)** | CHINA | CCSA |
| **Qorvo**<br>**(Qorvo)** | UNITED STATES | ETSI |
| **Qualcomm Atheros, Inc.**<br>**(Qualcomm Atheros, Inc.)** | UNITED STATES | ATIS |
| **QUALCOMM Europe Inc. - Italy**<br>**(QUALCOMM Europe Inc. - Italy Branch Office)** | ITALY | ETSI |
| **QUALCOMM Europe Inc. - Spain**<br>**(QUALCOMM Europe Inc. - Spain Branch Office)** | SPAIN | ETSI |
| **Qualcomm France**<br>**(Qualcomm France SARL)** | FRANCE | ETSI |
| **Qualcomm Germany**<br>**(Qualcomm Germany GmbH)** | GERMANY | ETSI |
| **Qualcomm Incorporated**<br>**(Qualcomm Incorporated)** | UNITED STATES | ATIS |
| **Qualcomm India Pvt Ltd**<br>**(Qualcomm India Pvt Ltd)** | INDIA | TSDSI |
| **Qualcomm Innovation Center Inc**<br>**(Qualcomm Innovation Center, Inc.)** | UNITED STATES | ATIS |
| **QUALCOMM JAPAN LLC.** | JAPAN | ARIB |

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| **(QUALCOMM JAPAN LLC.)** | | |
| **Qualcomm Korea**<br>**(Qualcomm Korea)** | KOREA (REPUBLIC OF) | TTA |
| **Qualcomm Tech. Netherlands B.V**<br>**(Qualcomm Technologies Netherlands B.V.)** | NETHERLANDS | ETSI |
| **Qualcomm Technologies**<br>**(Qualcomm Technologies)** | UNITED STATES | ATIS |
| **Qualcomm Technologies Int**<br>**(Qualcomm Technologies International, Ltd)** | UNITED KINGDOM | ETSI |
| **Qualcomm Technologies Ireland**<br>**(QT Technologies Ireland Limited)** | IRELAND | ETSI |
| **Quanray**<br>**(Shanghai Quanray Electronics Co., Ltd.)** | CHINA | CCSA |
| **Quectel**<br>**(Quectel Wireless Solutions Co., Ltd.)** | CHINA | CCSA |
| **QWCT**<br>**(QUALCOMM Wireless Communication Technologies (China) Limited)** | CHINA | CCSA |
| **RadiSys**<br>**(RadiSys Inc.)** | CANADA | ETSI |
| **Rakuten Mobile, Inc**<br>**(Rakuten Mobile, Inc)** | JAPAN | ARIB |
| **RATEL**<br>**(Regulatory Authority For Electronic Communications and Postal Services)** | SERBIA | ETSI |
| **Realme (Shenzhen)**<br>**(Realme Mobile Telecommunications (Shenzhen) Co., Ltd.)** | CHINA | CCSA |
| **Reflection B.V.**<br>**(Reflection Investment B.V.)** | NETHERLANDS | ETSI |
| **Reliance Jio**<br>**(Reliance Jio)** | INDIA | TSDSI |
| **RICHTEK KOREA**<br>**(RICHTEK KOREA)** | KOREA (REPUBLIC OF) | TTA |
| **RISE**<br>**(RISE Research Institutes of Sweden)** | SWEDEN | ETSI |
| **ROBERT BOSCH GmbH**<br>**(ROBERT BOSCH GmbH)** | GERMANY | ETSI |
| **Rogers Communications Canada**<br>**(Rogers Communications Canada Inc.)** | CANADA | ETSI |
| **ROHDE & SCHWARZ**<br>**(ROHDE & SCHWARZ GmbH & Co.KG)** | GERMANY | ETSI |
| **Ruijie Network Co. Ltd**<br>**(Ruijie Network Co. Ltd)** | CHINA | CCSA |
| **SageRAN**<br>**(Guangdong Sageran Technology Co., Ltd)** | CHINA | CCSA |
| **SAICT**<br>**(Shenzhen Academy of Information and Communication Technology)** | CHINA | CCSA |
| **Samsung Electronics Co., Ltd**<br>**(Samsung Electronics Co., Ltd.)** | KOREA (REPUBLIC OF) | TTA |
| **Samsung Electronics Czech**<br>**(Samsung Electronics Czech)** | CZECH REPUBLIC | ETSI |
| **Samsung Electronics France SA**<br>**(Samsung Electronics France SA)** | FRANCE | ETSI |
| **Samsung Electronics GmbH**<br>**(Samsung Electronics GmbH)** | GERMANY | ETSI |
| **Samsung Electronics Iberia SA**<br>**(Samsung Electronics Iberia SA)** | SPAIN | ETSI |
| **Samsung Electronics Nordic AB**<br>**(Samsung Electronics Nordic AB)** | SWEDEN | ETSI |
| **Samsung Electronics Polska**<br>**(Samsung Electronics Polska)** | POLAND | ETSI |
| **Samsung Guangzhou Mobile R&D**<br>**(Samsung Guangzhou Mobile R&D Center)** | CHINA | CCSA |
| **Samsung Nanjing**<br>**(Samsung Electronic (China) R&D Center)** | CHINA | CCSA |
| **Samsung R&D Institute India**<br>**(Samsung R&D Institute India - Bangalore Pvt. Ltd)** | INDIA | TSDSI |
| **SAMSUNG R&D INSTITUTE JAPAN** | JAPAN | ARIB |

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| **(SAMSUNG R&D INSTITUTE JAPAN)** | | |
| **Samsung R&D Institute UK**<br>**(Samsung R&D Institute UK)** | UNITED KINGDOM | ETSI |
| **Samsung Research America**<br>**(Samsung Research America)** | UNITED STATES | ATIS |
| **Samsung Shenzhen**<br>**(Samsung Network R&D Center-Shenzhen)** | CHINA | CCSA |
| **Sanechips**<br>**(Sanechips Technology Co. , Ltd.)** | CHINA | CCSA |
| **Sateliot**<br>**(Satelio IoT Services)** | SPAIN | ETSI |
| **Schindler**<br>**(Schindler Elevator Ltd)** | SWITZERLAND | ETSI |
| **SDI Squared**<br>**(SDI Squared LLC)** | UNITED STATES | ETSI |
| **Sectra Communications AB**<br>**(Sectra Communications AB)** | SWEDEN | ETSI |
| **Security Service**<br>**(Swedish Security Service)** | SWEDEN | ETSI |
| **Semtech Neuchatel SA**<br>**(Semtech Neuchatel SA)** | SWITZERLAND | ETSI |
| **Sennheiser electronic SE**<br>**(Sennheiser electronic SE & Co. KG)** | GERMANY | ETSI |
| **Sensus UK**<br>**(Sensus UK Systems Limited)** | UNITED KINGDOM | ETSI |
| **Sepura Ltd**<br>**(Sepura Limited)** | UNITED KINGDOM | ETSI |
| **Sequans Communications**<br>**(Sequans Communications)** | FRANCE | ETSI |
| **SES S.A.**<br>**(SES S.A.)** | LUXEMBOURG | ETSI |
| **SETS**<br>**(Society for Electronic Transactions and Security)** | INDIA | TSDSI |
| **SEU**<br>**(Southeast University)** | CHINA | CCSA |
| **SGDSN**<br>**(Secrétariat Général de la Défense et de la Sécurité Nationale (SGDSN))** | FRANCE | ETSI |
| **SGITG**<br>**(State Grid Information & Telecommunication Group Co., Ltd.)** | CHINA | CCSA |
| **SGS Wireless**<br>**(SGS Wireless)** | UNITED KINGDOM | ETSI |
| **Shanghai Chen Si Electronics**<br>**(Shanghai Chen Si Electronics Technology Co., Ltd)** | CHINA | CCSA |
| **Shanghai Jiao Tong University**<br>**(Shanghai Jiao Tong University)** | CHINA | CCSA |
| **Shanghai Tejet Com Technology**<br>**(Shanghai Tejet Communications Technology Co., Ltd.)** | CHINA | CCSA |
| **SHARP Corporation**<br>**(SHARP Corporation)** | JAPAN | ARIB |
| **Shenzhen Heytap**<br>**(Shenzhen Heytap Technology Corp.,Ltd.)** | CHINA | CCSA |
| **ShenZhen Zhongxing Shitong**<br>**(ShenZhen Zhongxing Shitong Tech. Co.,Ltd.)** | CHINA | CCSA |
| **SIA**<br>**(Shenyang Institute of Automation, Chinese Academy of Sciences)** | CHINA | CCSA |
| **Siemens AG**<br>**(Siemens AG)** | GERMANY | ETSI |
| **Signalchip Innovations Pvt.**<br>**(Signalchip Innovations Pvt. Ltd.)** | INDIA | TSDSI |
| **SIST**<br>**(Slovenian Institute for Standardisation)** | SLOVENIA | ETSI |
| **Sisvel**<br>**(Sisvel International S.A.)** | LUXEMBOURG | ETSI |
| **SK Telecom**<br>**(SK TELECOM)** | KOREA (REPUBLIC OF) | TTA |
| **SKY Perfect JSAT Corporation** | JAPAN | ARIB |

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| **(SKY Perfect JSAT Corporation)** | | |
| **Skylo Technologies**<br>**(Skylo Technologies)** | UNITED STATES | ATIS |
| **Skyworks Solutions Inc.**<br>**(Skyworks Solutions Inc.)** | UNITED STATES | ETSI |
| **Smart Internet Lab**<br>**(Smart Internet Lab, University of Bristol)** | UNITED KINGDOM | ETSI |
| **SmarterMicro Inc.**<br>**(Smarter Microelectronics(Guangzhou) Co.,Ltd)** | CHINA | CCSA |
| **SnT - University of Luxembourg**<br>**(Interdisciplinary Centre for Security, Reliability and Trust/University of Luxembourg)** | LUXEMBOURG | ETSI |
| **SoftBank Corp.**<br>**(SoftBank Corp.)** | JAPAN | ARIB |
| **Softel Systems**<br>**(Softel Systems Pty Ltd)** | AUSTRALIA | ETSI |
| **Softil Ltd**<br>**(Softil Ltd)** | ISRAEL | ETSI |
| **Sony Corporation**<br>**(Sony Corporation)** | JAPAN | ARIB |
| **Sony Europe B.V.**<br>**(Sony Europe B.V.)** | UNITED KINGDOM | ETSI |
| **Sony Group Corporation**<br>**(Sony Group Corporation)** | JAPAN | ARIB |
| **Sooktha Consulting Pvt Ltd**<br>**(Sooktha Consulting Pvt Ltd)** | INDIA | TSDSI |
| **Soongsil University**<br>**(Soongsil University)** | KOREA (REPUBLIC OF) | TTA |
| **SOS Alarm**<br>**(SOS Alarm Sverige AB)** | SWEDEN | ETSI |
| **Southern Linc.**<br>**(Southern Linc.)** | UNITED STATES | ATIS |
| **Southwest Jiaotong university**<br>**(Southwest Jiaotong university)** | CHINA | CCSA |
| **SpaceX**<br>**(SpaceX Netherlands B.V)** | NETHERLANDS | ETSI |
| **Spark NZ Ltd**<br>**(Spark NZ Ltd)** | NEW ZEALAND | ATIS |
| **Spirent Communications**<br>**(Spirent Communications)** | UNITED STATES | ETSI |
| **Sporton International Inc**<br>**(Sporton International Inc.)** | TAIWAN, PROVINCE OF CHINA | ETSI |
| **Spreadtrum Communications**<br>**(Spreadtrum Communications (Shanghai) Co., Ltd.)** | CHINA | CCSA |
| **SRTC**<br>**(The State Radio_monitoring_center Testing Center)** | CHINA | CCSA |
| **SS8**<br>**(SS8 Networks Inc.)** | UNITED STATES | ETSI |
| **SSNS**<br>**(Special Service for the National Security of Hungary)** | HUNGARY | ETSI |
| **Starpoint**<br>**(Beijing Starpoint Technology Company Limited)** | CHINA | CCSA |
| **STE IDIRECT IRELAND LTD**<br>**(ST ENGINEERING IDIRECT (IRELAND) LIMITED)** | IRELAND | ETSI |
| **STMicroelectronics**<br>**(STMicroelectronics International NV)** | SWITZERLAND | ETSI |
| **Sumitomo Elec. Industries, Ltd**<br>**(Sumitomo Electric Industries, Ltd.)** | JAPAN | ARIB |
| **SUNGKYUNKWAN UNIVERSITY**<br>**(SUNGKYUNKWAN UNIVERSITY)** | KOREA (REPUBLIC OF) | TTA |
| **SUTD**<br>**(Singapore University of Technology and Design)** | SINGAPORE | ETSI |
| **Swift Navigation**<br>**(Swift Navigation)** | UNITED STATES | ATIS |
| **SWISSCOM**<br>**(SWISSCOM SA)** | SWITZERLAND | ETSI |
| **SWR** | GERMANY | ETSI |

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| **(Südwestrundfunk)** | | |
| **SyncTechno Inc.**<br>**(SyncTechno Inc.)** | KOREA (REPUBLIC OF) | TTA |
| **Syniverse**<br>**(M/s Syniverse Technologies Services India Pvt. Ltd.)** | INDIA | TSDSI |
| **TA**<br>**(Tantra Analyst)** | UNITED STATES | ETSI |
| **Tait Europe Limited**<br>**(Tait Europe Limited)** | AUSTRIA | ETSI |
| **TATA Communications Ltd**<br>**(TATA Communications Ltd)** | INDIA | TSDSI |
| **Tata Elxsi Limited.**<br>**(Tata Elxsi Limited.)** | INDIA | TSDSI |
| **TCL**<br>**(Shenzhen TCL New Technology Company Ltd.)** | CHINA | CCSA |
| **TCS**<br>**(TATA Consultancy Services)** | INDIA | TSDSI |
| **TD Tech Ltd**<br>**(TD Tech Ltd)** | CHINA | CCSA |
| **TDF**<br>**(TDF SAS)** | FRANCE | ETSI |
| **Tech Mahindra Limited**<br>**(Tech Mahindra Limited)** | INDIA | TSDSI |
| **Tejas Network Limited**<br>**(Tejas Network Limited)** | INDIA | TSDSI |
| **Tektronix GmbH**<br>**(Tektronix GmbH)** | GERMANY | ETSI |
| **TELECOM ITALIA S.p.A.**<br>**(Telecom Italia S.p.A.)** | ITALY | ETSI |
| **Telefonica Germany GmbH**<br>**(Telefónica Germany GmbH & Co OHG)** | GERMANY | ETSI |
| **TELEFONICA S.A.**<br>**(TELEFONICA S.A.)** | SPAIN | ETSI |
| **Telekom Deutschland GmbH**<br>**(Telekom Deutschland GmbH)** | GERMANY | ETSI |
| **TELENOR ASA**<br>**(Telenor ASA)** | NORWAY | ETSI |
| **Telesat International Limited**<br>**(Telesat International Limited)** | UNITED KINGDOM | ETSI |
| **Telia Company AB**<br>**(Telia Company AB)** | SWEDEN | ETSI |
| **Telit Communications S.p.A.**<br>**(Telit Communications S.p.A.)** | ITALY | ETSI |
| **Telstra Limited**<br>**(Telstra Limited)** | AUSTRALIA | ETSI |
| **TELUS**<br>**(TELUS)** | CANADA | ATIS |
| **Tencent**<br>**(Shenzhen city Tencent computer system Co. Ltd.)** | CHINA | CCSA |
| **Tencent Cloud**<br>**(Tencent cloud computing Beijing Co., Ltd)** | CHINA | CCSA |
| **Teradyne**<br>**(Teradyne)** | UNITED STATES | ATIS |
| **TerreStar Solutions Inc.**<br>**(TerreStar Solutions Inc.)** | CANADA | ATIS |
| **Texas A&M University**<br>**(Texas A&M University)** | UNITED STATES | ETSI |
| **TEXAS Instruments**<br>**(Texas Instruments France)** | FRANCE | ETSI |
| **THALES**<br>**(THALES)** | FRANCE | ETSI |
| **THURAYA TELECOM CO.**<br>**(THURAYA TELECOMMUNICATIONS COMPANY)** | UNITED ARAB EMIRATES | ETSI |
| **Tiami Networks**<br>**(Tiami Networks)** | UNITED STATES | ATIS |
| **TII** | UNITED ARAB EMIRATES | ETSI |

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| **(Technology Innovation Institute)** | | |
| **T-Mobile Austria GmbH**<br>**(T-Mobile AUSTRIA GmbH)** | AUSTRIA | ETSI |
| **T-Mobile Polska S.A.**<br>**(T-Mobile Polska Spolka Akcyjna)** | POLAND | ETSI |
| **T-Mobile USA**<br>**(T-Mobile USA, Inc.)** | UNITED STATES | ETSI |
| **T-Mobile USA Inc.**<br>**(T-Mobile USA Inc.)** | UNITED STATES | ATIS |
| **TNO**<br>**(TNO)** | NETHERLANDS | ETSI |
| **Tomorrow's Creation Labs**<br>**(Tomorrow's Creation Labs)** | JAPAN | ARIB |
| **Tongji University**<br>**(Tongji University)** | CHINA | CCSA |
| **Toshiba**<br>**(Toshiba)** | UNITED KINGDOM | ETSI |
| **TOWE Wireless**<br>**(Sushi TOWE Wireless Testing (Shenzhen) Co.,Ltd.)** | CHINA | ETSI |
| **TOYOTA Info Technology Center**<br>**(TOYOTA Info Technology Center USA, Inc.)** | UNITED STATES | ETSI |
| **TOYOTA MOTOR CORPORATION**<br>**(TOYOTA MOTOR CORPORATION)** | JAPAN | TTC |
| **TRAFICOM**<br>**(The Finnish Transport and Communications Agency)** | FINLAND | ETSI |
| **Trafikverket**<br>**(Trafikverket)** | SWEDEN | ETSI |
| **Transsion Holdings**<br>**(Transsion Holdings)** | CHINA | CCSA |
| **TransUnion**<br>**(TransUnion)** | UNITED STATES | ATIS |
| **Trimble**<br>**(Trimble)** | UNITED STATES | ATIS |
| **Tron Future Tech Inc.**<br>**(Tron Future Tech Inc.)** | TAIWAN, PROVINCE OF CHINA | ETSI |
| **TTP plc**<br>**(TTP plc)** | UNITED KINGDOM | ETSI |
| **Turk Telekomunikasyon A.S.**<br>**(Turk Telekomunikasyon A.S.)** | TÜRKIYE | ETSI |
| **TURKCELL**<br>**(Turkcell Iletisim Hizmetleri A.S.)** | TÜRKIYE | ETSI |
| **U.S. Department of Defense**<br>**(U.S. Department of Defense)** | UNITED STATES | ATIS |
| **U.S. Department of Transport.**<br>**(U.S. Department of Transportation)** | UNITED STATES | ATIS |
| **U.S. National Security Agency**<br>**(US National Security Agency)** | UNITED STATES | ATIS |
| **Uangel**<br>**(Uangel Corporation)** | KOREA (REPUBLIC OF) | TTA |
| **Ubiik**<br>**(Ubiik SAS)** | FRANCE | ETSI |
| **ubinexus**<br>**(Beijing Ubinexus Technology Development Co., Ltd)** | CHINA | CCSA |
| **u-blox AG**<br>**(u-blox AG)** | SWITZERLAND | ETSI |
| **UESTC**<br>**(University of Electronic Science and Technology of China)** | CHINA | CCSA |
| **UL VS Ltd**<br>**(UL VS Ltd)** | UNITED KINGDOM | ETSI |
| **UMA**<br>**(Universidad de Malaga)** | SPAIN | ETSI |
| **umlaut**<br>**(umlaut communications GmbH)** | GERMANY | ETSI |
| **UNIBO**<br>**(ALMA MATER STUDIORUM Università di Bologna)** | ITALY | ETSI |
| **UniBw M** | GERMANY | ETSI |

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| **(University of the Bundeswehr Munich)** | | |
| **Unicom Broadband Online**<br>**(Unicom Broadband Online Co., Ltd.)** | CHINA | CCSA |
| **Unicompay**<br>**(Unicompay Co., Ltd.)** | CHINA | CCSA |
| **Union Inter. Chemins de Fer**<br>**(Union Internationale des Chemins de Fer)** | FRANCE | ETSI |
| **Union Telephone Company**<br>**(Union Telephone Company)** | UNITED STATES | ATIS |
| **Unisoc**<br>**(Unisoc (Shanghai) Technologies Co., Ltd.)** | CHINA | CCSA |
| **Unisoc Beijing**<br>**(Beijing Unisoc Communications Technology Co., Ltd.)** | CHINA | CCSA |
| **UPV/EHU**<br>**(Universidad del País Vasco/Euskal Herriko Unibertsitatea)** | SPAIN | ETSI |
| **US Cellular Corporation.**<br>**(US Cellular Corporation/TDS.)** | UNITED STATES | ATIS |
| **US DHS Science & Technology**<br>**(US DHS Science & Technology)** | UNITED STATES | ATIS |
| **UTIMACO TS GmbH**<br>**(UTIMACO TS GmbH)** | GERMANY | ETSI |
| **UTokyo**<br>**(The University of Tokyo)** | JAPAN | ETSI |
| **Vaan Megam**<br>**(Vaan Megam Networks)** | INDIA | TSDSI |
| **Valeo**<br>**(Valeo Telematik und Akustik GmbH)** | GERMANY | ETSI |
| **VALID SOLUCIONES TECNOLÓGICAS**<br>**(VALID SOLUCIONES TECNOLÓGICAS S.A.U)** | SPAIN | ETSI |
| **Valid8**<br>**(Valid8.com, Inc.)** | UNITED STATES | ETSI |
| **Vanchip**<br>**(Vanchip (Tianjin) Technology Co., Ltd.)** | CHINA | CCSA |
| **Verizon Denmark**<br>**(Verizon Denmark A/S)** | DENMARK | ETSI |
| **Verizon Finland**<br>**(Verizon Finland Oy)** | FINLAND | ETSI |
| **Verizon France**<br>**(Verizon France SAS)** | FRANCE | ETSI |
| **Verizon Netherlands**<br>**(Verizon Nederland B.V)** | NETHERLANDS | ETSI |
| **Verizon Spain**<br>**(Verizon Spain S.L.)** | SPAIN | ETSI |
| **Verizon Sweden**<br>**(Verizon Sweden Aktiebolag 2116)** | SWEDEN | ETSI |
| **Verizon Switzerland AG**<br>**(Verizon Switzerland AG)** | SWITZERLAND | ETSI |
| **Verizon UK Ltd**<br>**(Verizon UK Ltd)** | UNITED KINGDOM | ETSI |
| **Vestel**<br>**(Vestel Elektronik Sanayi ve Ticaret A.S)** | TÜRKIYE | ETSI |
| **ViaSat Satellite Holdings Ltd**<br>**(ViaSat Satellite Holdings Ltd)** | UNITED KINGDOM | ETSI |
| **VIAVI Solutions**<br>**(Viavi Solutions UK Ltd.)** | UNITED KINGDOM | ETSI |
| **vivo Mobile Com. (Chongqing)**<br>**(vivo Mobile Communication (Chongqing) Co., Ltd)** | CHINA | CCSA |
| **vivo Mobile Communication (H)**<br>**(vivo Mobile Communication (Hangzhou) Co., Ltd.)** | CHINA | CCSA |
| **vivo Mobile Communication (S)**<br>**(vivo Mobile Communication (Shenzhen) Co., Ltd.)** | CHINA | CCSA |
| **vivo Mobile Communication Co.,**<br>**(vivo Mobile Communication Co., Ltd)** | CHINA | CCSA |
| **vivo Software Technology**<br>**(vivo Software Technology (Xi'an) Co., Ltd.)** | CHINA | CCSA |
| **VIVO TECH GmbH** | GERMANY | ETSI |

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| **(VIVO TECH GmbH)** | | |
| **vivo Wisdom Technology**<br>**(vivo Wisdom Technology Co., Ltd.)** | CHINA | CCSA |
| **Vodafone GmbH**<br>**(Vodafone GmbH)** | GERMANY | ETSI |
| **VODAFONE Group Plc**<br>**(Vodafone Group Plc)** | UNITED KINGDOM | ETSI |
| **Vodafone Ireland Plc**<br>**(Vodafone Ireland Plc)** | IRELAND | ETSI |
| **Vodafone Italia SpA**<br>**(Vodafone Italia SpA)** | ITALY | ETSI |
| **Vodafone Romania S.A.**<br>**(Vodafone Romania S.A.)** | ROMANIA | ETSI |
| **Vodafone Telekomünikasyon A.S.**<br>**(Vodafone Telekomünikasyon A.S.)** | TÜRKIYE | ETSI |
| **VoiceAge Corporation**<br>**(VoiceAge Corporation)** | CANADA | ETSI |
| **Volkswagen AG**<br>**(Volkswagen AG)** | GERMANY | ETSI |
| **VSENS**<br>**(Unicom Vsens Telecommunications Co., Ltd)** | CHINA | CCSA |
| **VTT**<br>**(VTT Technical Research Centre of Finland)** | FINLAND | ETSI |
| **WE Certification Oy**<br>**(WE Certification Oy)** | FINLAND | ETSI |
| **Wiliot Ltd.**<br>**(Wiliot Ltd.)** | ISRAEL | ETSI |
| **WILUS Inc.**<br>**(WILUS Inc.)** | KOREA (REPUBLIC OF) | TTA |
| **Wipro**<br>**(Wipro Limited)** | INDIA | TSDSI |
| **Wipro GE**<br>**(Wipro GE Healthcare Private Limited)** | INDIA | TSDSI |
| **Wisig Networks Pvt Ltd**<br>**(Wisig Networks Pvt Ltd)** | INDIA | TSDSI |
| **Wuhan Hongxin Technology**<br>**(Wuhan Hongxin Technology Development Co., Ltd.)** | CHINA | CCSA |
| **XGN**<br>**(XGen Network LLC)** | UNITED STATES | ETSI |
| **Xiamen Sanan Integr. Circuit**<br>**(Xiamen Sanan Integrated Circuit Co., Ltd.)** | CHINA | CCSA |
| **Xiaomi Communications**<br>**(Xiaomi Communications)** | CHINA | CCSA |
| **Xiaomi Digital Technology**<br>**(Beijing Xiaomi Digital Technology Co., Ltd.)** | CHINA | CCSA |
| **Xiaomi Electronic Software**<br>**(Beijing Xiaomi Electronic Software Co., Ltd.)** | CHINA | CCSA |
| **Xiaomi EV Technology**<br>**(Xiaomi EV Technology Co., Ltd.)** | CHINA | CCSA |
| **Xiaomi Technology**<br>**(Xiaomi Technology)** | CHINA | CCSA |
| **Xiaomi Technology (Polska) sp.**<br>**(XIAOMI TECHNOLOGY (POLSKA) SPOLKA Z OGRANICZONA ODPOWIEDZIALNOSCIA)** | POLAND | ETSI |
| **Xiaomi Technology France**<br>**(Xiaomi Technology France)** | FRANCE | ETSI |
| **Xiaomi Technology Germany GmbH**<br>**(Xiaomi Technology Germany GmbH)** | GERMANY | ETSI |
| **Xiaomi Technology Italy srl**<br>**(Xiaomi Technology Italy srl)** | ITALY | ETSI |
| **Xiaomi Technology Netherlands**<br>**(Xiaomi Technology Netherlands B.V.)** | NETHERLANDS | ETSI |
| **Xiaomi Technology Spain S.L**<br>**(Xiaomi Technology Spain S.L)** | SPAIN | ETSI |
| **Xiaomi Technology UK Limited**<br>**(Xiaomi Technology UK Limited)** | UNITED KINGDOM | ETSI |
| **Xidian University** | CHINA | CCSA |

| | | |
|---|---|---|
| **(Xidian University)** | | |
| **Xilinx Ireland**<br>**(Xilinx Ireland)** | IRELAND | ETSI |
| **XNET**<br>**(ZGC Institute of Ubiquitous-X Innovation and Applications)** | CHINA | ETSI |
| **X-Net**<br>**(ZGC Institute of Ubiquitous-X Innovation and Applications)** | CHINA | CCSA |
| **Yonsei University**<br>**(Yonsei University)** | KOREA (REPUBLIC OF) | TTA |
| **Zhejiang Lab**<br>**(Zhejiang Lab)** | CHINA | CCSA |
| **Zhejiang University**<br>**(Zhejiang University)** | CHINA | CCSA |
| **ZITiS**<br>**(Central Office for Information Technology in the Security Sector)** | GERMANY | ETSI |
| **Zollkriminalamt (ZKA)**<br>**(Zollkriminalamt (ZKA))** | GERMANY | ETSI |
| **ZONSON**<br>**(ZONSON SAMRT AUTO CORPORATION)** | CHINA | CCSA |
| **ZTE**<br>**(ZTE Telecom India Pvt Ltd)** | INDIA | TSDSI |
| **ZTE Corporation**<br>**(ZTE Corporation)** | CHINA | CCSA |
| **ZTE Corporation**<br>**(ZTE Corporation)** | CHINA | ETSI |
| **ZTE Deutschland**<br>**(ZTE Deutschland GmbH)** | GERMANY | ETSI |
| **ZTE FRANCE SASU**<br>**(ZTE FRANCE SASU)** | FRANCE | ETSI |
| **ZTE Italia**<br>**(ZTE Italia S.R.L)** | ITALY | ETSI |
| **ZTE JAPAN K.K.**<br>**(ZTE JAPAN K.K..)** | JAPAN | TTC |
| **ZTE Japan K.K.**<br>**(ZTE Japan K.K.)** | JAPAN | ARIB |
| **ZTE Korea Limited**<br>**(ZTE Korea Limited)** | KOREA (REPUBLIC OF) | TTA |
| **ZTE Photonics**<br>**(ZTE Photonics Technology Co.,Ltd.)** | CHINA | CCSA |
| **ZXNE**<br>**(ZXNE CORPORATION)** | CHINA | CCSA |

Total : 835 Individual Members

Any comments or problems with this application? Please let us know...

# Appendix 10

The Wayback Machine - https://web.archive.org/web/20170510190630/http://www.3gpp.org:80/about-3gpp/3gpp-faqs



# 3GPP FAQs

## 3GPP FAQs

Questions about 3GPP Membership
Questions about 3GPP email exploder lists
Questions about Legal Matters
Questions about 3GPP Specifications
Questions about Technical Specification Group/Working Group
Questions about Documents and TSG/WG Meetings
Questions about Work Items and Deliverables
Miscellaneous
Technical topics

## Questions about 3GPP Membership

Who can become an Individual Member of 3GPP and how much does it cost?
Who may participate in 3GPP meetings?
Who shall fill in the 3GPP Individual Member Application form?
What shall I do if a 3GPP company or official contact details change?
What are the different membership categories?
Who may become an observer?
Who may become a Guest Member and do guests have to pay any fees?
Who can apply for market representative Partnership?
Can an ETSI Observer become an Individual Member of 3GPP?
Can an ETSI Applicant apply for 3GPP Membership?
Can an ETSI Member apply for 3GPP Guest status?

## Questions about 3GPP email exploder lists

Are there discussion archives for the 3GPP exploder lists?
How do I subscribe to the 3GPP exploder lists?

## Questions about Legal Matters

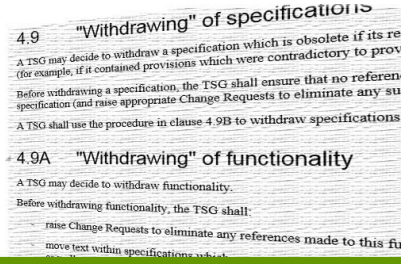
What is the 3GPP IPR Policy?
What is the 3GPP policy on licensing?
Who owns the Technical Specifications and the Technical Reports approved by 3GPP?
Are meeting contributions to ETSI TC SMG publically available?
Is permission needed to use the 3GPP logo in marketing collaterals or on a web site?
Can I use computer code included with a 3GPP TS to implement a product?

## Questions about 3GPP Specifications

How do I create the next Release version of a TS or TR?
Where can the rules, protocols or software needed to develop applications for UMTS be found?
What is the correlation between Stage 1, Stage 2 and Stage 3?
Are the 3GPP specifications produced only in word?
Which group works with specifications covering the use of the GSM codec (either in C or Java based)?
Where can I find documents produced by the GSM MoU Group / GSM Association?
Where would I find a document (e.g. UMTS 30.03 version 3.1.0) which does not appear on the status list?
Where are all the Change Requests (CRs) located?
Where are all the current ETSI SMG specs located?
Which group works on Physical Layer aspects of UMTS/LTE?
Where can I find the list of Abstract syntax notation (ASN.1) object identifiers?
Where can I find the 3GPP Confidentiality and Integrity algorithms?
What is a Release - how does specification version numbering work?
Where can I find information on the current status of 3GPP specifications?
What is the system for numbering specifications?
What is the meaning of the text at the foot of the TS/TR cover page?

## Questions about Technical Specification Group/Working Group




4.9 "Withdrawing" of specifications

A TSG may decide to withdraw a specification which is obsolete if its re
(for example, if it contained provisions which were contradictory to prov

Before withdrawing a specification, the TSG shall ensure that no referen
specification (and raise appropriate Change Requests to eliminate any su

A TSG shall use the procedure in clause 4.9B to withdraw specifications

4.9A "Withdrawing" of functionality

A TSG may decide to withdraw functionality.

Before withdrawing functionality, the TSG shall:

- raise Change Requests to eliminate any references made to this fu
- move text within specifications

Proposal to withdraw TR 38.900
(channel model for spectrum above 6GHz)
at RAN#76

Who are the TSG/WG Officials and Support team and where can I find their contact details?
Where can I find the Terms of Reference for my TSG/WG?
May I become an Official?
Where are my TSG/WGs documents stored?

## Questions about Documents and TSG/WG Meetings

How do I register for a meeting?
Who can submit a change proposal on any 3GPP specifications to 3GPP?
If a change proposal is submitted how long does it take for it to get approved?
How to get a user name and password for "Reserve a Document Number"?
How do I obtain a document number for my contribution?
Where can I download documents for an upcoming meeting?
Where can I find a temporary document template?

## Questions about Work Items and Deliverables

What is my role when my TSG/WGs has to approve a deliverable?
What are the different types of deliverables?
Can I write an 3GPP Document myself?
Do I and my company have to support my TSG/WGs Work Items?

## Miscellaneous

Do I need a password and user name to access the 3GPP Web site ?
Can you give me information about which companies manufacture particular types of equipment. (...)
How can I determine when a meeting contribution document (TDoc) became publicly available?
Is it possible to determine the date and time of publication of a particular version of a 3GPP specification?

## Technical topics

What formalities do I have to go through to get type approval for terminal equipment in Europe? Is there a single point of contact? What standards does my equipment need to conform to in order that I can place it on the market?
Where can I find a list of technical terms and abbreviations used in 3GPP documents?
What is the difference between a SIM and a USIM? What is a UICC?
I have transferred a video file from my phone to my PC. Where can I find a player for 3gp files?
Where can I find the specification of the SIM Lock feature?

## Who can become an Individual Member of 3GPP and how much does it cost?

Individual Members are by definition members of the Organizational Partners of 3GPP. This means that members of standardization bodies such as ETSI, ARIB, TTA, TTC, ATIS and CCSA have a right to take part in 3GPP. If your company becomes an ETSI member, please be informed that for participation in 3GPP you need to pay 3 units of contribution as a minimum except SMEs, Users, Universities, Public Research Bodies who should pay 2 units (instead of 1).

ETSI Members' and associate members' fees are calculated by class. The class is derived from the member company's annual ECRT band (Electronics Communications Related Turnover) – see ECRT definition.
Each class corresponds to a number of units. This number determines the contribution payable.

Example: If your organization declares an annual ECRT of up to 135€ million, you would need to pay 2 Units of Contribution (corresponding to 9380€ per year) plus an additional UoC for participation in 3GPP of 3380€ (see fees table). Members joining ETSI during the 2nd half of the year benefit from a 50% rebate on the membership fee of the current year. In this case, you would pay 12760€ minus 50% = 6380€ for yyyy.

## Who may participate in 3GPP meetings?

To attend a 3GPP meeting, you must be a 3GPP Individual Member (i.e., you must be a Member of one of the Organizational Partners involved in the project; ARIB, CCSA, ETSI, ATIS, TTA , TTC or TSDSI). A non-member company should seek membership with one of the above partners to be eligible to contribute and participate at 3GPP Meetings.

## Who shall fill in the 3GPP Individual Member Application form?

The person legally responsible for the requesting company shall fill in the form.

## What shall I do if a 3GPP company or official contact details change?

All changes of correspondence should be notified to ETSI Membership and 3GPPMembership.
In case of change of official contact an ETSI Online (EOL) account will be created for the new contact.
Please note that as official contact person you can view and modify your personal and organization's contact details via the "Manage my membership" web interface.

## What are the different membership categories?

The different membership categories of 3GPP are described in Article 4 of the 3GPP Working Procedures.

## Who may become an observer?

The status of Observer may be granted by the Organizational Partners to an entity which has the qualifications to become a future Partner (see also 3GPP Working Procedures Article 10)

## Who may become a 3GPP Guest Member and do guests have to pay any fees?

The 3GPP Guest status is for potential Individual Members who may be granted permission to participate in 3GPP for a maximum period of 6 months. Guest status is granted on a case-by-case basis by the Organizational Partners (see also 3GPP Working Procedures Article 10). If you like to apply for a Guest status, please complete the on-line 3GPP Application form.

No membership fees are requested for Guest applications. The Guest status is a one time only membership which is used to enable a company to decide whether or not they wish to become a full member (by joining one of the Partners).

## Who can apply for market representative Partnership?

Organisation who have the ability to offer market advice to 3GPP and to bring into 3GPP a consensus view of market requirements (e.g., services, features and functionality) falling within the 3GPP scope (see also 3GPP Working Procedures, Article 7).

## Can an ETSI Observer become an Individual Member of 3GPP?

An ETSI Observer cannot become an Individual Member of 3GPP. An ETSI Observer may "observe" all activities, but their participation is limited to the ETSI General Assembly only. Therefore, ETSI Observers have no participation rights in 3GPP. ETSI Observers have access to ETSI documentation and of course to 3GPP documentation since that is openly published on the web.

3GPP does have it's own category called "Observer" but that is entirely different and is used for potential Partners.

## Can an ETSI Applicant apply for 3GPP Membership?

YES, an ETSI Applicant means that your request to become an ETSI Member will be addressed (and normally approved) at the next General Assembly and that the company has specified they want to participate in 3GPP activities. See also above regarding 3GPP fees.

## Can an ETSI Member apply for 3GPP Guest status?

Yes, any ETSI Member can apply for a 3GPP Guest status by filling in the on-line 3GPP Application form.

## Are there discussion archives for the 3GPP exploder lists?

Yes! To see the complete list please have a look here: Home page of listserv and scroll down until you find the list you are interested in. For example, the archives for the main RAN email list.

## How do I subscribe to the 3GPP exploder lists?

All 3GPP email exploder lists can be found at list.3gpp.org. In order to subscribe to any of the lists, scroll down until you find the list you are interested in, then click on the link and on the right side of the page you will find Subscribe or Unsubscribe. Click on the link and follow the simple instructions. Delegates who already have an ETSI username and password should use the list management application on the ETSI site.

## What is the 3GPP IPR Policy?

The 3GPP Organizational Partners have agreed that their IPR policies should be respected and that their respective members should be encouraged to declare "their willingness to grant licenses on fair, reasonable terms and conditions and on non discriminatory basis" (Article 3.1 of the Third Generation Partnership Project). For more information, look here >>>

The above-mentioned principles are further reflected in Article 55 of the 3GPP Working Procedures which request that each Individual Members should declare "at the earliest opportunity, any IPR which they believe to be essential, or potentially essential, to any work ongoing within 3GPP".

## What is the 3GPP policy on licensing?

Some aspects of 3GPP systems are covered by essential Intellectual Property Rights (IPR) - that is, patented technologies without which equipment cannot be implemented. The IPR vests in - i.e. the patents are held by - individual companies, and not by 3GPP itself or any of its Organizational Partners (OPs). All Individual Members of 3GPP abide by the IPR policies of the OP to which they belong; all such policies are broadly similar see also "What is the 3GPP IPR Policy", and require IPR holders to make licences available to all third parties, whether or not they are 3GPP Individual Members, under fair, reasonable and non-discriminatory (FRAND) terms.

Neither 3GPP nor its component OPs offer an IPR search service. It is the responsibility of each manufacturer / system implementor to seek and obtain its own licenses from the individual IPR holders. For more information, and a guide to the IPRs declared to each 3GPP OP, look here>>>

## Who owns the Technical Specifications and the Technical Reports approved by 3GPP?

According to the Article 3.2.2 of the Third Generation Partnership Project Agreement, the 3GPP Organizational Partners jointly own copyright on the Technical Specifications and the Technical Reports approved by 3GPP.



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Ericsson v. Motorola 

## Are meeting contributions to ETSI TC SMG publically available?

ETSI TC SMG meeting documents can be found on the ETSI docbox file server. Access is limited to bona fide representatives of ETSI member organizations. These, together with early versions of the GSM specifications, have been gathered together into a set of DVDs "A Technical History of GSM" available to ETSI members via the ETSI WEB store.

The GSM standardization work was transferred from CEPT to ETSI in 1991. TC SMG was closed at meeting #32 and TC MSG created to continue the work. Like almost all ETSI Technical Committees, participation in TC SMG and its working groups was open to all ETSI member organizations. That is, any bona fide representative of an ETSI member was free to participate. Exceptionally, other individuals could participate by express invitation of the chairman. Each meeting report contains a list of participants with their corporate affiliations.

Until the late 1990s, all meeting documents were circulated in paper form. Electronic files started to take over from paper in around 1997. Meeting documents ("TDocs") were distributed by post (later, by fax) in batches prior to the meeting, to those persons registered as regular participants in SMG or the appropriate working group, and many more documents were produced during the course of the meeting itself. Although a provision existed (and still exists) in the context of the IPR Policy for contributors to place restrictions on the distribution of TDocs via a formal notification at the time the document was provided, this was seldom if ever invoked. In the absence of such a condition, all TDocs were free of any restriction on subsequent distribution. Thus no restriction has ever been placed on how meeting participants dispose of the documents subsequent to their distribution before, during, or after the meeting. There were no non-disclosure agreements.

ETSI maintains a paper archive of the SMG TDocs, and bona fide representatives of current ETSI members can, by appointment, make an accompanied search of the archives. This facility extends to members which may not have been members at the time the document was originally produced.

TC-approved versions of ETSI “deliverables” (see ETSI Directives for formal definition of this term) would have been transferred by the support officer of the committee to the secretariat team responsible for publishing ETSI deliverables. That team would have made cosmetic (non-technical) modifications to the draft deliverables before issuing them. Depending on the type of “deliverable”, those documents would have been issued via National Standards Organizations (NSOs) either for immediate publication, or first via either a one-step or two-step national public enquiry and vote process prior to final publication by ETSI. In ETSI parlance, “publication” of a deliverable is the final step in the development cycle of a technical standard, and has a precise meaning. That meaning is not “making publically available”, since draft deliverables released for public enquiry or for vote are "publically available" but not yet "published".

If the confidentiality conditions described above had been imposed on a TDoc by its authors, if the text of that TDoc was in due course incorporated into an ETSI "deliverable", then those conditions are regarded as annulled from the date on which the deliverable is published.

Collections of TDocs / meeting reports have from time to time been made available to ETSI members in CD or DVD form, look here >>>

## Is permission needed to use the 3GPP logo in marketing collaterals or on a web site?

ETSI (European Telecommunications Standards Institute) is the sole owner of the following acronyms:

ETSI,
DECT,
UMTS,
3GPP and
TIPHON,

as well as the ETSI, TIPHON, 3GPP and LTE logos. ETSI Members are authorized to use these Trade Marks in accordance with Collective Letter 1943. Authorization is needed to use the above mentioned acronyms and logos.

For further information contact the ETSI Legal Team or see http://www.3gpp.org/about-3gpp/legal-matters/logo-use.

## Can I use computer code included with a 3GPP TS to implement a product?

Yes, but read this clause carefully. Some 3GPP Technical Specifications include computer code such as ASN.1 or XML (protocols), ANSI-C language (codecs), ...; and some include test vectors (codecs) for verifying implementations. These are published to allow users of these TSs to implement real-world products. No permission is required from 3GPP or its Organizational Partners (OPs) to use this code in the design of products - e.g. to compile the C to implement a codec in machine code.

Nevertheless, there may be essential IPR involved with such a design, and implementers are obliged to seek licences from IPR owners to use that technology. See also What is the 3GPP policy on licensing?

Moreover, the copyright of all 3GPP TSs and TRs vests jointly by all the 3GPP OPs. Other than for in-house copies for the purpose of further development of the 3GPP standard or for product design purposes, etc. you may not reproduce any part of a 3GPP TS or TR without seeking permission from 3GPP (e.g. from the ETSI Legal Team): use the procedure described on the legal area of this site. This means that you must not provide verbatim copies of source code (or lightly modified copies) without seeking permission from 3GPP.

Finally, you are reminded that 3GPP TSs and TRs have no legal status, and you should not design products directly to them. See the advice notice on the cover page of every 3GPP TS and TR. Instead, use the technically identical publication of one of the OPs.

## How do I create the next Release version of a TS or TR?

There are three ways of upgrading a Release X spec to Release X+1:

1. Write a CR to the latest Release X version to incorporate technical changes to satisfy a Release X+1 work item, and on the cover sheet showing the WI code for that work item and the Release code for Release X+1. If the CR is approved at TSG level, this will automatically create the first instance of the next Release of the spec.
2. Make a specific request to the TSG to upgrade the latest version of the spec from Release X to Release X+1. This might be needed if the functionalities of the two Releases diverge, though backwards-incompatibility is to be avoided if possible.
3. Do nothing. If a spec has survived unchanged throughout the period during which Release X+1 was developed, when Release X+1 is frozen, all such specs will automatically be upgraded from Release X to Release X+1 without technical change.

## Where can the rules, protocols or software needed to develop applications for UMTS be found?

A good place to start is on the 3GPP website, and particularly the specifications list.

## What is the correlation between Stage 1, Stage 2 and Stage 3?

A three-stage methodology as defined in ITU T Recommendation I.130 is applied in 3GPP according TR 21.900 clause 4.1:

> Stage 1 is an overall service description from the user's standpoint.
> Stage 2 is an overall description of the organization of the network functions to map service requirements into network capabilities.
> Stage 3 is the definition of switching and signalling capabilities needed to support services defined in stage 1.

## Are the 3GPP specifications produced only in word?

The 3GPP specs are published as ETSI deliverables, and these are available in PDF form http://www.etsi.org/standards-search. But you can download a free Word viewer (i.e. read only) from the Microsoft web site. PDF is inherently secure (more so than html, in fact), and because WordViewer is very simple (it can not handle macros, for example), it is pretty safe too. ETSI has no plans at present to publish specifications in plain text or in html.

## Which group works with specifications covering the use of the GSM codec (either in C or Java based)?

The SMG STC SMG11 and 3GPP SA4 specifications, available from http://www.3gpp.org, respectively deal with this. It gives you a list of specifications via the status list (look for the GSM specs in the MS-Access database at : http://www.3gpp.org/ftp/Information/Databases/Spec_Status/)

and you can then download the specs you need. If you do not have an ETSI EOL account, you can download the ETSI equivalent standards from http://www.etsi.org/standards-search.

## Where can I find documents produced by the GSM MoU Group / GSM Association?

These documents are not available via 3GPP or its Organizational Partners. You must address this question to the GSM Association.

## Where would I find a document (e.g. UMTS 30.03 version 3.1.0) which does not appear on the 3GPP Status List?

Look at http://www.3gpp.org/DynaReport/3003U.htm. It is a document stemming from the initial TC-SMG studies on UMTS, not a product of 3GPP. It was, in fact, published as an ETSI deliverable, TR 101 112, and this may be downloaded via http://www.etsi.org/standards-search.

## Where are all the Change Requests (CRs) located?

The CR database can be downloaded under: http://www.3gpp.org/ftp/Information/Databases/Change_Request/

Or you select the specification under:
http://www.3gpp.org/specifications/79-specification-numbering

The information is classed by series so it is very easy to locate the particular specification which interests you. After selecting a series and a specification you will find a line "Change Requests for this spec: click here." which provides a web list of the CRs for this specification.

If, for example, you are looking for CRs on GSM 08.18 then you would use this link:
http://www.3gpp.org/ftp/Specs/html-info/0818-CRs.htm
http://www.3gpp.org/DynaReport/0818http://www.3gpp.org/ftp/Specs/html-info/0818-CRs.htm
-CRs.htm


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## Where are all the current ETSI SMG specs located?

All the ETSI SMG specs are located here archives for the GSM documentation. An ETSI On-Line account is needed to access these documents. You can apply for an ETSI online account.
In general, the cross-referencing between GSM and ETSI deliverables, and between 3GPP and ETSI deliverables may be found at http://webapp.etsi.org/key/queryform.asp

## Which group works on Physical Layer aspects of UMTS/LTE?

The radio aspects are standardised in TSG-RAN. The technical work is done in the 5 Working Groups of RAN (WG1 radio layer 1, WG2 radio layer 2/3, WG3 interfaces, WG4 RF measurements, WG5 Mobile Terminal Conformance Testing).
So Physical Layer aspects are addressed by TSG RAN WG1. Their UMTS specifications are numbered 25.2xx and their LTE specifications are numbered 36.2xx.
The temporary documents (meeting documents etc.) of WG1 are stored on ftp://ftp.3gpp.org/TSG_RAN/WG1_RL1.

## Where can I find the list of Abstract syntax notation (ASN.1) object identifiers?

The expandable list of object identifiers is available here >>>. To see the formal definition of the object identifiers, see the document cited on the right. The tree is not necessarily complete; further extensions may be included in the referenced document. For more information look here >>>.

## Where can I find the 3GPP Confidentiality and Integrity algorithms?

The 3GPP Confidentiality and Integrity algorithms F8 & F9 (KASUMI) have been developed through the collaborative efforts of the 3GPP Organizational Partners. For more information and in order to download the algorithms look here >>>.

## What is a Release - how does specification version numbering work?

To meet new market requirements, 3GPP specifications are continually being enhanced with new features. In order to provide developers with a stable platform for implementation while at the same time allowing the addition of new features, the 3GPP uses a system of parallel "releases". For more information look here >>>.

## Where can I find information on the current status of 3GPP specifications?

New versions of many 3GPP specifications are made available shortly after the 3GPP TSG plenary meetings which take place four times a year (March, June, September and December). In order to identify what the current version is or and how to find information about older versions of specifications look here >>>.

## What is the system for numbering specifications?

All 3G and GSM specifications have a 3GPP specification number consisting of 4 or 5 digits. (e.g., 09.02 or 29.002). For a more complete description and examples look here >>>.

## Who are the TSG/WG Officials and Support team and where can I find their contact details?

Each TSG/WG has a Chairman, up to two Vice-Chairmen (three Vice-Chairmen) in the case of TSGs and a secretary who is a member of the support team. From the 3GPP structural organization page, click on the TSG or WG of interest to reach its home page. From there, click on the "officials" entry in the table.

## Where can I find the Terms of Reference for my TSG/WG?

The current Terms of Reference for each TSG/WG appear on the web pages of each TSG/WG.

## May I become an Official?

The TSG Chairman and Vice Chairmen are elected by the Technical Specification Group from amongst the Individual Member representatives. Each TSG can elect a maximum of two Vice Chairmen. Once elected, these candidates are proposed to the PCG for appointment.
The Working Group Chairman and Vice Chairmen are elected by the Working Group from amongst the Individual Member representatives. Each Working Group can elect a maximum of two Vice Chairmen.
A candidate for TSG or Working Group election shall provide a letter of support from his Organization and nominations may be made up to the point when an election takes place.
The TSG Chairman and Vice-Chairmen shall be appointed by the PCG on the proposal of the TSG.
The Chairman and the Vice-Chairmen shall be appointed for a two year term of office. The Chairman and Vice-Chairmen may be appointed for one further consecutive term. If, at the end of a Chairman or Vice Chairmans second term, no other candidates are available, the Chairman or Vice Chairmen may be appointed for a further term.
Chairman and Vice Chairmen should not be from the same region, Organizational Partner, or from the same group of companies, unless no other candidate is available.
Successive Chairmen should not be from the same Organizational Partner, the same region or from the same group of companies, unless no other candidate is available

## How do I register for a meeting?

To register to any 3GPP TSG/WG meeting, please go to the Meetings tab on the 3GPP Ultimate portal (3GU) at https://portal.3gpp.org/, log in with your EOL credentials, and click "Not registered" in the Registration column of the meeting in question. When registration is complete, you will receive a confirmation email. Keep this email, it contains important information,


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without which you will not be able to confirm your presence!

Once you are at the meeting you have to "Check-in" to confirm your presence at the meeting itself. To check in, open the registration confirmation email and click on the check-in URL. This will take you to a page on the local meeting server (not the Internet). After you have checked in, your token will be sent to the main 3GPP server, and the web-based participants list will now show "yes" in the Participated column. Obviously you must be physically present at the meeting venue to be able to reach the local server.

## Who can submit a change proposal on any 3GPP specifications to 3GPP?

Any bona fide representative of any 3GPP Individual Member (see list via the first sentence at http://www.3gpp.org/membership) can present a technical contribution - for example, a Change Request - to any 3GPP TSG or WG meeting.

## If a change proposal is submitted how long does it take for it to get approved?

The usual procedure is that the responsible Working Group will examine a CR and agree it (or revise it until such time as it be agreeable - or not!). Having been agreed at WG level, it is packaged with related CRs and sent to the TSG plenary, where it will be discussed if necessary and then - if appropriate - formally approved. Within a matter a few weeks at most, a new version of the Specification is produced, which includes the contents of the TSG-approved CR.

TSGs meet every three months, and WGs meet at least once between each TSG meeting (sometimes two or occasionally even more times). Thus from inception of a CR to its approval is normally a matter of a few weeks, depending on the point in the meeting schedule of the WG and TSG concerned.

## How to get a user name and password for "Reserve a Document Number"?

You need to request an EOL account via: http://webapp.etsi.org/createaccount/form.asp (username and password will then be sent to you by separate email).

## How do I obtain a document number for my contribution?

Delegates wishing to make contributions must first obtain a document number either from the secretary or automatically via an on-line application "Automatic Document Numbering (ADN)" which is used by some groups.

You need a user name and password to "Reserve a Document Number" (see above).

## Where can I download documents for an upcoming meeting?

Each TSG/WG has a specific area allocated on the 3GPP ftp server. For example TSG SA look here ftp://ftp.3gpp.org/tsg_sa/TSG_SA/. It is advisable for delegates attending a meeting to download the documents available prior to the meeting from the ftp server and onto their personal computers.

## Where can I find a temporary document template?

The document template is made available by each TSG/WG in the meeting respective folder on the ftp server (see above).

## What is my role when my TSG/WGs has to approve a deliverable?

Approval of Technical Specifications and Technical reports by a TSG shall normally be by consensus. Where consensus cannot be achieved in the TSG a vote may be taken.
When Technical Specifications and Technical Reports become sufficiently stable, they shall be put under change control of the relevant TSG. The further elaboration of these Technical Specifications and Technical Reports shall be achieved by Change Requests (CRs) to be approved by the TSG.

## What are the different types of deliverables?

3GPP shall prepare, approve and maintain documents known as Technical Specifications and Technical Reports. Such documents shall be drawn up by the TSGs and shall, following approval at that level, be submitted to the participating Organizational Partners to be submitted to their respective standardization processes.

## Can I write an 3GPP Document myself?

Why not?! If you wish to propose a deliverable then bring it to the attention of your chairman and the other members of the TSG/WG in order to discuss the subject.
Each proposed new Work Item shall be supported by at least four Individual Members, and their names shall be recorded in the Work Item definition prepared for the TSG approval. One or more persons shall be named as Rapporteur for the proposed Work Item, and the Rapporteur shall act as the prime contact point on technical matters and for information on progress throughout the drafting phases. The supporting Individual Members are expected to contribute to and progress the new work item throughout the drafting phases.
In addition to the above, TSGs shall approve new Work Items, giving all essential parameters. The proposal shall be entered into the 3GPP work programme, clearly marked as a new entry, for which a unique reference identity shall be allocated.

## Do I and my company have to support my TSG/WGs Work Items?

Neither you or your company is obliged to support the work items of your TSG/WG, however it is normal that if you and your company are supporting members of a Work Item that you be in agreement with their work and will normally support the production of the related deliverable.

## Do I need a password and user name to access the 3GPP Web site ?

No password is needed to access any information on the 3GPP Web site, all information is openly published.

## Can you give me information about which companies manufacture particular types of equipment. Or about what services are available on particular networks?

No. The 3GPP Support Team must remain neutral and must not show bias to any of its Individual Members. Such information may be available from the Global Mobile Suppliers Association (www.gsacom.com) where you will find a statistics area which could be of help.

## How can I determine when a meeting contribution document (TDoc) became publicly available?

TDoc numbers start to be allocated some weeks before a 3GPP meeting, and the authors then create them and they or the group's secretary uploads them to the public file server as soon as possible. Some may have been distributed to the group's members in draft form for review, using the email exploder, in advance of the final one becoming available, and for some groups, it is normal to distribute even the final TDoc via the exploder, where the secretary picks it up and copies it to the public server. Typically, at the start of a meeting, around 50% of the TDocs are available.

This distribution on the group's email exploder is important, because once that happens, the document is effectively in the public domain, since membership of the exploder is open to all and is unpoliced.

During the meeting, further TDocs are created, mostly revisions of ones available before the meeting, but probably some brand new ones too – for example, outgoing liaison statements. These are uploaded to the meeting server, but (until recently) may or may not be uploaded to the public server during the meeting. (Since 2014, for most meetings, meeting server contents have been mirrored to a folder on the public server, but these copies are deleted shortly after the end of the meeting.)

Soon after the end of the meeting – same day, or at worst within a few days – the TDocs created during the meeting are uploaded by the secretary to the public server. Occasionally, some matters from the meeting cannot be resolved until maybe one week later, and these might result in some very late TDocs which are produced well after the end of the meeting, and thus uploaded onto the public server correspondingly late.

When the secretary copies from the meeting server (or from his own PC) to the public server, he may opt to only copy the missing files (i.e. the new ones), which is the best approach; or he may decide to overwrite everything and thus do a complete refresh of the files on the public server, which will now get an upload date/time-stamp of the new upload. This latter approach is now deprecated but has sometimes happened; you can detect this most easily when a meeting shows the same date/time-stamp for all TDoc files.

In cases such as this, one has to descend to greater subterfuge to narrow down the likely "public availability" moment. The zip file for a TDoc typically contains a Word file which has a particular date/time-stamp, which puts an absolute limit on the earliest moment that the TDoc could have become available in that form.

Searching the group's email exploder archive (http://list.etsi.org/scripts/wa.exe?INDEX) on or about the suspected production date gleaned from the file date/time-stamp may well reveal the message in which the TDoc was first distributed, or perhaps the message by which the group's secretary announced that it was available on the server. Note however that this technique does not reveal any earlier versions of the TDoc which might have been circulated, either as draft versions of the identified TDoc or as other Tdocs which were ultimately revised into the actual TDoc of interest. In order to identify this latter case, it is necessary to refer to the official secretary's report of the meeting, where the train of revisions will be evident.

## Is it possible to determine the date and time of publication of a particular version of a 3GPP Spec?

During the drafting phase (versions lower than 3.0.0), 3GPP TSs and TRs ("Specs") are under the control of their authors ("rapporteurs") and are handled like normal meeting contributions (see above). Revised versions incorporating text agreed by the responsible working group are often made available by the rapporteur via the group's email exploder shortly after the end of the meeting at which such text was discussed. Again, consultation of the exploder archives can reveal this. Alternatively, a revised draft may be sent directly to the 3GPP Support Team, and it will be uploaded to the public file server (specs archive directory) shortly afterwards. Again, the time stamp of the Zip file can be relied upon to indicate when the upload occurred.

After formal approval by the TSG (versions 3.0.0 or greater), Specs are edited only by the Support Team. The first approved version is based upon the draft version formally approved by the TSG, and thereafter versions are generated whenever Change Requests are approved by the TSG. These versions are made available shortly after the TSG meeting at which such approval occurred. The date (year and month) shown at the top of the Spec's cover page indicates either the date of (the last day of) the meeting, or the month in which the new version was prepared. However a more precise indication of the date of availability can be obtained from the Spec's web page (via the table at http://www.3gpp.org/specifications/) where a precise date is shown in the "available" column.

More information on the procedures relating to Spec handing can be found in 3GPP TR 21.900.

Note that, in accordance with the statement at the foot of the cover page of all 3GPP Specs, 3GPP does not "publish" its Specs per se. Formal publication is the responsibility of the individual Standards Development Organizations which comprise the Organizational Partners of 3GPP. For further information, see http://www.3gpp.org/specifications/63-official-publications.

## What formalities do I have to go through to get type approval for terminal equipment in Europe? Is there a single point of contact? What standards does my equipment need to conform to in order that I can place it on the market?

The legal requirements for the marketing of electrical products in Europe are governed by various EU Directives, depending on the nature of the equipment. Conformity with any of these Directives can be demonstrated by the use of Harmonized Standards, whose title has been cited in the Official Journal of the European Union. The lists of relevant standards can be found on the Commission web site which can be accessed via http://www.newapproach.org/Directives/DirectiveList.asp.

General electrical equipment is covered by the EMC Directive & Low Voltage Directives, see http://ec.europa.eu/enterprise/sectors/electrical/documents/index_en.htm.
The harmonized standards are listed at http://ec.europa.eu/enterprise/policies/european-standards/harmonised-standards/index_en.htm
More general information on procedures to declare conformity and how equipment should be marked are contained on the web sites related to the two Directives.

Radio Equipment and Telecommunications Terminal Equipment is covered by the Radio and Telecommunications Terminal Equipment Directive, see http://ec.europa.eu/enterprise/policies/european-standards/harmonised-standards/rtte/index_en.htm, which also includes a link to the one-stop procedure for "placing on the market" (http://ec.europa.eu/enterprise/sectors/rtte/documents/guidance/one-stop-procedure_en.htm).

Further information on EU harmonized standards relevant to telecommunications can be found on the ETSI site at http://www.etsi.org/standards/looking-for-an-etsi-standard/list-of-harmonized-standards, and the published standards themselves can be downloaded via http://pda.etsi.org/pda/queryform.asp.

## Where can I find a list of technical terms and abbreviations used in 3GPP documents?

Individual terms are defined in each 3GPP Technical Specification and Technical Report. A compendium of terms and abbreviations can be found in 3GPP TR 21.905. ETSI maintains a list of all terms and abbreviations defined in its publications in "TEDDI".

## What is the difference between a SIM and a USIM? What is a UICC?

The Universal Integrated Circuit Card (UICC) is the removable card bearing a silicon chip which holds 3GPP system subscriber information. The UICC is a general purpose card having both non-volatile memory and a general-purpose processor. Thus while it is used, in a 3GPP terminal, to hold (U)SIM information / applications, it is can also be used for other purposes, possibly unrelated to telecommunications. A common use of UICCs is in the well-known credit card format, and there is no reason why a single card could not hold (U)SIM functionality in addition to electronic purse / credit card functionality, or indeed any other application / data.

The Subscriber Identity Module (SIM) is the collection of functions which personalize a 3GPP terminal. The SIM contains static information about the services subscribed to, the phone number, the identity of the home network, a list of preferred roaming networks, and so on. The SIM also contains storage capacity for the subscriber's contacts' phone numbers. The term "SIM" is often misused for "UICC". The SIM concept was created during the early development of the GSM standards, and second-generation (based on GERAN) terminals up to and including Release 4 use SIM functionality.

For third generation systems (based on UTRAN), more complex functionality was called for, and the SIM evolved into the USIM or Universal Subscriber Identity Module. Release 99 3rd generations onwards use USIMs rather than SIMs. From Release 5 onwards, both second and third generation terminals use USIMs (though to maintain backwards compatibility with older networks and terminals, later Release 2nd generation USIMs are likely to implement Rel-4 SIM functionality in addition to Rel-5 or later USIM functionality).

For further information on the 3GPP Release system, see the Release page.

## I have transferred a video file from my phone to my PC. Where can I find a player for 3gp files?

The 3gp file format is defined in 3GPP TS 26.244 and in 3GPP TS 26.412. However, 3GPP has not defined a specific decoder. Your phone manufacturer may have supplied a player (check the CD-ROM which came with your phone) or look on its web site. Alternatively, search the Internet: a number of commercial players exist, and trial versions of some may be downloaded without charge.

## Where can I find the specification of the SIM Lock feature?

In clause 8 of 3GPP TS 22.022.

## What is the meaning of the text at the foot of the TS/TR cover page?

The present document has been developed within the 3rd Generation Partnership Project (3GPP TM) and may be further elaborated for the purposes of 3GPP..
The present document has not been subject to any approval process by the 3GPPOrganizational Partners and shall not be implemented.
This Specification is provided for future development work within 3GPPonly. The Organizational Partners accept no liability for any use of this Specification.

Specifications and Reports for implementation of the 3GPP TM system should be obtained via the 3GPP Organizational Partners' Publications Offices.

3GPP is not a legally incorporated body, and its technical work is conducted under the auspices of its Organizational Partners, each of which transposes relevant 3GPP specifications as its own publications. Thus the "raw" 3GPP TSs and TRs have no legal status per se. Under an agreement with the ITU at the time 3GPP was created, the ITU would not publish the output of 3GPP but would make reference to the publications of the participating Organizational Partners from its Recommendations; this state of affairs accounts for the text found on the cover of each 3GPP TS and TR. More information can be found here.

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Revision histoory:

2016-11-16: Correction of minor typo. (JMM)


**ABOUT RELEASES**

Release 15
Release 14
Release 13
Release 12
Release 11
Release 10
Release 9
Release 8
Release 7
Release 6
Release 5
Release 4
Release 1999

**FULL MEETING CALENDAR**

| | | | |
|---|---|---|---|
| GERAN | 74 | | 15-19 May 2017 |
| CT | 76 | West Palm Beach, Florida | 05-06 Jun 2017 |
| RAN | 76 | West Palm Beach, Florida | 05-08 Jun 2017 |
| SA | 76 | West Palm Beach, Florida | 07-09 Jun 2017 |
| GERAN | 75 | Berlin (TBC) | 21-25 Aug 2017 |
| CT | 77 | Sapporo | 11-12 Sep 2017 |
| RAN | 77 | Sapporo | 11-14 Sep 2017 |
| SA | 77 | Sapporo | 13-15 Sep 2017 |
| GERAN | 76 | US | 27 Nov-01 Dec 2017 |
| CT | 78 | Lisbon | 18-19 Dec 2017 |
| RAN | 78 | Lisbon | 18-21 Dec 2017 |
| SA | 78 | Lisbon | 20-22 Dec 2017 |
| CT | 79 | India | 19-20 Mar 2018 |
| RAN | 79 | India | 19-22 Mar 2018 |
| SA | 79 | India | 21-23 Mar 2018 |

**BROWSE TECHNOLOGIES**

LTE-Advanced
LTE
Carrier Aggregation Explained
HetNet/Small Cells
NAS
The Evolved Packet Core
HSPA
UMTS
W-CDMA
GPRS & EDGE


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# Appendix 11

The Wayback Machine - https://web.archive.org/web/20170509045639/http://www.3gpp.org:80/specifications/specifications

The Mobile Broadband Standard

A GLOBAL INITIATIVE



# Specifications Home

3GPP specifications are published - free of charge - up to four times a year following the quarterly Technical Specification Group (TSG) plenary meetings. At each TSG round, specs can be

- Newly brought under change control (i.e. at least 80% complete)
- Unchanged from their previous versions
- Revised as a result of incorporating approved Change Requests (either in existing Releases or in the latest Release)
- At Release-freeze time, upgraded to that Release with no technical change

The 3GPP Mobile Competence Centre (MCC) aims to make all Specs available following a TSG round as soon as possible. The target dates are shown in the table below. Where very many CRs have to be implemented, or very many specifications are to be produced, a further week beyond the above deadlines may be required. These dates are agreed by the TSG Chairmen. Over the Christmas and New Year period, when the winter TSG round finishes shortly before the holiday period, an extra week or so is normally added to the final deadlines.

## Quick link to the specifications file server area

The link above takes you straight to the specifications, but you need to know what you are looking for.

To find a particular specification by series, look at the Numbering page.

## 3GPP specifications

The term "3GPP specification" covers all GSM (including GPRS and EDGE), W-CDMA (including HSPA) and LTE (including LTE-Advanced and LTE-Advanced Pro) specifications, and the emerging 5G specifications.

Revised versions of many of these specifications are produced up to four times a year following the quarterly TSG plenary meetings.

**The table below leads to information about:**

- Specifications arising from each plenary TSG meeting, including the latest versions of each specification that was not changed at that meeting. i.e. each directory holds a complete set of specifications.
- The month of the meeting and the meeting number
- The Status List (ZIPped RTF or Word format) summarizing the current version number for every release of every 3GPP specification following each TSG plenary meeting.
- Details of each specification (working group, rapporteur, the Project Manager in MCC (Mobile Competence Centre), the meeting at which it was, or is expected to be, "frozen" (i.e. the point after which only corrections are allowed) - all are in the Status lists.

Full details of the Specifications, their history and current status can be found in the 3GPP Specifications Status database.

| year-month | remark<br>click here to see list of specs awaiting upload | latest status | specs directory | TSG CN # | TSG RAN* # | TSG T # | TSG SA # | TSG GERAN # | TSG CT # |
|---|---|---|---|---|---|---|---|---|---|
| 2017-03 | Target for availablilty of all new/revised specs:<br>TSG CT, SA = 2017-03-24<br>TSG RAN = 2017-03-31 | StatusList | 2017-03 | | 75 | | 75 | | 75 |
| 2016-12 | | StatusList | 2016-12 | | 74 | | 74 | | 74 |
| 2016-09 | | StatusList | 2016-09 | | 73 | | 73 | | 73 |
| 2016-06 | | StatusList | 2016-06 | | 72 | | 72 | 70 | 72 |

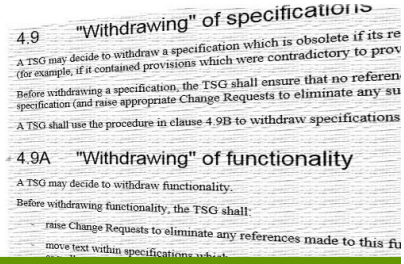
## Search

3GPP Website: Search for...

*Search and download specs, docs, CRs and more from the 3GPP FTP Server:*

ADVANCED FTP SEARCH

## More news...




Proposal to withdraw TR 38.900 (channel model for spectrum above 6GHz) at RAN#76

## News Feeds

- 3GPP News
- 3GPP tweets

| year-month | remark<br>click here to see list of specs awaiting upload | latest status | specs directory | TSG CN # | TSG RAN* # | TSG T # | TSG SA # | TSG GERAN # | TSG CT # |
|---|---|---|---|---|---|---|---|---|---|
| 2016-03 | | StatusList | 2016-03 | | 71 | | 71 | 69 | 71 |
| 2015-12 | | StatusList | 2015-12 | | 70 | | 70 | 68 | 70 |
| 2015-09 | | StatusList | 2015-09 | | 69 | | 69 | 67 | 69 |
| 2015-06 | | StatusList | 2015-06 | | 68 | | 68 | 66 | 68 |
| 2015-03 | | StatusList | 2015-03 | | 67 | | 67 | 65 | 67 |
| 2014-12 | | StatusList | 2014-12 | | 66 | | 66 | 64 | 66 |
| 2014-09 | | StatusList | 2014-09 | | 65 | | 65 | 63 | 65 |
| 2014-06 | | StatusList | 2014-06 | | 64 | | 64 | 62 | 64 |
| 2014-03 | | StatusList | 2014-03 | | 63 | | 63 | 61 | 63 |
| 2013-12 | | StatusList | 2013-12 | | 62 | | 62 | 60 | 62 |
| 2013-09 | | StatusList | 2013-09 | | 61 | | 61 | 59 | 61 |
| 2013-06 | | StatusList | 2013-06 | | 60 | | 60 | 58 | 60 |
| 2013-03 | | StatusList | 2013-03 | | 59 | | 59 | 57 | 59 |
| 2012-12 | | StatusList | 2012-12 | | 58 | | 58 | 56 | 58 |
| 2012-09 | | StatusList | 2012-09 | | 57 | | 57 | 55 | 57 |
| 2012-06 | | StatusList | 2012-06 | | 56 | | 56 | 54 | 56 |
| 2012-03 | | StatusList | 2012-03 | | 55 | | 55 | 53 | 55 |
| 2011-12 | | StatusList | 2011-12 | | 54 | | 54 | 52 | 54 |
| 2011-09 | | StatusList | 2011-09 | | 53 | | 53 | 51 | 53 |
| 2011-06 | | StatusList | 2011-06 | | 52 | | 52 | 50 | 52 |
| 2011-03 | | StatusList | 2011-03 | | 51 | | 51 | 49 | 51 |
| 2010-12 | | StatusList | 2010-12 | | 50 | | 50 | 48 | 50 |
| 2010-09 | | StatusList | 2010-09 | | 49 | | 49 | 47 | 49 |
| 2010-06 | | StatusList | 2010-06 | | 48 | | 48 | 46 | 48 |
| 2010-03 | | StatusList | 2010-03 | | 47 | | 47 | 45 | 47 |
| 2009-12 | | StatusList | 2009-12 | | 46 | | 46 | 44 | 46 |
| 2009-09 | | StatusList | 2009-09 | | 45 | | 45 | 43 | 45 |
| 2009-06 | | StatusList | 2009-06 | | 44 | | 44 | 42 | 44 |
| 2009- | | StatusList | 2009-03 | | 43 | | 43 | 41 | 43 |

| year-month<br><br>click here to see list of specs awaiting upload<br><br>03 | remark | latest status | specs directory | TSG CN # | TSG RAN* # | TSG T # | TSG SA # | TSG GERAN # | TSG CT # |
|---|---|---|---|---|---|---|---|---|---|
| 2008-12 | | StatusList | 2008-12 | | 42 | | 42 | 40 | 42 |
| 2008-09 | | StatusList | 2008-09 | | 41 | | 41 | 39 | 41 |
| 2008-06 | | StatusList | 2008-06 | | 40 | | 40 | 38 | 40 |
| 2008-03 | | StatusList | 2008-03 | | 39 | | 39 | 37 | 39 |
| 2007-12 | | StatusList | 2007-12 | | 38 | | 38 | 36 | 38 |
| 2007-09 | | StatusList | 2007-09 | | 37 | | 37 | 35 | 37 |
| 2007-06 | | StatusList | 2007-06 | | 36 | | 36 | 34 | 36 |
| 2007-03 | | StatusList | 2007-03 | | 35 | | 35 | 33 | 35 |
| 2006-12 | | StatusList | 2006-12 | | 34 | | 34 | 32 | 34 |
| 2006-09 | GERAN henceforward meets synchronously with other TSGs, so no further "delta" directories necessary. | StatusList | 2006-09 | | 33 | | 33 | 31 | 33 |
| 2006-06 | New at GERAN only. | | 2006-06 | | | | | 30 | |
| 2006-06 | | StatusList | 2006-06 | | 32 | | 32 | | 32 |
| 2006-04 | New at GERAN only. | | 2006-04 | | | | | 29 | |
| 2006-03 | | StatusList | 2006-03 | | 31 | | 31 | | 31 |
| 2006-01 | New at GERAN only. | | 2006-01 | | | | | 28 | |
| 2005-12 | | StatusList | 2005-12 | | 30 | | 30 | | 30 |
| 2005-11 | New at GERAN only. | | 2005-11 | | | | | 27 | |
| 2005-09 | | StatusList | 2005-09 | | 29 | | 29 | | 29 |
| 2005-08/09 | New at GERAN only. | | 2005-09 | | | | | 26 | |
| 2005-06 | New at GERAN only. | | 2005-06 | | | | | 25 | |
| 2005-06 | | StatusList | 2005-06 | | 28 | | 28 | | 28 |
| 2005-04 | New at GERAN only. | | 2005-04 | | | | | 24 | |
| 2005-03 | RAN closed and RANnew opened, CN and T closed, CT opened. | StatusList | 2005-03 | 27 | 27bis, 27 | 27 | 27 | | 27 |
| 2005-01 | New at GERAN only. | | 2005-01 | | | | | 23 | |
| 2004-12 | | StatusList | 2004-12 | 26 | 26 | 26 | 26 | | |
| 2004-11 | New at GERAN only. | | 2004-11 | | | | | 22 | |
| 2004- | | StatusList | 2004-09 | 25 | 25 | 25 | 25 | | |

| year-month<br><br>click here to see list of specs awaiting upload<br><br>09 | remark | latest status | specs directory | TSG CN # | TSG RAN* # | TSG T # | TSG SA # | TSG GERAN # | TSG CT # |
|---|---|---|---|---|---|---|---|---|---|
| 2004-08 | New at GERAN only. | | 2004-08 | | | | | 21 | |
| 2004-06 | New at GERAN only. | | 2004-06 | | | | | 20 | |
| 2004-06 | | StatusList | 2004-06 | 24 | 24 | 24 | 24 | | |
| 2004-04 | New at GERAN only. | | 2004-04 | | | | | 19 | |
| 2004-03 | | StatusList | 2004-03 | 23 | 23 | 23 | 23 | | |
| 2004-02 | New at GERAN only. | | 2004-02 | | | | | 18 | |
| 2003-12 | | StatusList | 2003-12 | 22 | 22 | 22 | 22 | | |
| 2003-11 | New at GERAN only. | | 2003-11 | | | | | 17 | |
| 2003-09 | | StatusList | 2003-09 | 21 | 21 | 21 | 21 | | |
| 2003-09 | New at GERAN only. | | 2003-09 | | | | | 16 | |
| 2003-06 | New at GERAN only. | | 2003-06 | | | | | 15 | |
| 2003-06 | | StatusList | 2003-06 | 20 | 20 | 20 | 20 | | |
| 2003-04 | New at GERAN only. | | 2003-04 | | | | | 14 | |
| 2003-02 | | StatusList | 2003-03 | 19 | 19 | 19 | 19 | | |
| 2003-02 | New at GERAN only. | | 2003-02 | | | | | 13 | |
| 2002-12, 2002-11 | | StatusList | 2002-12 | 18 | 18 | 18 | 18 | 12 | |
| 2002-09 | | StatusList | 2002-09 | 17 | 17 | 17 | 17 | 11 | |
| 2002-06 | Rel-5 GERAN features content functionally frozen | | 2002-06 | | | | | 10 | |
| 2002-06 | Rel-5 features content functionally frozen (remainder, non-GERAN) | StatusList | 2002-06 | 16 | 16 | 16 | 16 | | |
| 2002-04 | | | 2002-04 | | | | | 9 | |
| 2002-03 | Rel-5 features content functionally frozen (part) | StatusList | 2002-03 | 15 | 15 | 15 | 15 | | |
| 2002-02 | | | | | | | | 8 | |
| 2001-12 | | StatusList | 2001-12 | 14 | 14 | 14 | 14 | | |
| 2001-11 | | | | | | | | 7 | |
| 2001-09 | | StatusList | 2001-09 | 13 | 13 | 13 | 13 | | |
| 2001-08 | | | | | | | | 6 | |
| 2001-06 | | StatusList | 2001-06 | 12 | 12 | 12 | 12 | 5 | |

| year-month | remark<br>click here to see list of specs awaiting upload | latest status | specs directory | TSG CN # | TSG RAN* # | TSG T # | TSG SA # | TSG GERAN # | TSG CT # |
|---|---|---|---|---|---|---|---|---|---|
| 2001-06 | Rel-4 GERAN features content functionally frozen | | | | | | | 4 | |
| 2001-03 | Rel-4 non-GERAN features content functionally frozen | StatusList | 2001-03 | 11 | 11 | 11 | 11 | | |
| 2001-01 | | | | | | | | 3 | |
| 2000-12, 2000-11 | | StatusList | 2000-12 | 10 | 10 | 10 | 10 | 2 | |
| 2000-11 | | | | | | | | | |
| 2000-09 | | StatusList | 2000-09 | 9 | 9 | 9 | 9 | 1 | |
| 2000-06 | | StatusList | 2000-06 | 8 | 8 | 8 | 8 | | |
| 2000-03 | | | | 7 | 7 | 7 | 7 | | |
| 1999-12 | R99 features content functionally frozen | | | 6 | 6 | 6 | 6 | | |
| 1999-10 | | | | 5 | 5 | 5 | 5 | | |
| 1999-06 | | | | | 4 | 4 | 4 | | |
| 1999-05 | | | | 4 | | | | | |
| 1999-04 | | | | 3 | 3 | 3 | 3 | | |
| 1999-03 | | | | 2 | 2 | 2 | 2 | | |
| 1998-12 | | | | 1 | 1 | 1 | 1 | | |

** TSG RAN was closed at the end of meeting 27 and re-opened for meeting 27 bis.*

If you plan to download a large number of specifications we recommend using an FTP client software tool such as:

- Ipswitch WS_FTP Pro
- FTPSync
- Filezilla

For additional information relating to 3GPP Specifications, their creation and maintenance, etc. go here.

## Confidential Algorithms

3GPP confidentiality and integrity algorithms The 3GPP Confidentiality and Integrity algorithms F8 & F9 (KASUMI) have been developed through the collaborative efforts of the 3GPP Organizational Partners. They may be used only for the development and operation of 3G Mobile Communications and services. Every Beneficiary must sign a Restricted Usage Undertaking with a Custodian and (...)
more »

## ASN.1

ASN.1 Object Identifiers Abstract syntax notation (ASN.1) object identifiers maintained by ETSI. ETSI is a recognized organization under the ITU-T (formerly CCITT) arc. The formal rules governing assignment of object identifier values are given in ETSI EG 200 351. Since the 3GPP technical specifications are based on GSM specifications, which use object identifiers under the ETSI node, it (...)
more »

## Drafting Rules

The Specification drafting rulesTR 21.801 are the rules for the structure and drafting of documents intended to become a 3GPP Technical Specification or Technical Report. These rules are intended to ensure that such documents are drafted in as uniform a manner as is practicable, irrespective of the technical content. 21.801 is based on the ISO/IEC Directives, Part 3, but is a self-contained (...)
more »

## Official Publications

The 3GPP Technical Specifications and Technical Reports have, in themselves, no legal standing. They only become "official" when transposed into corresponding publications of the Partner Organizations (or the national / regional standards body acting as publisher for the Partner). At this point, the specifications are referred to as UMTS within ETSI and FOMA within ARIB/TTC. Some TRs (...)
more »

Page reviewed and updated every 3 months

## ABOUT RELEASES

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- Release 1999

## FULL MEETING CALENDAR

| | | | |
|---|---|---|---|
| **GERAN** | **74** | | 15-19 May 2017 |
| **CT** | **76** | **West Palm Beach, Florida** | 05-06 Jun 2017 |
| **RAN** | **76** | **West Palm Beach, Florida** | 05-08 Jun 2017 |
| **SA** | **76** | **West Palm Beach, Florida** | 07-09 Jun 2017 |
| **GERAN** | **75** | **Berlin (TBC)** | 21-25 Aug 2017 |
| **CT** | **77** | **Sapporo** | 11-12 Sep 2017 |
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| **GERAN** | **76** | **US** | 27 Nov-01 Dec 2017 |
| **CT** | **78** | **Lisbon** | 18-19 Dec 2017 |
| **RAN** | **78** | **Lisbon** | 18-21 Dec 2017 |
| **SA** | **78** | **Lisbon** | 20-22 Dec 2017 |
| **CT** | **79** | **India** | 19-20 Mar 2018 |
| **RAN** | **79** | **India** | 19-22 Mar 2018 |
| **SA** | **79** | **India** | 21-23 Mar 2018 |

## BROWSE TECHNOLOGIES

- LTE-Advanced
- LTE
- Carrier Aggregation Explained
- HetNet/Small Cells
- NAS
- The Evolved Packet Core
- HSPA
- UMTS
- W-CDMA
- GPRS & EDGE

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# Appendix 12

The Wayback Machine - https://web.archive.org/web/20170422110018/http://www.3gpp.org:80/specifications/79-specification-numbering



# Specification Numbering

All 3GPP specifications have a specification number consisting of 4 or 5 digits. (e.g. 09.02 or 29.002).

The first two digits define the series, followed by 2 further digits for the 01 to 13 series or 3 further digits for the 21 to 55 series.

The full title, specification number and latest version number for every specification can be found in the current status list (warning: large file!).

An automated list of Specification numbers - with the Title and details of the Specification Group responsible.

| Subject of specification series | 3G and beyond / GSM (R99 and later) | GSM only (Rel-4 and later) | GSM only (before Rel-4) |
|---|---|---|---|
| General information (long defunct) | | | 00 series |
| Requirements | 21 series | 41 series | 01 series |
| Service aspects ("stage 1") | 22 series | 42 series | 02 series |
| Technical realization ("stage 2") | 23 series | 43 series | 03 series |
| Signalling protocols ("stage 3") - user equipment to network | 24 series | 44 series | 04 series |
| Radio aspects | 25 series | 45 series | 05 series |
| CODECs | 26 series | 46 series | 06 series |
| Data | 27 series | 47 series (none exists) | 07 series |
| Signalling protocols ("stage 3") -(RSS-CN) and OAM&P and Charging (overflow from 32.- range) | 28 series | 48 series | 08 series |
| Signalling protocols ("stage 3") - intra-fixed-network | 29 series | 49 series | 09 series |
| Programme management | 30 series | 50 series | 10 series |
| Subscriber Identity Module (SIM / USIM), IC Cards. Test specs. | 31 series | 51 series | 11 series |
| OAM&P and Charging | 32 series | 52 series | 12 series |
| Access requirements and test specifications | | 13 series (1) | 13 series (1) |
| Security aspects | 33 series | (2) | (2) |
| UE and (U)SIM test specifications | 34 series | (2) | 11 series |
| Security algorithms (3) | 35 series | 55 series | (4) |
| LTE (Evolved UTRA), LTE-Advanced, LTE-Advanced Pro radio technology | 36 series | - | - |
| Multiple radio access technology aspects | 37 series | - | - |
| Radio technology beyond LTE | 38 series | - | - |

Note (1): The 13 series GSM specifications relate to European-Union-specific regulatory standards. On the closure of ETSI TC SMG, responsibility for these specifications was transferred to ETSI TC MSG, (Mobile Specification Group) and they do not appear on the 3GPP file server.

Note (2): The specifications of these aspects are spread throughout several series.

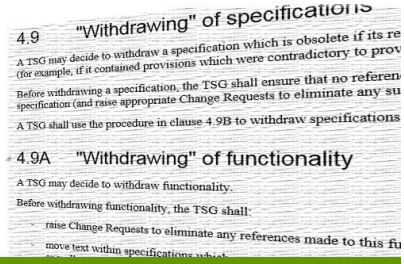
## Search

3GPP Website: Search for...

*Search and download specs, docs, CRs and more from the 3GPP FTP Server:*

ADVANCED FTP SEARCH

## More news...


4.9 "Withdrawing" of specifications

A TSG may decide to withdraw a specification which is obsolete if its re
(for example, if it contained provisions which were contradictory to prov

Before withdrawing a specification, the TSG shall ensure that no referen
specification (and raise appropriate Change Requests to eliminate any su

A TSG shall use the procedure in clause 4.9B to withdraw specifications

4.9A "Withdrawing" of functionality

A TSG may decide to withdraw functionality.

Before withdrawing functionality, the TSG shall:

- raise Change Requests to eliminate any references made to this fu
- move text within specifications

Proposal to withdraw TR 38.900 (channel model for spectrum above 6GHz) at RAN#76

## News Feeds

3GPP News

3GPP tweets

Note (3): Algorithms may be subject to export licensing conditions. See the relevant 3GPP page. See also the relevant ETSI pages.

Note (4): The original GSM algorithms are not published and are controlled by the GSM Association.

Technical Reports are of two classes:

> Those intended to be transposed and issued by the Organizational Partners as their own publications; and
>
> Those not intended for publication but which are simply 3GPP internal working documents, used, for example, for documenting planning and scheduling of work, or for holding the interim results of feasibility studies.

The first category have numbers of the form: xx.9xx

The second category have numbers of the form:
xx.8xx (feasibility study reports, etc) or, more rarely,
30.xxx / 50.xxx (planning and scheduling)
For some spec series, the stock of xx.8xx TRs has been exhausted, and in these cases, further internal TRs are allocated xx.7xx numbers.

Missing Specs: Click here to see those Specs not yet available following the most recent round of TSG meetings.

The 3GPP Specifications are stored on the file server as zipped MS-Word files. The filenames have the following structure:

SM[-P[-Q]]-V.zip

where the character fields have the following significance ...

S = series number - 2 characters (see the table above)
M = mantissa (the part of the spec number after the series number) - 2 or 3 characters (see above)
P = optional part number - 1 or 2 digits if present
Q = optional sub-part number - 1 or 2 digits if present
V = version number, without separating dots - 3 digits (6 digits when any component of the three-digit range has been exhausted - see the fifth example below)

So for example:

> 21900-320.zip is 3GPP TR 21.900 version 3.2.0
> 0408-6g0.zip is 3GPP TS 04.08 version 6.16.0
> 32111-4-410 is 3GPP TS 32.111 part 4 version 4.1.0
> 29998-04-1-100 is 3GPP TS 29.998 part 4 sub-part 1 version 1.0.0
> 29898-133601 is 3GPP TR 29.898 version 13.36.1

Further information:

**Latest version**
The latest versions of the approved specifications in the "latest" directory. The latest version of draft specs (i.e. those not yet under change control) are in the "latest-drafts" directory. See also the page on version numbering.

**Particular version**
All older versions of specifications (where available) are stored in the archive subdirectory. All versions of all releases of a given specification are placed directly under the name of the specification.

**Title or subject**
If you only know the title or the subject, but not the specification number, the best place to start looking is the complete list of all 3GPP specification numbers and titles. This list also shows the most recent version in each Release.

**Specs related to a particular working group**
Each 3GPP TSG Working Group has a home page, which lists the specifications under its responsibility. Follow the links from here, or use the main menu item "Specification Groups".

**Official versions published by recognized Standards Development Organizations**
The 3GPP Technical Specifications (and Technical Reports) which are publicly available from this site have, in themselves, no legal standing. They only become "official" when transposed into corresponding publications of the Partner Organizations. If you are looking for the official versions, see the official publications page.

## Yet more information:

**Work plan**
The 3GPP Work plan describes the new functionality currently being elaborated in the TSG working groups. It also indicates the expected timescales for their finalization.

**Releases (and phases, stages)**
An introduction to the 3GPP mechanism for specifications releases can be found here.

**Historical information**
If you need to look for old / superseded specifications or change requests, start here.

**TSG working methods**
The procedures for creating, enhancing and maintaining specifications are described in TR 21.900. A presentation outlining the release and change request process can be found here.

**3GPP Drafting rules**
The rules for drafting specifications are described in TR 21.801.

**Change Requests**
The change request mechanism is used when a correction or new functionality is required for an existing specification.

**Version numbering**
More information on the version numbering page.

Issuing new TS/TR numbers. More information on this page.

---

Page updated:

2016-12-08: Spec file structure caters for the six-character version format used for specs where the three-character limit has been exhausted.
2016-01-12: Mention of TRs numbered xx.7xx as overflow of xx.8xx allocations (JMM)
2015-10-01: Fix broken link to specification groups (JMM)


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Release 1999

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|---|---|---|---|
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| CT | 76 | West Palm Beach, Florida | 05-06 Jun 2017 |
| RAN | 76 | West Palm Beach, Florida | 05-08 Jun 2017 |
| SA | 76 | West Palm Beach, Florida | 07-09 Jun 2017 |
| GERAN | 75 | Berlin (TBC) | 21-25 Aug 2017 |
| CT | 77 | Sapporo | 11-12 Sep 2017 |
| RAN | 77 | Sapporo | 11-14 Sep 2017 |
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# Appendix 13

The Wayback Machine - https://web.archive.org/web/20170422204855/http://www.3gpp.org:80/specifications/Releases

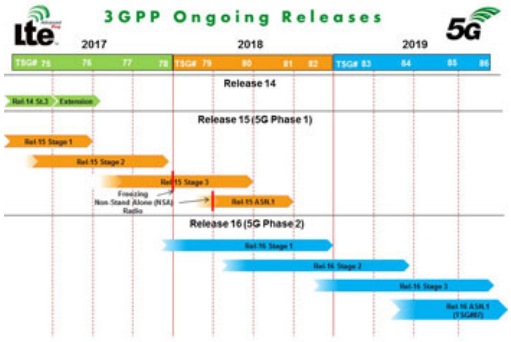
The Mobile Broadband Standard
EDGE



# Releases

3GPP uses a system of parallel "Releases" which provide developers with a stable platform for the implementation of features at a given point and then allow for the addition of new functionality in subsequent Releases. You can learn more about 3GPP Releases by looking in to the following resources:

- A brief description of each Release can be found in the footer of this page, in the 'About Releases' section.
- Full details of the specifications needed for each 3GPP Release can be found in the "Release Description" folder of the ftp site.
- A table of the features, by Release, can also be found in the 3GPP Work Plan.
- There is also a 3GPP Specification Release version matrix which is a listing (with links) of the Specifications - showing the Release in which each specification was first developed.




Click to enlarge this view...

## Start, Freeze and End dates:

The table below is extracted from the data on the 3GPP Ultimate portal at https://portal.3gpp.org/ "Releases" tab. Please refer to that data for the most up-to-date information.

Future dates are proposals, subject to change.

| Name | Status [Note 3] | Start date [Note 2a] | End date | Closure date |
|---|---|---|---|---|
| Release 15 | Open | 2016-06-01 | 2018-09-14 (SA#81) | |
| Release 14 | Open | 2014-09-17 | 2017-06-09 (SA#76) | |
| Release 13 | Frozen | 2012-09-30 | 2016-03-11 (SP-71) | |
| Release 12 | Frozen | 2011-06-26 | 2015-03-13 (SP-67) | |
| Release 11 | Frozen | 2010-01-22 | 2013-03-06 (SP-59) | |
| Release 10 | Frozen | 2009-01-20 | 2011-06-08 (SP-52) | |
| Release 9 | Frozen | 2008-03-06 | 2010-03-25 (SP-47) | |
| Release 8 | Frozen | 2006-01-23 | 2009-03-12 (SP-43) | |
| Release 7 | Closed | 2003-10-06 | 2008-03-13 (SP-39) | 2014-09-17 (SP-65) |
| Release 6 | Closed | 2000-03-28 | 2005-09-28 (SP-29) | 2014-09-17 (SP-65) |
| Release 5 | Closed | 2000-05-01 [Note 2a] | 2002-09-12 (SP-17) | 2014-09-17 (SP-65) |

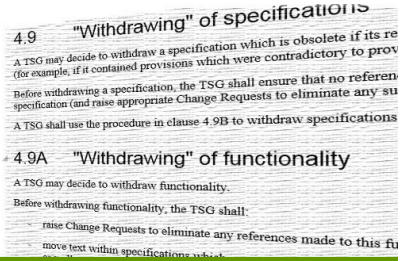
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## More news...


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Proposal to withdraw TR 38.900 (channel model for spectrum above 6GHz) at RAN#76

## News Feeds

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| | | | | |
|---|---|---|---|---|
| Release 4 | Closed | 1998-08-01 | 2001-06-21 (SP-12) | 2014-09-17 (SP-65) |
| Release 2000 [Note 1] | Closed | 1999-03-30 [Note 2a] | | 1999-12-17 (SP-06) |
| Release 1999 | Closed | 1996-11-01 | 1999-12-17 (SP-06) | 2008-06-05 (SP-40) |
| UMTS | Closed | 1994-08-18 | 1999-02-12 (SMG-28) | 2005-06-08 (SP-28) |
| Release 1998 | Closed | 1996-03-26 | 1999-02-12 (SMG-28) | 2005-06-08 (SP-28) |
| Release 1997 | Closed | 1996-04-15 [Note 2a] | | 2005-06-08 (SP-28) |
| Release 96 / Phase 2+ | Closed | 1995-07-20 | | 2004-09-16 (SP-25) |
| Phase 2 | Closed | 1993-03-25 | | 2004-09-16 (SP-25) |
| Phase 1 extension | Closed | 1994-10-01 | | |
| Phase 1 DCS-1800 | Closed | 1992-12-03 | | |
| Phase 1 | Closed | 1987-01-01 | | |

## GSM Phases and Version numbers

| GSM Release | TS/TR version [Note 2, 4] | 3GPP Release | TS/TR version |
|---|---|---|---|
| GSM Phase 1 | 3.x.y | | |
| GSM Phase 2 | 4.x.y | | |
| GSM Phase 2+ | 5.x.y | | |
| GSM Phase 2+ Release 97 | 6.x.y | | |
| GSM Phase 2+ Release 98 | 7.x.y | | |
| GSM Phase 2+ Release 99 | 8.x.y | UMTS Release 99 | 3.x.y |
| *GSM Phase 2+ Release 00* | *9.x.y* | | |

## 3GPP Releases and Version numbers

| Release | TS/TR version |
|---|---|
| Release 4 | 4.x.y |
| Release 5 | 5.x.y |
| Release 6 | 6.x.y |
| ... | |
| Release 14 | 12.x.y |
| ... | |

## Other associated terms

**Stages**

The term "Stage" derives from the ITU-T (originally CCITT) method for categorizing specifications (Recommendation I.130).

> "Stage 1" refers to the service description from a service-user's point of view.
> "Stage 2" is a logical analysis, devising an abstract architecture of functional elements and the information flows amongst them across reference points between functional entities.

> "Stage 3" is the concrete implementation of the functionality and of the protocols appearing at physical interfaces between physical elements onto which the functional elements have been mapped.

In addition, 3GPP often performs feasibility studies the results of which are made available in Technical Reports (normally 3GPP-internal TRs, numbered xx.8xx, not intended for transposition by the Organizational Partner SDOs). The feasibility study might be considered as a sort of "Stage 0". Furthermore, some Stage 3 specifications require test specifications to be prepared: effectively a "Stage 4".

**Phases**

This term has two distinct usages within the 3GPP:

> in reference to GSM specifications, Phase 1, Phase 2 and Phase 2+ referred to releases of specifications (see table above);
> some features within GSM/3G specifications have been enhanced over the years. For example, enhancements to the original CAMEL functionality are referred to as CAMEL phase 2, CAMEL phase 3 and CAMEL phase 4.

**Further information**

The mechanisms for creating and maintaining specifications are described in TR 21.900. A presentation outlining the release and change request process can be found here.

---

*Note 1*: The term "Release 2000" was used only temporarily and was eventually replaced by "Release 4" and "Release 5" (most elements originally in Release 2000 were renamed Release 4, but some were deferred until Release 5).

*Note 2*: A Specification with a version number of 0.x.y, 1.x.y or 2.x.y indicates that it is a new, draft, specification which has not yet been approved. The anticipated release is normally shown on the cover of the document.

*Note 2a*: The start date for a Release is an indication of when the first work item for that Release was approved at TSG level. In fact, it is somewhat approximate because often work items started in an earlier Release, but not completed, are "promoted" to the next Release. The end date for a Release is an indication of when the detailed protocols become stable. However, see Note 3 below.

*Note 3*: After "freezing", a Release can have no further additional functions added. However, detailed protocol specifications (stage 3) may not yet be complete. "Freezing" is applied successively for each of the three stages (see below), with stage 3 normally being frozen one or two TSG meetings earlier than the "end" date. The "end" date shown on the 3GU portal is indicative only, since for each Release, a considerable number of refinements and corrections can be expected for at least two years following this date. In addition, OA&M specs and test specs may lag by some considerable time. A "frozen" Technical Specification is one which can have no further category B or C (new or modified functionality) Change Requests, other than to align earlier stages with later stages. The individual stage freeze dates can only be seen by 3GU account holders (delegates, officials, secretariat).

*Note 4*: In the version number of a 3GPP TS or TR, the first field (before the first dot) indicates the Release number according to the table below. The field "x" is incremented at each change in the spec resulting from one or more Change Requests approved by the responsible TSG. Field "y" is incremented whenever an editorial change is made to a specification; editorial changes are those which cannot in any way change the technical interpretation of the spec, and are introduced at the discretion of the Support Team. Exceptionally, field "y" is incremented when a newly-provided version of a spec is found to be flawed due to, for example, misimplementation of a newly-approved CR; however, this circumstance is only permitted during the three-week period following the end of a TSG plenary round, during which new versions of specs are produced. Every change of version is documented in the "change history" annex of the spec. When "x" is incremented, field "y" is reset to zero. When the Release field (the first digit) is incremented, fields "x" and "y" are reset to zero. Version numbering was unified from Release 4 onwards, regardless of radio access technology. This implied a renumbering of the GSM-only specifications (see the Specification Numbering page).


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**FULL MEETING CALENDAR**

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| GERAN | 74 | | 15-19 May 2017 |
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| RAN | 77 | Sapporo | 11-14 Sep 2017 |
| SA | 77 | Sapporo | 13-15 Sep 2017 |
| GERAN | 76 | US | 27 Nov-01 Dec 2017 |
| CT | 78 | Lisbon | 18-19 Dec 2017 |
| RAN | 78 | Lisbon | 18-21 Dec 2017 |
| SA | 78 | Lisbon | 20-22 Dec 2017 |
| CT | 79 | India | 19-20 Mar 2018 |
| RAN | 79 | India | 19-22 Mar 2018 |
| SA | 79 | India | 21-23 Mar 2018 |

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The Evolved Packet Core
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# Appendix 14

The Wayback Machine - https://web.archive.org/web/20170718150907/http://www.3gpp.org:80/specifications-groups/ran-plenary/ran1-radio-layer-1



# RAN1 - Radio layer 1

<<NEW 2017-06-13>>Elections for a Chairman and 1 Vice Chairman will be held during RAN WG1#90 meeting in Prague (21 to 25 August 2017).

RAN WG1 (Radio layer 1) is responsible for the specification of the physical layer of the radio Interface for UE, UTRAN, Evolved UTRAN, and beyond; covering both FDD and TDD modes of the radio interface.

## Terms of reference

The latest terms of reference were approved at RAN#53
in document RP-110963.zip.

Within the scope of TSG RAN, RAN WG1 is responsible for the development of specifications dealing with UTRA, Evolved UTRA, and beyond.
RAN WG1 is responsible for:

Specification of the physical layer of the Uu radio Interface for UE, UTRAN, Evolved UTRAN, and beyond, covering both FDD and TDD modes, as well as the physical layer of the Un Interface for Relay Nodes. The work in RAN WG1 includes especially:

Specification of physical channel structures
Specification of the mapping of the transport channels onto physical channels
Specification of the physical layer multiplexing, and channel coding and error detection
Specification of the spreading and modulation
Specification of the physical layer procedures
Specification of definition of measurements and their provision by the physical layer to the upper layers RAN WG1 also carries out work related to handling of the physical layer related UE capabilities and to physical layer related parameters used in UE tests developed in TSG RAN.

## Useful links and information

| | |
|---|---|
| *About RAN WG1* | List of elected officials |
| *Documents* | Documents area |
| | Specifications |
| | Work items |
| *Meetings* | Next meeting information & previous meeting reports and documents |
| | Liaisons Statements |
| | Full RAN WG1 meeting calendar |
| *General info* | Email exploder lists |

| | |
|---|---|
| RAN Working groups and Ad Hoc groups | |
| TSG RAN Plenary | |
| TSG RAN WG1 | Radio Layer 1 specification |
| TSG RAN WG2 | Radio Layer 2 and Radio Layer 3 RR specification |
| TSG RAN WG3 | Iub Iur and Iu specification - UTRAN O&M requirements |

| | |
|---|---|
| RAN Working groups and Ad Hoc groups | |
| TSG RAN WG4 | Radio performance and protocol aspects (system) - RF parameters and BS conformance |
| TSG RAN WG5 | Mobile terminal conformance testing |
| TSG RAN WG6 | Legacy RAN radio and protocol |
| TSG RAN AHG-ITU | Ad-hoc group on ITU (internal) co-ordination |

**ABOUT RELEASES**

Release 15
Release 14
Release 13
Release 12
Release 11
Release 10
Release 9
Release 8
Release 7
Release 6
Release 5
Release 4
Release 1999

**FULL MEETING CALENDAR**

| | | | |
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| **GERAN** | **75** | **Berlin (TBC)** | 21-25 Aug 2017 |
| **CT** | **77** | **Sapporo** | 11-12 Sep 2017 |
| **RAN** | **77** | **Sapporo** | 11-14 Sep 2017 |
| **SA** | **77** | **Sapporo** | 13-15 Sep 2017 |
| **GERAN** | **76** | **US** | 27 Nov-01 Dec 2017 |
| **CT** | **78** | **Lisbon** | 18-19 Dec 2017 |
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| **SA** | **78** | **Lisbon** | 20-22 Dec 2017 |
| **CT** | **79** | **India** | 19-20 Mar 2018 |
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| **SA** | **79** | **India** | 21-23 Mar 2018 |
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| **RAN** | **80** | **North America** | 11-14 Jun 2018 |
| **SA** | **80** | **North America** | 13-15 Jun 2018 |

**BROWSE TECHNOLOGIES**

LTE-Advanced
LTE
Carrier Aggregation Explained
HetNet/Small Cells
NAS
The Evolved Packet Core
HSPA
UMTS
W-CDMA
GPRS & EDGE

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# Appendix 15

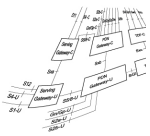
The Wayback Machine - https://web.archive.org/web/20170718235226/http://www.3gpp.org:80/

The Mobile Broadband Standard
LTE

A GLOBAL INITIATIVE



## Cover Story



...ank Yong Yang (Ericsson)

...mpleted the Release 14
...ature for many operators.

EPC nodes and provides the
...ments for the separation of functionality in the Evolved Packet Core's
. This enables flexible network deployment and operation, by
...zed deployment and the independent scaling between control plane and user plane functions - while not affecting the functionality of the existing nodes subject to this split.

READ MORE...



# Mission Critical Services in 3GPP

***June 20, 2017***

**By Yannick Lair and Georg Mayer**

A platform for mission critical (MC) communications and MC Services has been a key priority of 3GPP in recent years and is expected to evolve into the future by taking more requirements, from different sectors of the global critical communications industry, on board.

This article provides an overview of what was achieved so far in the MC domain within 3GPP and also gives an outlook of what can be expected in the near future. We plan to create a more detailed paper on MC Services, which will summarize the use cases and functional aspects of Rel-13, Rel-14 and upcoming Rel-15, later this year.

Driven by the 3GPP release schedule, the mission critical related functionalities have been phased across them, each release encompassing a complete set of standards for equipment vendors and operators to phase their implementations and deployments, based on market demands.

READ MORE...

## Recent News

# LTE MCPTT testing

***June 27, 2017***

3GPP Market Representation Partner TCCA has worked closely with ETSI to produce their first Mission Critical Push to Talk (MCPTT) test event, held last week in Sophia Antipolis, focusing on test sessions for mission-critical LTE equipment.

140 participants from 19 companies carried out over 1000 tests based on 3GPP, ETSI and IETF standards – with 47 of the test cases specifically developed for Release 13 MCPTT.

READ MORE...



# 5G at RAN#76, a video interview

***June 22, 2017***

Video by Telecom TV, featuring Balazs Bertenyi, TSG RAN Chairman

A new video is on-line today, covering the transition from Rel-14 completion to the task of meeting two major milestones for Rel-15, within the next twelve months.

The video has news on the early drop of 5G NR specifications for December 2017 and some words on the full set of Rel-15 features - due by June 2018.

READ MORE...

---

**ABOUT RELEASES**

Release 15
Release 14
Release 13
Release 12
Release 11
Release 10
Release 9
Release 8
Release 7
Release 6
Release 5
Release 4
Release 1999

**FULL MEETING CALENDAR**

| | | | |
|---|---|---|---|
| **GERAN** | **75** | **Berlin (TBC)** | 21-25 Aug 2017 |
| **CT** | **77** | **Sapporo** | 11-12 Sep 2017 |
| **RAN** | **77** | **Sapporo** | 11-14 Sep 2017 |
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| **CT** | **78** | **Lisbon** | 18-19 Dec 2017 |
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| **RAN** | **80** | **North America** | 11-14 Jun 2018 |
| **SA** | **80** | **North America** | 13-15 Jun 2018 |

**BROWSE TECHNOLOGIES**

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# Appendix 16

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# www.3gpp.org - /ftp/

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# Appendix 17

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# Appendix 18

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# Appendix 20

# 3GPP_TSG_RAN_WG1 Archives

June 2017, Week 2

## 3GPP_TSG_RAN_WG1@LIST.ETSI.ORG

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From: Patrick Merias <[log in to unmask]>
Reply To: Patrick Merias <[log in to unmask]>
Date: Thu, 8 Jun 2017 08:06:55 +0000
Content-Type: multipart/alternative
Parts/Attachments: text/plain (1562 bytes) , text/html (29 kB)

Dear all,

Upcoming ad-hoc meeting agenda has been entered into 3GU (RAN1#AH_NR2 agenda is now available with Tdoc# R1-1709880 based on draft version 5 distributed by Mr Chair) and consequently Tdoc reservation is opened…
Please remember a few basics:

- Don't forget to register (or unregister if you're not coming) as participant of the meeting
- Keep the acknowledgment message as confirmation of your registration – the token included in shall be used during the meeting time for your official checking in to the meeting
- Use the correct type when requesting Tdoc numbers especially for CR and draftCR – do not use "other" or "discussion" for CR and draftCR – also pay attention entering accurate information regarding spec, release, WI code and category both for CR and draftCR.

I'll soon check and submit any incoming NR-related LSs relevant to the June meeting.
Wish you all a pleasant day
BR
P

**Patrick Merias** - Mobile Competence Center Technical Officer

ATOM RSS1 RSS2

# Appendix 21

# 3GPP_TSG_RAN_WG1 Archives

July 2017, Week 1

## 3GPP_TSG_RAN_WG1@LIST.ETSI.ORG

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From: Patrick Merias <[log in to unmask]>
Reply To: Patrick Merias <[log in to unmask]>
Date: Mon, 3 Jul 2017 14:06:47 +0000
Content-Type: multipart/mixed
Parts/Attachments: text/plain (789 bytes) , text/html (4 kB) , Draft_Minutes_report_RAN1#AH_NR2_v010.zip (823 kB)

Dear all,

Hope you all had a safe journey back…
Enclosed is a preliminary version of last week meeting.
Contributions have been uploaded to the 3GPP ftp web site – I'm going now to start checking them all and report the actual status into 3GU Tdoc_list
BR
P

**Patrick Merias**– Mobile Competence Center Technical Officer
**ETSI** • www.etsi.org • [log in to unmask]
Phone: +33 (0)4 92 94 42 06 • Mobile: +33 (0)6 07 59 08 47
This email may contain confidential information and is intended for the use of the addressee only. Any unauthorized use may be

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# Appendix 22

# 3GPP TSG RAN WG1 Meeting #90bis
# Prague, Czech Rep, 9th – 13th October 2017

**R1-1716941**

**2**

**Source:** **MCC Support**

**Title:** **Final Report of 3GPP TSG RAN WG1 #90 v1.0.0 (Prague, Czech Rep, 21st – 25th August 2017)**

**Document for:** **Approval**

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Ericsson Ex. 1008, p. 268 of 900
Ericsson v. Motorola

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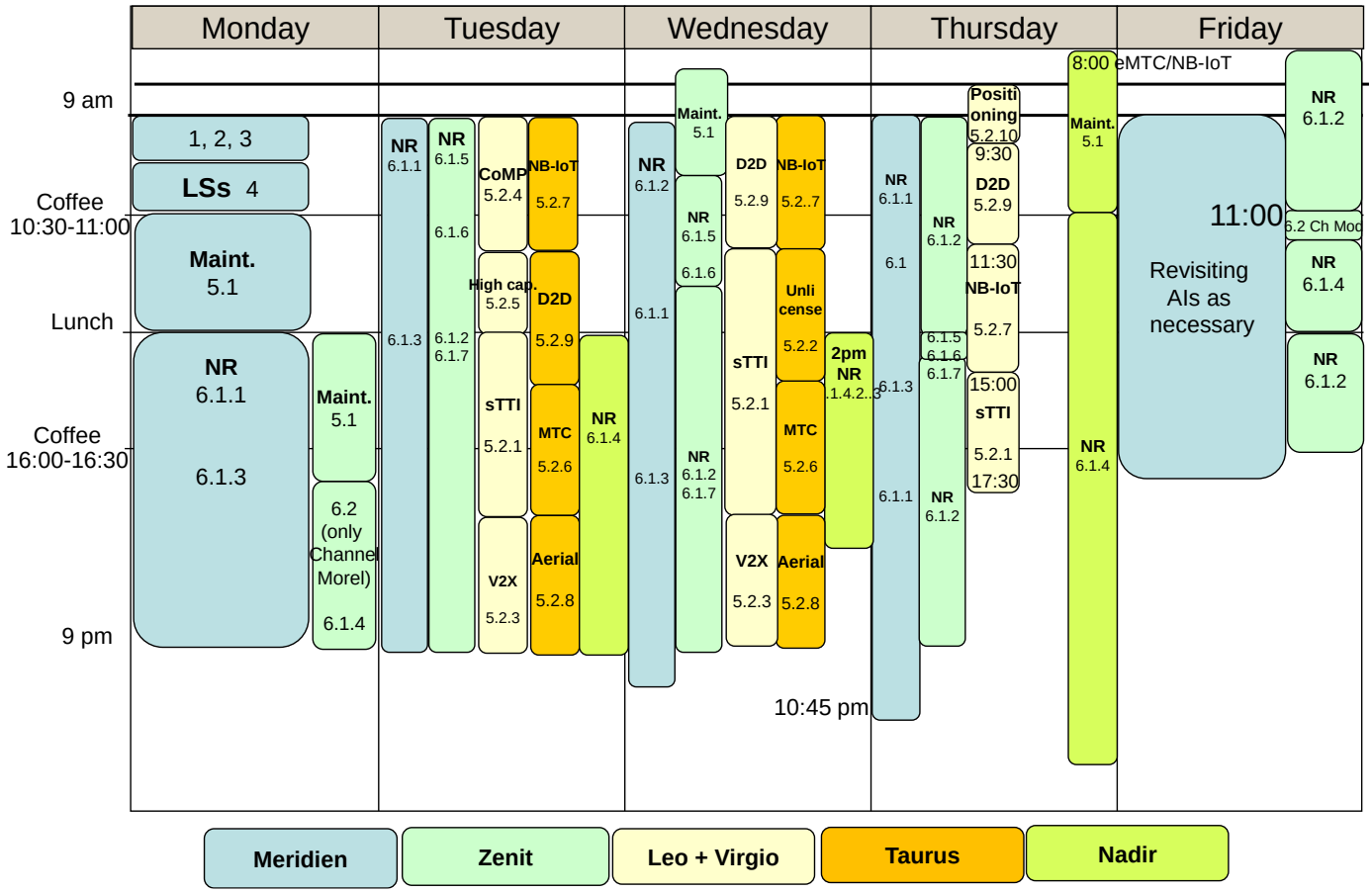
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**Main facts summary**

The 3GPP TSG WG RAN1#90 meeting, hosted by European Friends of 3GPP, was held at the CLARION CONGRESS HOTEL PRAGUE, Czech Republic.
The meeting started at 9:00 on Monday 21st August and finished at 18:00 on Friday 25th August 2017.
The number of attending delegates, having confirmed their participation through the electronic check-in application, was **xxx.**
Note that the number of registered was 631.

On day one, Monday 21st of August, the election of WG RAN1 Chairman took place and the result was as follows:
New Chairman: **Dr Wanshi Chen (Qualcomm Inc., ATIS)**
On day two, Tuesday 22nd of August, the election of one WG RAN1 Vice Chairman took place and the result was as follows:
New Vice Chairman: **Dr. Younsun Kim (Samsung, TTA)**

The schedule of the week was as follows:




Note: The empty slots are devoted to offline sessions.

**The list of action points that required RAN1 close follow-up is listed in Annex F (end of document).**

The number of contributions for this meeting was **3237**.

Note: The amount of documents includes those discussed during the email discussion session post meeting.

| | |
|---|---|
| | Contribution is agreed/approved |
| | Contribution is not pursued (no consensus) |
| | Further discussion is required – come-back needed |
| | Working assumption |
| | Specific action needed from MCC |
| | Contribution is for email discussion/approval |



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# 1 Opening of the meeting

Mr Satoshi Nagata (RAN1 Chairman) welcomed the participants of the RAN WG1 #90 meeting and opened the meeting at 09:00. Before any other duties, RAN1 paid a tribute to François Courau (former RAN chair) who passed away during this week end. François has been a well known figure in the mobile world for decades and retired from RAN chairmanship and from Alcatel-Lucent some years ago.

Mr Alexei Davydov from Intel on behalf of the European Friends of 3GPP, Apple, BlackBerry, BT, Deutsche Telekom, Ericsson, Huawei, Intel, InterDigital, KPN, Motorola, Nokia, Orange, Qualcomm, SIMAlliance, Sony, TeliaSonera, Telefonica, TIM, Telenor, Vodafone, welcomed the delegates, and detailed the domestic arrangements for the full week.

## *1.1 Call for IPR*

*The attention of the members of this Technical Specification Group was drawn to the fact* ***that 3GPP Individual Members have the obligation*** *under the IPR Policies of their respective Organizational Partners to* ***inform their respective*** *Organizational Partners* ***of Essential IPRs they become aware of****.*
*The members take note that they are hereby invited:*

- *to investigate whether their organization or any other organization owns IPRs which were, or were likely to become Essential in respect of the work of 3GPP.*
- *to notify their respective Organizational Partners of all potential IPRs, e.g., for ETSI, by means of the IPR Information Statement and the Licensing declaration forms (e.g. see the ETSI IPR forms http://webapp.etsi.org/Ipr/).*

## *1.2 Competition law statement*

*The Chairman also drew Member's attention to the fact that 3GPP activities are subject to antitrust and competition laws and that compliance with said laws is therefore required of any participant of this WG meeting including the Chairman and Vice Chairmen. In case of question, please contact your legal counsel.*
*The present meeting will be conducted with strict impartiality and in the interests of 3GPP.*
*Furthermore, the Chairman reminded Members that timely submission of work items/contributions in advance of WG meetings is important to allow for full and fair consideration of such matters.*

## *1.3 Network usage conditions*

*The PCG has laid down the following network usage conditions:*

**Users shall not use the network to engage in illegal activities. This includes activities such as copyright violation, hacking, espionage or any other activity that may be prohibited by local laws**.

**Users shall not engage in non-work related activities that consume excessive bandwidth** or cause significant degradation of the performance of the network.
Since the **network is a shared resource**, users should exercise some basic etiquette when using the 3GPP network at a meeting. It is understood that high bandwidth applications such as downloading large files or video streaming might be required for business purposes, but delegates should be strongly discouraged in performing these activities for personal use. Downloading a movie or doing something in an interactive environment for personal use essentially wastes bandwidth that others need to make the meeting effective. The meeting chairman should remind end users that the network is a shared resource; the more one user grabs, the less there is for another. Email and its attachments already take up significant bandwidth (certain email programs are not very bandwidth efficient). In case of need the chair can ask the delegates to restrict IT usage to things that are essential for the meeting itself.

**1. DON'T place your WiFi device in ad-hoc mode**
**2. DON'T set up a personal hotspot in the meeting room**
**3. DO try 802.11a if your WiFi device supports it**
**4. DON'T manually allocate an IP address**
**5. DON'T be a bandwidth hog by streaming video, playing online games, or downloading huge files**
**6. DON'T use packet probing software which clogs the local network (e.g., packet sniffers or port scanners)**



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### 1.4 Check-in for Registered Delegates

*The attention of the delegates to this meeting was drawn to the fact that it is not permitted to check in other delegates on their behalf. In the event of technical difficulties preventing check-in, delegates should present themselves in person to the Secretary.*

# 2 Approval of Agenda

**R1-1714602 Draft Agenda of RAN1#90 meeting RAN1 Chair (rev of R1-1712030)**
Satoshi Nagata (RAN1 Chair) proposed the agenda for the meeting, as well the schedule of the week.
**Discussion:** Details of the elections were provided to the group. A short introduction was made by the candidates. Refer to AI 7.
**Decision:** The agenda is approved.

**R1-1712033 Selected highlights from RAN#76 of relevance to RAN1 RAN1 Chair**
The document was presented by Satoshi Nagata (RAN1 Chair) and provides highlights relevant to RAN1 from the last plenary.
**Discussion:** Confirmation that the additional ad-hoc meeting in January 2018 will be hosted by NAF3. Exact location to be defined.
**Decision:** The document is noted.

# 3 Approval of Minutes from previous meetings

**R1-1712031 Report of RAN1#89 meeting ETSI (rev of R1-1709881)**
The document was presented by Patrick Merias from MCC (ETSI Mobile Competence Center) and provides the report from last RAN1#89 meeting in Hangzhou.
**Discussion:** MCC recalled that the report (with a focus on NR) was presented in June ad-hoc meeting. R1-1712031 is the final report including the LTE part.
**Decision:** The document is approved.

**R1-1712032 Report of RAN1#AH_NR2 meeting ETSI**
The document was presented by Patrick Merias from MCC (ETSI Mobile Competence Center) and provides the report from last June ad-hoc meeting in Qingdao.
**Discussion:** MCC apologized for the late submission, mainly due to the preparation of the RAN1 elections.
**Decision:** The document is approved.

# 4 Incoming Liaison Statements

**R1-1712052 Response to IEEE LS to 3GPP RAN/RAN1/RAN4 related to PD and ED issues RAN, Qualcomm**
RAN informs IEEE 802 that the Study on Multi-node Testing for LAA has been completed and the Technical Report 36.789 has been approved at RAN #76 (June 2017). The multi-node tests define an evaluation methodology to assess co-channel coexistence performance. The impact from LAA to Wi-Fi and from Wi-Fi to LAA can be analyzed, considering both best effort and voice traffic scenarios.
The execution of the test plan will be determined by the manufacturers of LAA equipment and/or their customers. RAN is not able to comment on the timeline for execution.
**Discussion:** No action to RAN1.
**Decision:** The document is noted.

**R1-1712038 Reply LS on monitoring of partial NPDCCH search spaces RAN2, Huawei**
RAN2 confirms that after a (re)configuration via RRC signalling, the UE is required to receive the UL grant from the start of a search space after the processing delay has passed, i.e. the UE is required to monitor the NPDCCH from the first NPDCCH search space which starts at or after the 45ms processing delay.
**Decision:** The document is noted.

**R1-1712761 Discussion on search space monitoring after search space reconfiguration or change Qualcomm Incorporated**
Proposal: The UE is not required to monitor partial search spaces after a search space change. The search space change includes the case of a search space changing because of a reconfiguration (e.g. after RRC Reconfiguration) and the case of switching between different search spaces (e.g. monitoring of CSS after PDCCH order).
**Decision:** The document is noted.
**Conclusion:** The proposal in R1-1712761 is implied in the RAN2 LS

**R1-1712053 Reply LS on UE capabilities for MBMS SA2, Qualcomm**

**Decision:** The document is noted.

**R1-1712035 Reply LS on SFN indication in handover message RAN2, Qualcomm**



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**Decision:** The document is noted.

R1-1712036 **RAN2 agreement on UAV requirements** **RAN2, NTT DOCOMO**
**Decision:** The document was already treated in RAN1#89

R1-1712037 LS on short processing time and short TTI RAN2, Ericsson
**Decision:** The document is noted.
R1-1712045 LS on Maximum Transmission Timing Difference and Maximum Receive Timing Difference in CA for sTTI RAN4, Intel

**Decision:** The document is noted.

R1-1712043 LS on RAN4 agreements for FeD2D SI RAN4, Intel

**Decision:** The document is noted.

R1-1712044 Reply LS regarding 1024QAM RAN4, Huawei

**Decision:** The document is noted.

R1-1712040 LS on support of CACC and platooning applications by 3GPP systems SAE DSRC Technical Committee, Chair

R1-1712039 **LS on shared baseband capabilities for MR-DC** **RAN2, Nokia**
RAN2 understands for LTE and NR dual-connectivity i.e. MR-DC (Multi-RAT DC) the capability signalling and coordination will be needed for baseband capabilities between LTE and NR if baseband capabilities are shared and should be split by the network (eNB/gNB).*"RAN4 has identified that some NR UE capabilities may depend on the LTE/NR band combinations, such as MIMO layers, however it is FFS to identify all parameters"*.
Q1: In the context of the above discussion, RAN2 would like to know which of the baseband capabilities are shared and split between LTE and NR by eNB/gNB?
**Decision:** The document is noted.
R1-1714025 **On shared baseband capabilities for MR-DC** **Nokia, Nokia Shanghai Bell**
**Proposal:** Consider the UE capability aspects in the LTE+NR dual connectivity related discussions for UE soft buffer management and transmit power sharing mechanisms and provide the outcomes to RAN2.
**Proposal:** RAN1 agrees to a principle for handling the LTE+NR dual connectivity capabilities, where the UE LTE capabilities that the eNB needs to be aware of do not dynamically change based anything taking place in the NR or vice versa.
**Decision:** The document is noted. Continue offline discussion until Wednesday afternoon - (Nokia)
Wednesday: outcomes to be provided in other LS to RAN2

R1-1712046 Reply LS on set of configuration values for SS burst set periodicity RAN4, Intel

R1-1712047 Reply LS on the feasibility of DC-related mobility enhancements in NRRAN4, Huawei

R1-1712048 LS Reply on transient period for NR RAN4, Qualcomm

R1-1712049 Reply LS on support of supplementary uplink in NR RAN4, CMCC

R1-1712050 **LS on spectrum utilization** **RAN4, Vodafone**
RAN4 asks RAN1 and RAN2 if it would be feasible to ensure that the protocols do not restrict the number of PRBs that can be allocated, such that operation in Scenarios 2 and 3 in the attached document can be enabled
**Decision:** The document is noted.
R1-1713775 **LS response on spectrum utilization** **Huawei, HiSilicon**
**Decision:** The document is noted. Continue offline discussion until Wednesday afternoon – David (Huawei)
**Thursday:**
R1-1715022 **Reply LS response on spectrum utilization** **Huawei, HiSilicon**
**Decision:** The document is endorsed and final LS is approved in R1-1715184

R1-1712051 LS on DL & UL channel bandwidth for NR RAN4, Intel



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**R1-1712054** **LS on EPC QoS aspects for TSG RAN's lower latency features** **SA2, Ericsson**

To determine the QCI parameters Packet Delay Budget (PDB) and Packet Error Loss Rate (PELR), SA2 asks RAN1, RAN2 and RAN3 for the following inputs, considering standalone E-UTRA operation in EPS, and dual connectivity E-UTRA+NR operation in EPS:

Q1: input on the combination of packet one-way latencies over the eNodeB and the radio interface and the associated packet error loss rates that the RAN groups intend to meet. SA WG2 are interested in whether the values for NR and E-UTRA are different.

Q2: guidance on other parameter values, e.g. whether a non-GBR very low latency QCI would still need a maximum bit rate parameter and/or whether very low latency services impose limits on the maximum packet size. SA WG2 are interested in whether the values for NR and E-UTRA are different.

**Decision:** The document is noted.

**R1-1714483** **[DRAFT] LS on response to EPC QoS aspects for TSG RAN's lower latency features** **Ericsson, Vodafone**

**Decision:** The document is noted. Continue offline discussion until Wednesday afternoon – Daniel (Ericsson)

**Wednesday:**

**R1-1714818** **[DRAFT] LS on response to EPC QoS aspects for TSG RAN's lower latency features** **Ericsson, Vodafone**

**Decision:** The document is endorsed and final LS is approved in R1-1715089

**R1-1714227** **Draft LS response on Random Access** **Samsung Electronics Co., Ltd**

Continue offline discussion until Wednesday morning – Qi (Samsung)

**Wednesday:**

**R1-1715258** **Draft Reply LS response on Random Access** **Samsung**

**R1-1715266** **Multiple Msg1 during Contention based Random Access Procedure** **Qualcomm, LGE, Docomo, Ericsson, Mediatek**

- Multiple Msg1 before the expiration of RAR window is not supported during a contention based random access procedure in Rel-15

**Decision:** The document is noted.

**Friday:**

**R1-1715314** **Draft Reply LS response on Random Access** **Samsung**

**Decision:** The document is endorsed and final LS is approved in R1-1715315

**R1-1712034** **Liaison Statement from NGMN Alliance to 3GPP on Test Results of Technology Building Blocks phase of the Trial and Testing Initiative** **NGMN Alliance, KT, Telecom Italia**

NGMN informs 3GPP that the first Trial and Test Initiative project deliverable has been finalized and made publicly available on the NGMN web site (http://ngmn.org/uploads/media/170729_TTBB_report_v1.0.pdf).

**Discussion:** No action to RAN1.

**Decision:** The document is noted.

**R1-1712041** LIAISON STATEMENT TO 3GPP on UNWANTED EMISSIONS OF IMT-2020 ITU-R Working Party 5D

**R1-1712042** CHARACTERISTICS OF IMT-2020 SYSTEM FOR COEXISTENCE STUDY IN THE FREQUENCY BAND 4 800-4 990 MHz ITU-R Working Party 5D

**R1-1714585** Response to 3GPP Liaison R4-164972 Wi-Fi Alliance

LS received during the meeting week:

R1-1714826 Reply LS on spectrum utilization RAN2, Huawei

R1-1714921 Reply LS on Relay UE discovery RAN2, Nokia

R1-1715263 LS on uplink and downlink channel bandwidth for NR RAN4, Intel

**R1-1715264** **LS on effect of SRS switching in TDD + FDD CA** **RAN4, Qualcomm**

**Decision:** The document is noted. See 5.1.1

R1-1715268 LS on RACH agreements RAN2, Ericsson

R1-1715269 Response LS on BWP operation in NR RAN2, Samsung

**R1-1715279** **LS on RAR reception for NB-IoT** **RAN2, Nokia**

**Decision:** The document is noted. See 5.1.6



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# 5 E-UTRA

## 5.1 Maintenance of E-UTRA Releases 8 – 14

**R1-1715125** **Chairman's notes of AI 5.1 Maintenance of E-UTRA Releases 8 – 14** **Ad-Hoc chair (Nokia)**
The document was presented Matthew Baker of Nokia.
**Decision:** The document is endorsed, content is updated and incorporated as follows.

### 5.1.1 Maintenance of E-UTRA Release 8 – 13

**eMTC and NB-IoT**

**R1-1712760** **Discussion on NPUSCH transmission during UL NPRACH gaps** **Qualcomm Incorporated**
Proposal 1: When determining the "NPRACH resource" for postponing of NPUSCH, such NPRACH resource does not include the NPRACH gaps (i.e., the UE transmits NPUSCH during the NPRACH gaps).
Proposal 2: RAN1 to discuss whether a change in the specification is needed to unambiguously implement proposal 1.
**Decision:** The document is noted.

Interpretation 1 – Qualcomm, Huawei, HiSilicon, Intel, Nokia, Nokia Shanghai Bell, Neul
Interpretation 2 – Samsung, LG, ZTE, Ericsson, Sanechips

Agreement:
- Interpretation 1 is adopted
- CRs to be prepared by Alberto - R1-1714707 **36211CR0388** (Rel-13(F)), R1-1714708 36211CR0389 (Rel-14(A)).

**R1-1714552** **MPDCCH Frequency hopping for RRC connected contention-based RACH** **Nokia**
**Decision:** Agreed in R1-1714632 (CR0951). Shadow CR for Rel-14 is also agreed in R1-1715278 (CR0954).
Post meeting: 4632/5278 are withdrawn by MCC due to wrong CR# allocated to 36.213 instead of 36211. Agreed in R1-1715326 (CR0390). Shadow CR for Rel-14 agreed in R1-1715327 (CR0391).

**R1-1712463** **Correction on MPDCCH search space with CRC scrambled by the C-RNTI outside the random access procedure** **Intel Corporation**
**Decision:** Agreed in R1-1714633 (CR0952). Shadow CR for Rel-14 is also agreed in R1-1714634 (CR0953).

**R1-1712758** **Discussion on NPDCCH CSS monitoring after contention resolution** **Qualcomm Incorporated**
Conclusion:
- Physical layer UE behaviour to support early contention resolution is not specified in the RAN1 specifications.
- Send LS to RAN2 cc RAN3 to inform them of this situation – Alberto (Qualcomm) to draft the LS in R1-1714709 – Final LS is approved in R1-1714719.

**R1-1713490** **Clarification on MPDCCH search space** **Samsung**
**Decision:** The document is noted and the proposal is captured as below:
**Conclusion:** A UE is not required to monitor any candidates of a MPDCCH search space with repetitions that crosses over (SFN=0), where a search space is the set of candidates with ki derived from the same k0.

**R1-1712141** **Clarification on the "repetition level" in TS 36.213** **Huawei, HiSilicon**
**Conclusion:** This ~~draft~~ CR is in line with RAN1's understanding but a CR is not considered necessary.
Post-meeting: Written as draft CR though a CR# was allocated by 3GU (following Tdoc# request)
**Decision:** The CR is not pursued.

**R1-1712762** **Draft CR on clarification for valid Rmax and G values** **Qualcomm Incorporated**
**Conclusion:** CR is not needed, and behaviour described in R1-172762 is already implied in the current RAN1 specs.
**Decision:** The draft CR is not pursued.

**R1-1713003** **Clarification of type-2 NPDCCH search space monitoring** **ZTE**
**Conclusion:** CR is not needed, and behaviour described in R1-173003 is already RAN1's common understanding
**Decision:** The draft CR is not pursued.


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R1-1712770 **Clarification for precoding cycling in eMTC** **Qualcomm Incorporated**
**Conclusion:**
- An eNB supporting BL/CE UEs shall broadcast *interval-DLHoppingConfigCommonModeA-r13* regardless of whether hopping is supported or not. If the eNB supports CE Mode B, it shall also broadcast *interval-DLHoppingConfigCommonModeB-r13.*

R1-1714361 **Clarification on NB-IoT NPRACH configurations** **Ericsson India Private Limited**
**Conclusion:**
- RAN1 concludes and notes that both *nprach-StartTime* > *nprach-Periodicity* and *nprach-StartTime* < *nprach-Periodicity* are valid configurations.
  - NPRACH starting subframes are between 0-10239 for: (*nprach-StartTime* + N**nprach-Periodicity*) and (*nprach-StartTime* – N**nprach-Periodicity*)

**eFD-MIMO**
R1-1712765 **Draft CR for PUCCH priority for CSI report types 7/8/9/10** **Qualcomm Incorporated**
**Decision:** Agreed in principle; check whether other parts of text are impacted; also add change tracking for Y=3.
Final CRs are agreed in R1-1714645 **36213CR0967(Rel-13/F)**/R1-1714649 36213CR0968(Rel-14/A).

R1-1713686 **Correction of codeword constructions in FD-MIMO** **MediaTek Inc.**
**Decision:** The draft CR is not pursued.

R1-1713824 **Corrections on ClassA codebook in 36.213** **Huawei, HiSilicon**
**Decision:** Agreed in R1-1714646 36213CR0960 (Rel-13/Cat-F), R1-1714647 36213CR0961 (Rel-14/Cat-A).

R1-1714357 **Correction for FD-MIMO PMI definition** **Ericsson**
**Decision:** Agreed in R1-1714648 36213CR0948r1 with addition of clauses affected on CR cover sheet.

**CA**
R1-1714402 **Correction on PUCCH format 3 information for eCA** **ROHDE & SCHWARZ, Nokia**
**Decision:** Agreed in R1-1714897 36213CR0957 (Rel-13, F), R1-1714704 36213CR0958 (Rel-14, A).

R1-1712764 **Discussion on simultaneous PUSCH and SRS transmission for intraband UL CA** **Qualcomm Incorporated**
**Decision:** Discuss offline e.g. the following proposal: For the case of collision between PUCCH/PUSCH and SRS in the same TAG, same band, same CP, a UE using the same PA for the PUCCH/PUSCH and SRS is not expected to transmit simultaneous PUCCH/PUSCH and SRS.
Revisit on Wednesday, aiming for an agreeable solution by then; also agree which release this would be applicable from.
R1-1714652 **Discussion on simultaneous PUSCH and SRS transmission for intraband UL CA** **Qualcomm Incorporated**
**Decision:** The document is noted. Note typo in "Solution 2": "Implicit"->"Explicit"

Agreements:
- The "same PA" is implicitly identified by the following. Two "CC with the same PA" are those that:
  - Are in the same band
  - Are in the same TAG
  - Have the same CP
- In the identifed cases, Allow the UE to drop SRS, not making it mandatory:
  - [for the 'same PA case'] the UE may drop SRS transmission in a symbol whenever SRS and PUSCH transmissions happen to overlap in the same symbol
- To be corrected from Rel-11.
- CRs to be prepared in R1-1714712 **36213CR0970 (Rel-11/F)**, R1-1714713 36213CR0971 (Rel-12/A), R1-1714714 36213CR0972 (Rel-13/A), R1-1714715 **36213CR0973 (Rel-14/A)**.

R1-1712766 **Draft CR for PUCCH format 4/5 collision with SRS** **Qualcomm Incorporated**
**Decision:** Agreed in R1-1714653 36213CR0974 (Rel-13, F), R1-1714654 36213CR0975 (Rel-14, A)

R1-1712767 **Discussion on maximumCodeRate applicability for reporting over PUSCH** **Qualcomm Incorporated**

Conclusion: Option 1 is agreed.
Alberto to prepare the CR in R1-1714694 36213CR0965 (Rel-13, F), R1-1714695 36213CRxxxx (Rel-14, A) – revisit on Thursday.
**Decision:** Agreed in R1-1714720 36213CR0965r1 (Rel-13, F), R1-1714695 36213CR0966 (Rel-14, A), with the following changes:

> If a UE configured with PUCCH format 4 or PUCCH format 5 transmits UCI over PUSCH, that ~~otherwise~~ would have been transmitted over PUCCH format 4 or PUCCH format 5 if the UE did not have a PUSCH grant, then the UE shall select the CSI report(s) (if any) for transmission following the same procedure as for transmission over PUCCH.

Post meeting: MCC to correct CR number of R1-1714720 to CR0965r1

**R1-1712769 Discussion on simultaneous PUSCH and SRS transmission from different antenna ports Qualcomm Incorporated**
**R1-1714181 Clarification on Closed-loop UE Tx antenna selection for UL CA SoftBank Corp.**
Further revised in R1-1714566

- Interpretation 1: A UE may discard the RRC message because its FDD does not support Tx antenna selection and hence the message is inconsistent.
- Interpretation 2: A UE accepts the RRC message but does not expect to receive a DCI indicating UE port 1 for the UL carrier not supporting Tx antenna selection.

Possible agreement, for discussion offline and on Friday after receipt of LS from RAN4:

- Interpretation 2 from R1-1714181.
- For each band combination, signal which bands support Tx antenna selection. For each of the bands that support Tx antenna selection:
  - For each uplink band, signal all the bands for which UL switches together (thus same port has to be enforced)
  - For each uplink band, signal all the bands for which DL switches together (thus introducing a 'glitch' in the DL reception)
- FFS: From Rel-12 or 13?

**Friday:** The above is agreed.
**R1-1715264 LS on effect of SRS switching in TDD + FDD CA RAN4**
**Decision:** Email discussion about Release number and potential LS to RAN2 (cc RAN4) and potential approval of CR until Sept.6th – Alberto (Qualcomm)

**LAA**
**R1-1713022 Clarification CR for LAA RRM measurements within the DRS transmission window Qualcomm Incorporated**
**R1-1713023 Clarification CR for LAA RRM measurements within the DRS transmission window Qualcomm Incorporated**
Agreement:
Agree the change from R1-1713023 for both Rel-13 and Rel-14, with corresponding update to the cover sheet of the Rel-13 CR.
**Decision:** Final CRs are agreed in R1-1714696 36214CR0045 (Rel-13, F) and R1-1714697 36214CR0046 (Rel-14, A).

**Miscellaneous**
**R1-1712763 Discussion on modulation enhancements for 256QAM Qualcomm Incorporated**

### 5.1.2 Maintenance of Release 14 Enhanced Licensed-Assisted Access to Unlicensed Spectrum

**R1-1714401 Correction on periodic CSI reporting for LAA SCell ROHDE & SCHWARZ**
**Decision:** Agreed in R1-1714698 36213CR0959 (Rel-14, F).

**R1-1714403 Correction for UCI transmission on LAA sCell Ericsson Japan K.K.**
**Decision:** Agreed with addition of space in last line: agreed in R1-1714699 36213CR0950r1.

R1-1714569 Discussion on CSI report reference subframe for an LAA SCell Intel Corporation

### 5.1.3 Maintenance of Release 14 V2V/V2X services based on LTE sidelink

**R1-1713369 Discussion on TBS and MCS selection for PSSCH transmission Huawei, HiSilicon**
**R1-1713823 Correction on MCS table for PSSCH transmission in TS 36.213 Huawei, HiSilicon**
**R1-1713825 Correction on resource mapping for PSSCH transmission in TS 36.211 Huawei, HiSilicon**
**R1-1713826 Correction on interleaver parameter for PSSCH transmission in TS 36.212 Huawei, HiSilicon**
**Conclusion**: Considered too late for Rel-14.



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R1-1713491 **Discussion on definition of sensing window** **Samsung**
R1-1713492 **Draft CR on definition of sensing window** **Samsung**
**Decision:** Agreed in R1-1714700 36213CR0962.

R1-1713493 **Draft CR on subframe index for PSCCH re-transmission in mode 3** **Samsung**
**Decision:** Agreed in principle; discuss exact wording offline and revisit on Thur - R1-1714701 36213CR0963 – agreed in R1-1714716 36213CR0963r1 with correct version of the cover sheet and removed tracked changes on the cover sheet.

R1-1713822 **Correction on sidelink power control for simultaneous UL and SL transmissions** **Huawei, HiSilicon**
Conclusion – no need identified for a CR.

R1-1713991 **Corrections to mode 3 scheduling** **Ericsson**
R1-1713992 **Draft CR on corrections to mode 3 scheduling** **Ericsson**
**Decision:** Draft CR (RAN1#89) in R1-1709300 is agreed in principle - final version agreed in R1-1714702 36213CR0955.

### 5.1.4 Maintenance of Release 14 Full-Dimension MIMO for LTE

**Codebook subset restriction for Advanced CSI feedback**
R1-1712464 **Discussion on codebook subset restriction for eFD-MIMO** **Intel Corporation**
R1-1713358 **Codebook Subset Restriction in advanced CSI** **Huawei, HiSilicon**
R1-1713487 **On codebook subset restriction for advanced CSI** **ZTE**
R1-1714350 **Advanced CSI Codebook Subset Restriction** **Ericsson**
Conclusion

- Discuss offline and agree by Thur what additional evaluations, and under what assumptions/scenarios, are needed in order to understand the gains of codebook subset restriction for Advanced CSI and Hybrid CSI sufficiently to take a decision at RAN1#90bis.
  - **R1-1715148** – Sebastian (Ericsson)
- Agree at RAN1#90bis whether or not to accept codebook subset restriction for Advanced CSI and Hybrid CSI under TEI-15.

**Conclusion:** Assumptions in R1-1715148 are agreed, with Option 2 for cell association taken as baseline.

**Other**
R1-1714166 **Corrections on CDM8 sequence for 24 and 32 CSI-RS ports** **Huawei, HiSilicon**
**Decision:** Agreed in principle; check whether a correction is also needed for CDM4.
Final CR to be provided in R1-1714650 36213CR0386.
Agreed in R1-1714711 36211CR0386r1 with addition of CDM4 in title and correction of typo in "definition".

R1-1713488 **Draft CR 36.213 for CSI periodicity relationship between eMIMO-Types in hybrid CSI** **ZTE**
**Decision:** Agreed in R1-1714651 36213CR0956.

### 5.1.5 Maintenance of Release 14 Further Enhanced MTC for LTE

R1-1712755 **Draft CR on transmissionCombNum for eMTC** **Qualcomm Incorporated**
**Decision:** Postponed to next meeting.

R1-1712754 **Draft CR on PRS and PDSCH/MPDCCH collision** **Qualcomm Incorporated**
**Decision:** Final CR agreed in R1-1714637 **36211CR0387**.

R1-1712465 **Correction on TBS determination for PDSCH in CE mode B with larger PDSCH BW** **Intel Corporation**
**Decision:** Final CR to be prepared in R1-1714638. Revised and agreed in R1-1715102 **36213CR0969**.

R1-1712142 **Clarification of LCRBGs in UL resource allocation type 4** **Huawei, HiSilicon**
**Decision:** Not an essential correction.

R1-1714368 **Discussion on Msg4 in CE Mode A for eMTC** **China Telecom**



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### 5.1.6 Maintenance of Release 14 Enhancements of NB-IoT for LTE

**Interference Randomisation**

**R1-1712768 Summary for email discussion on interference randomization for NB-IoT Qualcomm Incorporated**

Agreement:

- Introduce interference randomization scheme based on RE-level scrambling for NPDSCH and NPDCCH from Rel-14
  - Details (scrambling initialization, applicability to different RNTI/search spaces, signaling) to be discussed and decided during RAN1#90

Agreement for DL:

- Agree the proposals in R1-1714639. Details for interference randomization for NPDSCH and NPDCCH Qualcomm, Huawei, HiSilicon

Alberto to prepare CR in R1-1714710 for email approval by Thur 31st Aug (note availability of Alberto!)
LS to be drafted to RAN2: R1-1714640 is endorsed and final LS is approved in R1-1715149 with correction of WI code to include "-Core" and note at end of first sentence "as an essential correction to Rel-14".

Proposal for UL:

- Introduce either SC-FDMA symbol-level scrambling or I/Q symbol level scrambling for interference randomization for NPUSCH – proposal in R1-1714641 – revised in:

**R1-1715142 WF on NPUSCH scrambling ZTE, LGE, Qualcomm, Sanechips, Lenovo**
Proposal: Agree the proposal in R1-1715142, except for use of NPDSCH c_init instead of what is shown in R1-1715142.
**Decision:** No consensus at this meeting.

**R1-1714620 WF on Rel-14 NPRACH hopping ZTE, Ericsson, Sanechips**
Interference randomisation for PRACH:
Revisit on Thursday to check whether there is consensus to adopt an enhancement; otherwise, can reconsider under TEI15.
**R1-1714946 Further Clarification and WF on NPRACH hopping ZTE, Sanechips**
**Decision:** No consensus at this meeting.

R1-1712636 Improved FH randomization for NB-IoT Rel-14 Ericsson
R1-1712756 Interference randomization for Rel-14 NB-IoT Qualcomm Incorporated
R1-1713018 Improved frequency hopping randomization for NPRACH ZTE
R1-1713005 Interference randomization enhancement for NB-IoT ZTE
R1-1714706 On scrambling for interference randomization in Rel-14 NB-IoT Huawei, HiSilicon (rev of R1-1713368)
R1-1714619 On improved Random Access Procedure for NB-IoT Rel-14 Ericsson

**PRACH power control**

**R1-1712634 On improved Random Access Procedure for NB-IoT Rel-14 Ericsson**
**R1-1713017 NPRACH power control for Rel-14 NB-IoT ZTE**
**R1-1714623 On Rel-14 NB-IoT RACH power control Huawei, HiSilicon** (Revision of R1-1713367)
Proposal:

- The following are configurable by the network:
  - Specify a delta around the CE level threshold, below which the UE does not level ramp, and above which it does level ramp and power ramp
  - Introduce NPUSCH power control for the Msg3 transmission in the case where NPUSCH is configured with repetitions, based on the existing open loop power control functionality but with the restriction on repetitions eliminated.

Currently no consensus.
Check on Friday if the situation has changed.
Otherwise continue discussion at RAN1#90bis.

**Other**

**R1-1712139 Correction of RRC parameter names for non-anchor carriers Huawei, HiSilicon**
**Decision:** CR0384 to 36.211 (Rel-14, F) is agreed.

**R1-1712633 Correction on NB-IoT DCI format N1 in 36.212 Ericsson**
The intention of the CR is agreed in principle; revisit on Thur for a more precise solution - R1-1714642 – Yutao/Alberto
**Decision:** Revised in R1-1715094 – agreed in R1-1714717 36212CR0264r3 with correction of "refence" typo on cover sheet.


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Also add sections affected on CR cover sheet.

**R1-1712140 Clarification of Type1A-CSS candidates Huawei, HiSilicon**
**Decision:** CR0945rev1 to 36.213 (rel-14, F) is agreed in R1-1714643 with change of comma to fullstop in last new bullet.

**R1-1713004 Clarification on NPDCCH monitoring for Rel-14 2-HARQ NB-IoT UE ZTE**
**Decision:** No consensus. Check on Friday whether consensus has emerged; otherwise consider email discussion.
**Friday:**
**R1-1714802 WF on NPDCCH monitoring for Rel-14 UE configured with 2-HARQ process ZTE, Huawei, HiSilicon, Ericsson, Nokia, NSB**

Agreements:

- For Rel-14 NB-IoT UE configured with two HARQ processes, the UE is not required to monitor an NPDCCH candidate of an NPDCCH search space if this NPDCCH candidate ends later than 4 ms before the beginning of the next NPDCCH search space.
- Prepare a CR

**R1-1714803 Clarification on NPDCCH monitoring for Rel-14 2-HARQ process UE ZTE, Huawei, HiSilicon**
**Decision:** Agreed in R1-1715310 (CR0977)

**R1-1712635 Search space monitoring Ericsson**
**Decision:** Agreed in principle – discuss the detailed wording offline – revisit on Thur – Yutao, R1-1714644.
**Decision:** Agreed in R1-1714718 36213CR0976 with change of n+k to n+k-1 twice.

**Friday**
**R1-1715279 LS on RAR reception for NB-IoT RAN2**
**R1-1715285 Correction of RAR window timing definition in NB-IoT Nokia**
**Decision:** Email approval of R1-1715285 until August 31st - Rapeepat (Nokia)

### 5.1.7 Other

*Including maintenances of indoor positioning enhancements, performance enhancements for high speed scenario, Downlink multiuser superposition transmission, eMBMS enhancements, SRS carrier based switching, UL capacity enhancements, voice and video enhancement*

**R1-1712759 Draft CR on correct RRC parameter for UL 256QAM Qualcomm Incorporated**
**Decision:** Agreed in R1-1714703 36213CR0964.

**R1-1712771 Discussion on issues for SRS Carrier Switching Qualcomm Incorporated**
**Decision:** Companies are encouraged to consider these observations and proposals, noting that Proposal 1 can be replaced by the first agreement from R1-1714652.
Agreement in Principle: Capture the following in 36.213:

- The "same PA" is implicitly identified by the following. Two "CC with the same PA" are those that:
  - Are in the same band
  - Are in the same TAG
  - Have the same CP
- Adopt the following solution for the cases of collision between SRS switching and victim CC:
  - Extend collision rules to victim CC (i.e., the transmission of SRS depends on the information transmitted in the source CC and the victim CC).

CR to be prepared for RAN1#90bis.

**R1-1713827 Draft CR on UE assumption on co-scheduled DMRS ports for MUST in 36.212 CMCC**
**Decision:** Agreed in R1-1714814 36212CR0265, with removal of extra spaces.
Post meeting: MCC to delete rev1 before submission to RAN.

**R1-1714399 PUSCH and SRS Transmission in UpPTS MediaTek Beijing Inc.**
**Decision:** Withdrawn.
R1-1714400 Clarification on PUSCH and SRS transmission in UpPTS MediaTek Beijing Inc.


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Mediatek decided to withdraw their contributions as more discussions seem to be required.

## 5.2 LTE Release 15

### 5.2.1 Shortened TTI and processing time for LTE - *WID in RP-171468*

*NOTE: RAN1 should target to complete the RAN2 related topics within RAN1 #90*

**R1-1715126** **Chairman's notes of AI 5.2.1 Shortened TTI and processing time for LTE** **Ad-Hoc chair (Ericsson)**
The document was presented by Mårten Sundberg of Ericsson.
**Decision:** The document is endorsed, and content is updated and incorporated as below.

R1-1713297 Introduction of shortened processing time and shortened TTI Ericsson
Endorsed as a baseline for further drafting

R1-1714171 Introduction of shortened processing time and shortened TTI into 36.212 Huawei
Endorsed as a baseline for further drafting

R1-1714605 Introduction of shortened processing time and shortened TTI into 36.213, s06-s09 Motorola Mobility
Endorsed as a baseline for further drafting. It was noted that 7.1, 9.1 may need further revisions (to be discussed on the reflector).

R1-1714606 Introduction of shortened processing time and shortened TTI into 36.213, s10-s13 Motorola Mobility
Endorsed as a baseline for further drafting

**Friday:** Email discussions about specs
- Rapporteur to provide updated agreements and working assumptions list by Wed Aug 30th;
- Editors to prepare updated draft CRs including agreements and WA until Wed Sep 27th;
- Editors may update CRs by 6th of October based on the comments received until Wed Oct 4th.

#### 5.2.1.1 *Shortened processing time for 1ms TTI*

##### 5.2.1.1.1 Configuration of shortened processing time for 1ms TTI

*Including DL/UL configuration of shortened processing time in single carrier and CA scenario*

R1-1712772 Configuration of shortened processing time for 1ms TTI Qualcomm Incorporated
R1-1712885 Configuring reduced processing time for 1 ms TTI Ericsson
R1-1712943 UE capability and configuration of shortened processing time for 1ms TTI Nokia, Nokia Shanghai Bell
R1-1713063 Discussion on configuration of shortened processing time for 1ms TTI LG Electronics
R1-1713356 Configuration of shortened processing time for 1ms TTI Huawei, HiSilicon
R1-1713494 Configuration of shortened processing time for 1ms TTI Samsung

Proposed agreement
- Alt 1: Shortened processing time for 1 ms TTI is configured per CC. The cell carrying the PUCCH should be configured with n+3 timing.
- Alt 2: Shortened processing time for 1 ms TTI is configured per PUCCH group
- Alt 3: Per band combination capability + revert FS capability + per PUCCH group

##### 5.2.1.1.2 Handling collisions between n+4 and n+3

*Including remaining issues of collisions for FS1 and FS2 (including the order of the numbers in the table for DL HARQ-ACK timing from PDSCH to HARQ-ACK)*

R1-1712255 Handling collisions between n+4 and n+3 Huawei, HiSilicon
R1-1712318 Remaining issues of handling collisions between n+4 and n+3 ZTE
R1-1712773 Handling collisions between n+4 and n+3 Qualcomm Incorporated
R1-1712886 Remaining aspects of collisions handling with reduced processing time for 1ms TTI Ericsson
R1-1712935 Remaining issues of collision handling between n+3 and n+4 Nokia, Nokia Shanghai Bell
R1-1713064 Discussion on PUCCH resource collision handling for FS2 LG Electronics
R1-1713495 Handling collisions between n+4 and n+3 Samsung
R1-1715140 WF on 1-ms FS2 Nokia, LG Electronics, Nokia Shanghai Bell



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#### 5.2.1.1.3 UL DCI for asynchronous UL HARQ

*Including aspects related asynchronous HARQ in UL for the reduced processing time operation.*

R1-1712944 On UL DCI details for asynchronous UL HARQ of 1ms TTI shortened processing time Nokia, Nokia Shanghai Bell
R1-1712466 Asynchronous HARQ for PUSCH transmissions Intel Corporation
R1-1712774 UL DCI for asynchronous UL HARQ Qualcomm Incorporated
R1-1712887 Asynchronous UL HARQ with shortened processing time for 1ms TTI Ericsson
R1-1713354 Asynchronous UL HARQ Huawei, HiSilicon
R1-1713496 Asynchronous UL HARQ for 1ms TTI Samsung

#### 5.2.1.1.4 Other

**Friday**
**R1-1714765 DRAFT Reply LS on short processing time and short TTI Source: Ericsson[RAN1]**
**Decision:** The draft LS is endorsed and final LS is approved in R1-1715280.

Not treated.
R1-1712319 TDD HARQ with n+3 timing for 1ms TTI ZTE
R1-1712888 On the use of UL channel interleaver for 1 ms TTI Ericsson
R1-1712889 UE capabilities for short processing time Ericsson
R1-1712890 UL HARQ RTT timer values for 1ms TTI with n+3 timing Ericsson
R1-1713355 CSI feedback for 1ms TTI Huawei, HiSilicon
R1-1713497 Clarification of fallback mode to n+4 timing Samsung
R1-1713498 FS3 aspects for 1ms TTI Samsung
R1-1713499 UL power control timing for 1ms TTI Samsung
R1-1715067 WF on 1ms TTI UL power control timing Samsung

Proposed agreement:
- When n+3 timing is configured for 1ms TTI for FS1, the value of $K_{PUSCH}$ for UL power control is equal to 3.
- When n+3 timing is configured for 1ms TTI for FS2, the value of $K_{PUSCH}$ for UL power control can be defined as below. The highlighted values with red are for special subframe configuration 10.

| TDD UL/DL Configuration | subframe number *i* | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 0 | - | 6 | 6 | 3 | 3 | - | 6 | 6 | 3 | 3 |
| 1 | - | 5 | 3 | 3 | - | - | 5 | 3 | 3 | - |
| 2 | - | 3 | 3 | - | - | - | - | 3 | - | - |
| 3 | - | 3 | 3 | 3 | 3 | - | - | - | - | - |
| 4 | - | 3 | 3 | 3 | - | - | - | - | - | - |
| 5 | - | 3 | 3 | - | - | - | - | - | - | - |
| 6, SSC 0-9 | - | - | 6 | 4 | 4 | - | - | 6 | 3 | - |
| 6, SSC 10 | - | 5 | 3 | 3 | 4 | - | 5 | 6 | 3 | - |

### *5.2.1.2 Shortened TTI with shortened processing time*

#### 5.2.1.2.1 sTTI operation

##### 5.2.1.2.1.1 (s)TTI configurations

*Including the supported combinations of sTTI lengths in UL CA scenarios (and any relevant power handling), and configuration of sTTI in single carrier and CA scenarios, e.g. in terms of number of carriers supported, cross-carrier scheduling support.*

R1-1712072 sTTI combinations in CA scenario Huawei, HiSilicon
R1-1712467 Remaining issues of sTTI combinations in CA scenarios Intel Corporation
R1-1712775 (s)TTI configurations Qualcomm Incorporated
R1-1712891 (s)TTI configurations Ericsson
R1-1712945 sTTI UE capability and configurability for carrier aggregation Nokia, Nokia Shanghai Bell
R1-1713065 Discussion on sTTI configuration LG Electronics
R1-1713500 sTTI configurations Samsung
R1-1714780 WF on UE capability for sTTI operation LG Electronics, Intel

Agreement:


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- RAN2 specification should allow for different UL sTTI lengths to be configured for the serving cells across different PUCCH groups for which sTTI operation is configured. Such a configuration might be restricted in RAN1 specifications later on.
  - NOTE: Power allocation and applicable band combinations for this case is FFS
  - NOTE: No specific optimization for power allocation is intended

Agreement:
- Define separate UE capability per sTTI length combination {DL,UL}:
  - {2,2},{2,7},{7,7},{7,7}+{2,7},{2,2}+{2,7},{7,7}+{2,2}
    - NOTE: The last two combinations only apply if different UL sTTI lengths in different PUCCH groups are supported.
  - For each combination above, define separate UE capability on the maximum number of DL CCs and UL CCs for sTTI operation
- FFS: Define separate UE capability per band/band combination

Intel (Hong) to draft LS to RAN4:
Content: If per band/band combination should be defined (FFS above)
R1-1715015 [DRAFT] LS on UE capability signalling for sTTI configurations Intel
**R1-1714764 LS on UE capability signalling for sTTI configurations RAN1; To: RAN4; Cc: RAN2**
Decision: The LS is approved.

Agreement: The maximum number of supported UL and DL sTTI carriers is the same as in 1 ms TTI operation.

Agreement: If UE is indicating the capability of and is configured with simultaneous transmission, it applies to both sPUSCH/sPUCCH and PUSCH/PUCCH.

Agreement: Cross-carrier scheduling is not supported for sTTI

#### 5.2.1.2.1.2 Aspects related to dynamic switching between 1ms TTI and sTTI

*Including HARQ processes handling when switching, and potential restrictions/solutions to avoid exceeding UE maximum processing capability.*

R1-1712073 HARQ processes handling to support dynamic switching between 1ms TTI and sTTI Huawei, HiSilicon
R1-1712320 HARQ processes sharing between 1ms TTI and sTTI ZTE
R1-1712468 HARQ processes handling for dynamic switching between 1ms TTI and sTTI Intel Corporation
R1-1712776 Aspects related to dynamic switching between 1ms TTI and sTTI Qualcomm Incorporated
R1-1712892 On dynamic switching between 1ms TTI and sTTI Ericsson
R1-1712946 HARQ process handling and maximum processing capability for shortened TTI Nokia, Nokia Shanghai Bell
R1-1713066 Dynamic switching between 1ms TTI and sTTI LG Electronics
R1-1713501 Remaining issues for dynamic switching between 1ms TTI and sTTI Samsung
R1-1714348 On HARQ process for dynamic switching between sTTI and 1ms TTI InterDigital, Inc.

Agreements:
- In case of switching from 1ms PDSCH scheduled within TTIs n-$W_{DL}$ to n-1(i.e. including all CCs) to an sPDSCH in TTI/subframe n (i.e. including all CCs):
  - Whether the UE skips processing PDSCH(s) is up to the UE implementation.
  - In case UE skips PDSCH processing, the legacy procedures are applied. If the UE skips decoding, the physical layer indicates to higher layers that the transport block(s) is not successfully decoded.
  - The value of $W_{DL}$ is a UE capability with the value range of 0 to k-1, where k is the DL HARQ processing time. The UE indicates a separate capability per DL sTTI length.
  - The UE should attempt to skip the processing of as small number of PDSCH(s) as possible.
- In case of switching from the reception of PUSCH grants within TTIs n-$W_{UL}$ to n-1 (i.e. including all CCs) to the sPUSCH grant in TTI/subframe n (i.e. including all CCs):
  - Whether the UE skips processing/transmission of PUSCH(s) is up to the UE implementation.
  - As in case of eLAA procedures, also in case of skipping, the UE should request data from higher layers based on the issued PUSCH grant(s)
  - The value of $W_{UL}$ is a UE capability with the value range of 0 to k-1, where k is the 1ms TTI UL scheduling time. The UE indicates a separate capability per UL sTTI length.
  - The UE should attempt to skip the processing/transmission of as small number of PUSCH(s) as possible.

Agreement: Support HARQ process sharing between TTI and sTTI


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- The sharing is only possible for asynchronous HARQ processes, i.e. not supported for legacy processing time synchrounous UL HARQ processes
- If configured with sTTI on a CC:
  - the HARQ ID field size in the DL assignments of PDSCH on USS for legacy and reduced processing time is the same as for sPDSCH assignments
  - the HARQ ID field size in the UL grants on USS for reduced processing time is the same as for sPUSCH grants
- The re-transmission of a TB with another (s)TTI length is possible if:
  - The number of codewords of the HARQ process is not larger than supported by the respective sTTI length
  - The TB size of a codeword is not larger than X. X is FFS and may be sTTI length dependent.
  - FFS other restrictions

#### 5.2.1.2.1.3 Collision of sTTI/TTI in UL

**R1-1714781 WF on UCI handling for collision of PUSCH and sPUSCH LG Electronics, Ericsson, Intel, KT**

Agreement:
- In case of collision between PUSCH and sPUSCH in the same subframe on a given carrier for a UE
  - HARQ-ACK of PUSCH is transmitted on sPUSCH
    - FFS on coding of HARQ-ACK and sHARQ-ACK (e.g., joint coding or separate coding)
    - FFS on whether to bundle HARQ-ACK before mapping onto sPUSCH
  - No requirement on the time of dropping prior to sPUSCH transmission is adopted
  - CSI of PUSCH is dropped

**R1-1714782 WF on remaining issues on collision of PUCCH and sPUCCH LG Electronics, Ericsson**

Agreement:
- In case of collision between PUCCH format 1/1a/1b/3 and sPUCCH in the same subframe on a given carrier for a UE
  - The UE shall transmit sPUCCH

Agreement:
- In case of collision between PUCCH format 1/1a/1b/3 and sPUCCH in the same subframe on a given carrier for a UE
  - The UE, should attempt drop/stop, as soon as possible (up to UE implementation) whole/remaining transmission of PUCCH format 1/1a/1b/3
    - The UE should strive to drop the PUCCH at a slot boundary before the start of the sPUCCH transmission.
    - The UE shall not resume the dropped/stopped transmission

Agreement:
- In case of collision between PUCCH and sPUCCH in the same subframe on a given carrier for a UE
  - HARQ-ACK of PUCCH is transmitted on 1-slot sPUCCH
    - Spatial bundling of HARQ-ACK of PUCCH is applied when configured
    - No new higher layer signaling for spatial bundling is added. Existing signaling is re-used for the collision case.
  - HARQ-ACK of PUCCH is transmitted on 2/3-os sPUCCH
    - Spatial bundling of HARQ-ACK of PUCCH is applied
    - FFS on other bundling
  - FFS: How to resolve ambiguity between UE and eNB on reported HARQ-ACK.

**R1-1714783 WF on remaining issues on collision of PUCCH and sPUSCH LG Electronics, Ericsson, KT**

Agreement:
- In case of collision between PUCCH format 1/1a/1b/3 and sPUSCH in the same subframe on a given carrier for a UE
  - The UE shall transmit sPUSCH

Agreement:
- In case of collision between PUCCH format 1/1a/1b/3 and sPUSCH in the same subframe on a given carrier for a UE
  - The UE, should attempt drop/stop, as soon as possible (up to UE implementation) whole/remaining transmission of PUCCH format 1/1a/1b/3
    - The UE should strive to drop the PUCCH at a slot boundary before the start of the sPUSCH transmission.
    - The UE shall not resume the dropped/stopped transmission



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Agreement:

- In case of collision between PUCCH and sPUSCH in the same subframe on a given carrier for a UE
  - HARQ-ACK of PUCCH is transmitted on sPUSCH
    - FFS on coding of HARQ-ACK and sHARQ-ACK (e.g., joint coding or separate coding)
    - FFS on whether to bundle HARQ-ACK before mapping onto sPUSCH
  - CSI of PUCCH is dropped

Agreement: Update the previous agreements with the following changes

Agreement:

- In case of collision between PUSCH and sPUSCH in the same subframe on a given carrier for a UE
  - The UE ~~shall~~ should attempt to drop/stop as soon as possible (up to UE implementation) the whole/remaining transmission of PUSCH ~~without resuming the transmission~~
  - The UE shall not resume the dropped/stopped transmission
  - FFS: HARQ-ACK of PUSCH is transmitted on sPUSCH
    - FFS on how to map HARQ-ACK of PUSCH to sPUSCH
  - FFS on whether CSI of PUSCH is dropped or not
  - FFS if a requirement on the time of dropping prior to sPUSCH transmission is adopted

Agreement:

- In case of collision between PUCCH format 2/4/5 and sPUCCH in the same subframe on a given carrier for a UE
  - The UE shall transmit sPUCCH
  - The UE ~~shall~~ should attempt to drop/stop as soon as possible (up to UE implementation) whole/remaining transmission of PUCCH format 2/4/5 ~~without resuming the transmission~~
  - The UE shall not resume the dropped/stopped transmission
  - FFS: HARQ-ACK of PUCCH is transmitted on sPUCCH
    - FFS on how to map HARQ-ACK of PUCCH to sPUCCH
  - CSI of PUCCH is dropped
  - FFS if a requirement on the time of dropping prior to sPUCCH transmission is adopted
- FFS for other PUCCH formats

Agreement:

- In case of collision between PUCCH format 2/4/5 and sPUSCH in the same subframe on a given carrier for a UE
  - The UE shall transmit sPUSCH
  - The UE ~~shall~~ should attempt to drop/stop as soon as possible (up to UE implementation) whole/remaining transmission of PUCCH format 2/4/5 ~~without resuming the transmission~~
  - The UE shall not resume the dropped/stopped transmission
  - FFS: If HARQ-ACK of PUCCH is transmitted
  - FFS on whether CSI of PUCCH is dropped or not
  - FFS if a requirement on the time of dropping prior to sPUSCH transmission is adopted
- FFS for other PUCCH formats

Not treated.

| | | |
|---|---|---|
| R1-1712074 | Handling collisions of sTTI/TTI in UL | Huawei, HiSilicon |
| R1-1712321 | Collision handling of 1ms TTI and sTTI in uplink | ZTE |
| R1-1712469 | Collision handling for UL sTTI and normal TTI transmissions | Intel Corporation |
| R1-1712777 | Collision of sTTI/TTI in UL | Qualcomm Incorporated |
| R1-1712893 | Handling collisions of sTTI and TTI in UL | Ericsson |
| R1-1712936 | On collisions between sTTI and TTI transmissions in UL | Nokia, Nokia Shanghai Bell |
| R1-1713067 | Discussion on UL collision handling between TTI and sTTI | LG Electronics |
| R1-1713502 | Collision handling of sTTI and TTI in UL | Samsung |
| R1-1714967 | WF on handling collision between PUSCH and sPUCCH | Huawei, HiSilicon |
| R1-1714968 | WF on HARQ-ACK for PDSCH and sPDSCH on sPUCCH or sPUSCH | Huawei, HiSilicon |

#### 5.2.1.2.2 DL control channel design

##### 5.2.1.2.2.1 sTTI scheduling

*Considering fields for sDCI1 including UL DMRS position signalling and associated functionality, potential support of sDCI2 and corresponding sDCI2 candidate fields, potential support of multi-sTTI scheduling*



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Email discussion on DCI formats including how many DCI formats for sTTI, DCI fields for UL grant and DL assignment, estimated DCI payload, LGE (Kyuhwan), until 22nd of Sept

R1-1712075 sTTI scheduling Huawei, HiSilicon
R1-1712322 Discussion on sTTI scheduling ZTE
R1-1712470 Discussions on DCI formats for sTTI scheduling Intel Corporation
R1-1712778 sTTI scheduling Qualcomm Incorporated
R1-1712894 On sTTI scheduling options Ericsson

**R1-1714767 Reply LS on possible RF impacts related to sPUSCH design Source: RAN1; To: RAN4**
**Decision:** The LS is approved.

R1-1713041 On scheduling of sPDSCH and sPUSCH Nokia, Nokia Shanghai Bell
R1-1713068 Consideration on sTTI scheduling LG Electronics
R1-1713503 sTTI scheduling Samsung
R1-1714200 Discussion on UL DMRS signaling for 2/3-symbol sPUSCH Potevio
R1-1714207 sTTI scheduling Motorola Mobility, Lenovo

### 5.2.1.2.2.2 sPDCCH design

*Considering sREG definition, mapping alternatives, RB sets, number of aggregation levels, the location of sPDCCH candidates for different aggregation levels per user, etc.*

Email discussion on sPDCCH design, Qualcomm (Kianoush), until 20th of Sept

**R1-1712795 Summary of the e-mail discussion [89-04] on sPDCCH design for sTTI operation Qualcomm Incorporated**

Agreement:
- For an RB set configured with more than 1 symbol and the localized sCCE-to-sREG mapping for CRS based sPDCCH, the frequency-first time-second sCCE-to-sREG mapping is adopted.
- For an RB set configured with more than 1 symbol and the distributed (FFS: on sCCE or sREG level) mapping for CRS based sPDCCH, the frequency-first time-second sCCE-to-sREG mapping is adopted.

Agreement:
- For an RB set configured with more than 1 symbol and the localized sCCE-to-sREG mapping for DMRS based sPDCCH, the time-first frequency-second sCCE-to-sREG mapping is adopted.
- For an RB set configured with more than 1 symbol and the distributed (FFS: on sCCE or sREG level) mapping for DMRS based sPDCCH, the time-first frequency-second sCCE-to-sREG mapping is adopted.

Agreement: DMRS-based RB set in 3-symbol sTTI spans 3 symbols.

Agreement: The sDCI for sTTI#0 is accommodated in:
- 1-slot: in the legacy PDCCH region
- 2/3os: in the legacy PDCCH region

Agreement: In sTTI operation, there is no restriction for RB sets to be fully non-overlapping by specification.

Agreement: For the 1-slot sTTI operation, the maximum number of symbols per CRS-based RB set is 2.

Agreement: For employing SFBC in CRS-based sPDCCH, the maximum number of antenna ports is 4. The number of antenna ports is indicated by the PBCH. Handling of orphan RE is FFS.

Agreement: #sREGs per sCCE is the same for 2/3os and 1-slot sTTI

Agreement: #sREGs per sCCE is independent of sTTI index in the subframe for CRS based sPDCCH

Proposed agreement: (no further progress – checked on Friday)
For further down-selection:
- Alt 1: #sREGs per sCCE is 6 for all sTTI index in the subframe for DMRS based sPDCCH
  - Samsung, Qualcomm
- Alt 2: #sREGs per sCCE is 4 for 2os sPDCCH and 3 for 3os sPDCCH the subframe for DMRS based sPDCCH


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- Nokia, LGE, Ericsson, Intel, Huawei, DCM
- Sustained objection by Qualcomm due to UE complexity.

Agreement: #sREGs per sCCE is for CRS based sPDCCH is 4

Agreement: DMRS bundling (if applicable) is supported for DMRS based sPDCCH

Agreement: CRS-based sPDCCH is only applied to non-MBSFN subframe.

Proposed offline consensus:
- Alt 1: DMRS-based sPDCCH is applied to both MBSFN subframe and non-MBSFN subframe.
  - DCM, Ericsson, LGE, Huawei, HiSilicon
- Alt 2: DMRS-based sPDCCH is applied to MBSFN subframe.
  - ZTE, Qualcomm, Motorola

Proposed offline consensus:
- Separate sPDCCH RB set configuration for MBSFN subframe and non-MBSFN subframe.

Proposed offline consensus:
- To support different number of sPDCCH candidates per aggregation level to be monitored for different sTTI index up to *M* configurations can be defined. The applicable sTTIs per subframe for each configuration is indicated by a bitmap.
  - *M*=2

**R1-1715044 WF on two antenna ports for DM-RS based sPDCCH Nokia, Ericsson, Nokia Shanghai Bell**

Working assumption:
- Support two port DM-RS based demodulation
  - The single port or dual port based demodulation is configured for each DM-RS based sPDCCH RB-set
  - Decide between:
    - Alt. 1: SFBC using {107,108}: Same handling of orphan REs than for CRS-based sPDCCH (which is still FFS)
    - Alt. 2: Antenna hopping/port mapping using ports {107,108} is used within a sREG.
  - The DM-RS bundling is independent on the configured number of antenna ports for DM-RS based demodulation

R1-1712895 Design aspects of sPDCCH Ericsson
R1-1712951 On DL control channel design for shorter TTI operation Nokia, Nokia Shanghai Bell
R1-1712779 sPDCCH design Qualcomm Incorporated
R1-1712076 sPDCCH design Huawei, HiSilicon
R1-1712323 sPDCCH design for short TTI ZTE
R1-1712471 Remaining details of sPDCCH design for shortened TTI Intel Corporation
R1-1713069 sPDCCH design aspects for sTTI LG Electronics
R1-1713504 sPDCCH design Samsung
R1-1714208 sPDCCH design Motorola Mobility, Lenovo

### 5.2.1.2.2.3 Search space for sTTI operation

*Considering the number of sPDCCH candidates per user, supported aggregation levels, number of blind decodes, etc.*

Email discussion on sPDCCH search space, Huawei (Chengyan), until 20th of Sept

**R1-1714163 Summary of email discussion [89-05] on search space for sTTI operation Huawei**

**For sPDCCH search space design for sDCI**

Agreement: Support aggregation level L∈{1,2,4,8} for sPDCCH search space.

Agreement: A UE can be configured to monitor an sPDCCH RB set p with M_p^((L))sPDCCH candidate(s) for sPDCCH search space at aggregation level L within an sTTI, where p∈{0,1} and M_p^((L))∈{0,1,⋯,M_total}. M_total is the maximum allowable number of sPDCCH candidates to be monitored in an sTTI over all sPDCCH sets and aggregation levels.
- FFS: The value of M_total.
- FFS: The total number of RB sets configurable to a UE



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Agreement: The configured aggregation levels to be monitored within an sPDCCH RB set in an sTTI can be any subset of the supported aggregation levels L for sPDCCH search space.

Agreement: The maximum allowable blind decodes per sTTI on one CC, irrespective if the sDCI is in sPDCCH or PDCCH, for 2/3os sTTI is 6.

Agreement: The maximum allowable blind decodes per sTTI on one CC, irrespective if the sDCI is in sPDCCH or PDCCH, for 1-slot is 12.

Agreement: Support different number of sPDCCH candidates per aggregation level to be monitored for different sTTI index. FFS configured per sub-set of the sTTI in a subframe, over different subframe types, or different RS overhead, details on configuration.

Proposed offline consensus:
Support same sPDCCH search space for sDCI1 scheduling sPDSCH and sDCI1 scheduling sPUSCH.

Agreement: Whether the UE-specific search spaces for different UEs overlap is up to configuration.

Proposed offline consensus:
Proposal 11: The starting sCCE index of an sPDCCH search space at aggregation level L is configured by higher layer signaling.

Proposed offline consensus:
Proposal 10: Within an sPDCCH RB set, an sPDCCH candidate consisting of $n$ consecutive sCCEs may only start on an sCCE fulfilling $i \bmod n = 0$, where $i$ is the sCCE number and $n$ is the number of sCCEs corresponding to aggregation level L.

Proposed offline consensus (only applicable if Proposal 11 is not agreed):
Proposal 12: There is no fixed relationship among the sCCEs corresponding to sPDCCH candidate at different aggregation levels.

Proposed offline consensus:
Proposal 13: sPDCCH candidates belongs to an sPDCCH search space at aggregation level L are mapped consecutively in logical domain with increasing index m, m=0,1,…, M_p^((L))-1, where M_p^((L))is the number of sPDCCH candidates to monitor at aggregation level L in sPDCCH RB set p.

**For PDCCH search space design for sDCI and DCI,**

Agreement: For sDCI monitoring in legacy PDCCH, the hashing function for PDCCH is used by using M_sDCI^(L) instead of M_L. Value of M_sDCI^(L) is FFS.

Conclusion:
Potential needed reduction of legacy USS blind decodes of DCI due to sDCI monitoring is FFS.

Proposal offline consensus:
PDCCH candidate reduction for montoring 1ms DCI is up to eNB configuration, if reduction is required.

Agreement: The number of PDCCH candidate(s) M_sDCI^((L)) at aggregation level L for monitoring sDCI1 in legacy PDCCH region is determined by higher layer signalling, independent on the number of M_L at aggregation level L for monitoring DCI.

Proposed offline consensus:
Whether to support configuring an sPDCCH RB set with 0 sPDCCH candidates for all aggregation levels needs further study.

Proposed offline consensus:
Whether to support aligning the payload size of sDCI1 scheduling sPDSCH and sPUSCH needs further study.

| | | |
|---|---|---|
| R1-1712089 | Search space for sTTI | Huawei, HiSilicon |
| R1-1712952 | On search space design for sPDCCH | Nokia, Nokia Shanghai Bell |
| R1-1712780 | Search space for sTTI operation | Qualcomm Incorporated |
| R1-1712324 | Search space for sTTI operation | ZTE |
| R1-1712472 | Search space for shortened DL control channels | Intel Corporation |
| R1-1712896 | Search space for sTTI | Ericsson |
| R1-1713070 | Consideration on search space for sTTI operation | LG Electronics |



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| | | |
|---|---|---|
| R1-1713505 | Search space for sTTI operation | Samsung |
| R1-1714209 | Search space for sTTI operation | Motorola Mobility, Lenovo |
| R1-1714347 | On sPDCCH search space design | InterDigital, Inc. |

### 5.2.1.2.2.4 sPDCCH multiplexing with data

Email discussion on sPDCCH muxing with data, including sPDCCH resource reuse scheme, Nokis (Karol), until 22nd of September

**R1-1713042 Summary of Email discussion [89-06] on sPDCCH multiplexing with sPDSCH for sTTI Nokia, Nokia Shanghai Bell**

Agreement:
- For 1-slot sTTI containing sPDCCH, the following scheduling cases are supported
  - CRS-based sPDCCH scheduling CRS-based sPDSCH
  - CRS-based sPDCCH scheduling DMRS-based sPDSCH
  - DMRS-based sPDCCH scheduling DMRS-based sPDSCH

Agreement:
- For 1-slot sTTI containing sPDCCH, both TDM (if supported) and FDM of sPDCCH and sPDSCH are supported.

**R1-1715042 WF on enabling TDM between sPDCCH and sPDSCH of the same UE in a PRB Ericsson, Nokia, Nokia Shanghai Bell**

Proposed agreement:
sPDSCH is rate-matched at least around the REs overlapping with the configured sPDCCH RB set where the UE found its sDCI scheduling sPDSCH
  - FFS rate-matching for other RB sets known to the UE
- FFS if and how sPDSCH can use REs left unused within the configured sPDCCH RB-set where the UE found its sDCI and other RB sets known to a UE

Agreement: For 1-slot sTTI, separate DMRS resource is used for sPDCCH and sPDSCH in slot 1.

Agreement: In the 1-slot sTTI#1 of a DL subframe, the sPDCCH DMRS are placed in symbols #7,8

Agreement: In the 1-slot for normal subframes and sTTI#0, at least one pair of symbols carry sPDSCH DMRS and the pair of symbols is selected among the following options:
- Op 1: 3-4
- Op 2: 5-6 (legacy DMRS position)
- Op 3: 2-3 if CFI=1,2 and 3-4 if CFI=3 (2OS-sTTI#1)

Agreement: In the 1-slot for normal subframes and sTTI#1, at least one pair of sPDSCH DMRS is supported and can be placed in symbols
- Op 1: 10-11
- Op 2: 12-13 (legacy DMRS position)
- Op 3: 9-10 (2OS-sTTI#4)

Agreement: For 2/3-OS sTTI containing sPDCCH, the following scheduling cases are supported:
- CRS-based sPDCCH scheduling CRS-based sPDSCH
- CRS-based sPDCCH scheduling DMRS-based sPDSCH
- DMRS-based sPDCCH scheduling DMRS-based sPDSCH

Agreement: For 2/3-OS sTTI containing sPDCCH, TDM (if supported) and FDM of CRS-based sPDCCH and CRS-based sPDSCH is supported.

Agreement: For 2/3-OS sTTI containing sPDCCH, FDM of CRS-based sPDCCH and DMRS-based sPDSCH is supported.
- FFS: TDM of CRS-based sPDCCH and DMRS-based sPDSCH is supported


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Agreement: Prioritize designing a mechanism for unused sPDCCH resources for 2/3-OS sTTI

- The sPDCCH reuse indication is based on RB set, sREG, sCCE, or sPDCCH candidate granularity. Details are FFS.
- Adopt the same mechanism for 1-slot sTTI, if applicable

| | | |
|---|---|---|
| R1-1712077 | sPDCCH multiplexing with data | Huawei, HiSilicon |
| R1-1712325 | sPDCCH multiplexing with sPDSCH | ZTE |
| R1-1712781 | sPDCCH multiplexing with data | Qualcomm Incorporated |
| R1-1712897 | Multiplexing sPDCCH with sPDSCH/PDSCH | Ericsson |
| R1-1713043 | On multiplexing of sPDCCH and sPDSCH | Nokia, Nokia Shanghai Bell |
| R1-1713071 | On multiplexing sPDCCH with data | LG Electronics |
| R1-1713506 | sPDCCH multiplexing with data | Samsung |
| R1-1714210 | sPDCCH and sPDSCH multiplexing | Motorola Mobility, Lenovo |

Proposed agreement:

- To enable TDM between sPDCCH and sPDSCH of the same UE in a PRB, as baseline operation down-select between these three options:
  - Option 1:
    - sPDSCH is rate-matched at least around the REs of the configured RB set where the UE found its sDCI scheduling sPDSCH
      - FFS rate-matching for other RB sets known to the UE
    - FFS if and how sPDSCH can use REs left unused within the configured sPDCCH RB-set where the UE found its sDCI and other RB sets known to a UE
  - Option 2:
    - sPDSCH is rate-matched around the sPDCCH scheduling sPDSCH
    - FFS if and how REs of the RB set not used by sDCI scheduling sPDSCH can be excluded from sPDSCH
    - FFS if and how sPDSCH can use REs left unused within other RB sets known to a UE
  - FFS: Down-selection may be based on size of the RB set.
  - FFS: If other RB sets than the ones configured to the UE are used

#### 5.2.1.2.3 UL control channel design

### 5.2.1.2.3.1 sPUCCH format design

Email discussion on sPUCCH format design including format selection, remaining PF4b 2/3os format, resource management, bundling,.ZTE (Xianghui), until 15th of Sept

| | | |
|---|---|---|
| R1-1712078 | sPUCCH design | Huawei, HiSilicon |
| R1-1712326 | sPUCCH format design | ZTE |
| R1-1712782 | sPUCCH format design | Qualcomm Incorporated |
| R1-1712898 | Design aspects of sPUCCH | Ericsson |
| R1-1712937 | sPUCCH Design for shortened TTI | Nokia, Nokia Shanghai Bell |
| R1-1713072 | Remaining details on sPUCCH design | LG Electronics |
| R1-1713507 | sPUCCH format design | Samsung |
| R1-1714346 | Remaining issues on sPUCCH format | InterDigital, Inc. |

**R1-1714794 WF on 2/3-OS sPUCCH for up to 2 bits LG Electronics, KT, ZTE**

Agreements:

The sequence-based sPUCCH w/o DMRS is supported for up to two HARQ-ACK bits in 2OS sTTI and 3OS sTTI.

- ACK/NACK information map to different sPUCCH resource
  - NOTE: sPUCCH resource consist of RB index and cyclic shift
- The cyclic shifts on different sPUCCH symbols can be different due to cyclic shift randomization
  - Cyclic shift randomization is re-used from 1 ms operation to support multiplexing with legacy PUCCH
- Only frequency hopping between sPUCCH symbol(s) is supported (no FH is not supported).
- 1 RB allocation per symbol
- Hopping pattern for 3-OS sPUCCH (i.e., sTTI#0 and sTTI#5) is {1|2} where | is a hopping boundary.

**R1-1714900 WF on collision of 1-slot SR and HARQ-ACK Huawei, HiSilicon, Ericsson, LG Electronics, Nokia, Nokia Shanghai Bell, Intel, KT, Samsung**



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Agreements:

- When positive SR and HARQ-ACK are to be transmitted on 1-slot sPUCCH in the same sTTI,
  - For sPUCCH format carrying up to 2 bits HARQ-ACK , HARQ-ACK is transmitted on sPUCCH resource for SR;
  - For sPUCCH format carrying more than 2 bits HARQ-ACK, SR and HARQ-ACK are transmitted on sPUCCH resource for HARQ-ACK.
- When there is negative SR:
  - For sPUCCH format carrying up to 2 bits HARQ-ACK , HARQ-ACK is transmitted on sPUCCH resource for HARQ-ACK;
  - For sPUCCH format carrying more than 2 bits HARQ-ACK, SR and HARQ are transmitted on sPUCCH resource for HARQ-ACK.

**R1-1714901 WF on collision of 2/3-symbol SR and HARQ-ACK Huawei, HiSilicon, Nokia, Nokia Shanghai Bell, KT**

Agreement:

- When positive SR and 1-bit HARQ-ACK are to be transmitted on 2/3-symbol sPUCCH in the same sTTI, one of the options can be supported:
  - Two sPUCCH resources are configured for SR+HARQ and two sPUCCH resources are configured for only HARQ.

Proposed agreement:

- When positive SR and 2-bit HARQ-ACK for two codewords are to be transmitted on 2/3-symbol sPUCCH in the same sTTI:
  - Opt 1. spatial bundling is always applied for HARQ-ACK feedback in SR subframes.
  - Opt 2. spatial bundling is applied for HARQ-ACK feedback in SR subframes when there is a positive SR.
  - Opt 3: Four sPUCCH resources are configured for SR+HARQ and four sPUCCH resources are configured for only HARQ.

**R1-1714882 WF on sPUCCH resource allocation for HARQ-ACK transmission ZTE, LG Electronics, Ericsson, Intel**

Agreement:

- One of four sPUCCH resources configured by higher layer is indicated by a 2-bit field in sDCI1 at least for the following sPUCCH formats,
  - 2/3-OS sPUCCH format(s) carrying more than 2 bits ACK/NACK + SR (if any)
  - 7-OS sPUCCH format(s) carrying more than 2 bits ACK/NACK + SR (if any)
  - 7-OS sPUCCH format carrying up to 2 bits ACK/NACK

Agreement:

- For 2/3-OS sPUCCH format carrying up to 2 bits ACK/NACK, one of four sPUCCH resource groups configured by higher layer is indicated by a 2-bit field in sDCI1. Each group contains 2 or 4 sPUCCH resources (depending on the expected number of HARQ-ACK bits) configured by higher layer.

**R1-1714784 WF on 7-symbol sPUCCH for more than 2 bits LG Electronics, ZTE**

Agreement:

- For PF4-based 7-symbol sPUCCH
  - Hopping is supported
    - {D R D | D D R D} for the first slot, {D R D D | D R D} for the second slot

Agreement: For 7-symbol sPUCCH format for more than 2 bits, PF3-based 7-symbol sPUCCH is supported in addition to PF4-based 7-symbol sPUCCH.

Agreement: For PF3-based 7-symbol sPUCCH hopping is not supported

Agreement:

- Channel coding for 7-symbol sPUCCH
  - Up to 11 bits: Single RM coding
  - 12-22: Dual RM



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- More than 22 bits: TBCC+8bit-CRC

Agreement: For 1-slot sPUCCH format 4 the number of RBs is signaled by higher layer signaling and can be configured between 1 to 8.

Proposed agreement:
- For sPUCCH carrying more than 2-bit ACK/NACK and SR (if any) in 2os/3os sTTI, the number of RB(s) is configured by higher layer signaling as a value from 1 to 8.

#### 5.2.1.2.3.2 sPUCCH resource management

R1-1712079 sPUCCH resource allocation Huawei, HiSilicon
R1-1712783 sPUCCH resource management Qualcomm Incorporated
R1-1712473 sPUCCH resource allocation for sTTI Intel Corporation
R1-1712327 Discussion on sPUCCH resource management ZTE
R1-1712899 sPUCCH resource management Ericsson
R1-1712938 sPUCCH resource management for shortened TTI Nokia, Nokia Shanghai Bell
R1-1713508 sPUCCH resource management Samsung
R1-1714914 Proposal on SR periodicity on sPUCCH Ericsson

Proposed agreement:
- The periodicity of SR sent on 2/3os sPUCCH can be configured from the following set of values:
  - {1 sTTI, 2 sTTI, 3 sTTI, 4 sTTI, 1ms}
- The periodicity of SR sent on 7os sPUCCH can be configured from the following set of values:
  - {0.5ms, 1ms}
- Other values FFS

#### 5.2.1.2.3.3 UCI on sPUSCH

R1-1712080 UCI on sPUSCH Huawei, HiSilicon
R1-1712900 UCI on sPUSCH with short TTI Ericsson
R1-1713073 UCI transmission on sPUSCH LG Electronics
R1-1712328 UCI transmission on sPUSCH in sTTI ZTE
R1-1712474 UCI transmission on sPUSCH Intel Corporation
R1-1712784 UCI on sPUSCH Qualcomm Incorporated
R1-1712939 UCI on sPUSCH Nokia, Nokia Shanghai Bell
R1-1713509 UCI on sPUSCH Samsung
R1-1714201 Discussion on UCI on sPUSCH Potevio
R1-1714966 WF on UCI on sPUSCH Huawei, HiSilicon

**R1-1714949 WF on beta offset for sPUSCH LG Electronics, Ericsson, NTT DOCOMO**

Agreement:
- For UCI on sPUSCH:
  - The beta offset values for sPUSCH and PUSCH are independently configured.
  - The beta offset table for 1 ms operation is re-used
  - FFS: If aperiodic CSI on sPUSCH is supported

#### 5.2.1.2.3.4 CSI reporting for sTTI

R1-1712071 CSI feedback for short TTI Huawei, HiSilicon
R1-1712785 CSI reporting for sTTI Qualcomm Incorporated
R1-1712901 On CSI reporting for sTTI Ericsson
R1-1712940 On CSI Reporting for sTTI Nokia, Nokia Shanghai Bell
R1-1713074 Discussion on sTTI based CSI LG Electronics
R1-1713510 CSI reporting for sTTI Samsung
R1-1714187 CSI reporting for sTTI operation ITRI
R1-1714211 CSI aspects of shortened TTI Motorola Mobility, Lenovo
R1-1714469 Discussion on short CSI reporting in sTTI KT Corp.
R1-1715048 WF on CSI feedback for sTTI Huawei, HiSilicon

Email discussion on sTTI CSI reporting (Qualcomm, Kianoush), until 22nd of Sept



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#### 5.2.1.2.3.5 sPUCCH power control

R1-1712902 sPUCCH power control Ericsson
R1-1713511 sPUCCH power control Samsung
R1-1712090 sPUCCH power control Huawei, HiSilicon
R1-1712786 sPUCCH power control Qualcomm Incorporated
R1-1713075 Discussion on sPUCCH power control LG Electronics

### *5.2.1.2.4* DL data channel design

#### 5.2.1.2.4.1 sPDSCH design

*Including aspects related to sPDSCH resource allocation, TM, TBSs.*

Email discussion on sPDSCH/sPUSCH design including TBS scaling, single CW, DL DMRS pattern, configuration of transmission modes, fallback transmission scheme, resource allocation, UL DMRS details, HARQ ACK mapping on sPUSCH, Huawei (Yubo), until 22nd of September

R1-1712081 sPDSCH design Huawei, HiSilicon
R1-1712329 sPDSCH transmission in sTTI ZTE
R1-1712475 On the details of sPDSCH designs Intel Corporation
R1-1712787 sPDSCH design Qualcomm Incorporated
R1-1712903 Design aspects of sPDSCH Ericsson
R1-1713044 On details of short PDSCH design Nokia, Nokia Shanghai Bell
R1-1713076 Design aspects on sPDSCH LG Electronics
R1-1713512 sPDSCH design Samsung
R1-1714972 WF on RBG size for sPDSCH Huawei, HiSilicon, Samsung
R1-1714973 WF on transmission mode for sPDSCH Huawei, HiSilicon

Working assumption:

- A single codeword is used for sPDSCH independent on the number of layers

#### 5.2.1.2.4.2 DL DMRS design

*Including aspects related to number of layers and DMRS patterns.*

R1-1712082 DL DMRS design for short TTI Huawei, HiSilicon
R1-1712330 DL DMRS design in sTTI ZTE
R1-1712788 DL DMRS design Qualcomm Incorporated
R1-1712904 DL DMRS design for sPDSCH Ericsson
R1-1713045 On details of DMRS design for 2-OS and 7-OS DL shorter TTI Nokia, Nokia Shanghai Bell
R1-1713077 Consideration on DL DMRS for sTTI LG Electronics
R1-1713513 DL DMRS design Samsung
R1-1714971 WF on DMRS pattern for sPDSCH Huawei, HiSilicon

### 5.2.1.2.5 UL data channel design

#### 5.2.1.2.5.1 sPUSCH design

*Including aspects related to sPUSCH resource allocation, TM, TBS.*

R1-1712083 sPUSCH design Huawei, HiSilicon
R1-1712331 sPUSCH transmission in sTTI ZTE
R1-1712789 sPUSCH design Qualcomm Incorporated
R1-1712905 Design aspects of sPUSCH Ericsson
R1-1713046 On details of short PUSCH design Nokia, Nokia Shanghai Bell
R1-1713514 sPUSCH design Samsung

#### 5.2.1.2.5.2 UL DMRS design

*Including aspects related to sPUSCH number of layers.*

R1-1712084 UL DMRS design for sPUSCH Huawei, HiSilicon
R1-1712790 UL DMRS design Qualcomm Incorporated
R1-1712906 On UL DMRS design Ericsson



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R1-1712941 UL DMRS Design for sTTI Nokia, Nokia Shanghai Bell
R1-1713515 UL DMRS design Samsung

#### 5.2.1.2.5.3 sPUSCH power control

Email discussion on sPUSCH/sPUCCH power control including both single carrier and multiple carrier scenario and remaining issues on collisions in UL, LGE (Hyunho), until 22nd of Sept

R1-1712086 sPUSCH power control Huawei, HiSilicon
R1-1712332 sPUSCH power control ZTE
R1-1712791 sPUSCH power control Qualcomm Incorporated
R1-1712907 sPUSCH power control and PHR report for sTTI Ericsson
R1-1713078 Discussion on sPUSCH power control LG Electronics
R1-1713516 sPUSCH power control Samsung

**R1-1714769 LS on Pcmax for shortened TTI RAN1, Huawei; To: RAN4**
Decision: The LS is approved.

**R1-1715171 WF on sPUSCH power control with DMRS sharing Huawei, HiSilicon**

Agreement:
- When multiple sPUSCH scheduled to the same UE share a DMRS symbol, the eNB has to guarantee the same output power and resource assignment for those sTTI.

#### 5.2.1.2.6 FS2 aspects

Email discussions on remaining issues of FS2 including HARQ timing and UL scheduling tables, Samsung (Jeongho), until 18th of Sept

**R1-1714164 Summary of email discussion [89-07] on FS2 aspects for sTTI Huawei**

Agreement: For special subframe configurations 1, 2, 3, 4, 6, 7 and 8, DwPTS is split into a 1-slot sTTI and an X-symbol sTTI, where X is the number of symbols of DwPTS in the second slot. The minimum processing time for X-symbol sTTI is the same as 1-slot sTTI.

Agreement: For special subframe configurations [3, 4, 8], the sPDSCH transmission is supported in the second slot of DwPTS. FFS on configuration 1,2,6,7.

Agreement: The X-symbol sTTI is scheduled independently.

Agreement: For special subframe configurations 0~9, the sPUSCH/sPUCCH transmission is not supported in UpPTS.

Agreement: For special subframe configurations 10, the sPUSCH transmission is supported in UpPTS, and sPUCCH transmission is FFS.

Agreement: For 1-slot sTTI operation, a single minimum processing time is supported.

Agreement: The timing between sPDSCH to HARQ-ACK and UL grant to sPUSCH are determined by pre-defined table.

R1-1712088 TDD-specific design for short TTI Huawei, HiSilicon
R1-1712333 TDD-specific considerations on sTTI ZTE
R1-1712792 FS2 aspects Qualcomm Incorporated
R1-1712908 FS2 aspects of short TTI Ericsson
R1-1713079 Discussion on FS2 aspects for sTTI operation LG Electronics
R1-1713239 Design aspects of slot-level sTTI with FS2 Nokia, Nokia Shanghai Bell
R1-1713517 TDD-specific issues on sTTI operation Samsung
R1-1713828 Discussion on HARQ timing for shortened TTI in TDD CMCC

#### 5.2.1.2.7 Other

R1-1712087 TBS determination for short TTI Huawei, HiSilicon
R1-1712126 Discussion on CA issues for shortened TTI operation Huawei, HiSilicon
R1-1712127 Discussion on SR in shortened TTI scenario Huawei, HiSilicon



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R1-1712909 TBS scaling for short TTI Ericsson
R1-1712910 On sTTI operation with small system bandwidth Ericsson
R1-1712911 UE capabilities for sTTI Ericsson
R1-1713518 Flexible UL DMRS position Samsung
R1-1714470 Multiplexing sPDCCH RB sets for 2/3 symbol and 1-slot sTTI Huawei, HiSilicon
R1-1714471 Discussion on sDCI2 Huawei, HiSilicon

#### 5.2.1.3 Maximum TA and processing time

*Including maximum supported TA for sTTI and 1 ms operation, minimum data processing time for short TTI and potential relationship between them.*

Email discussion on remaining issues for max TA and processing time, including how to handle (2,7)? Where to ACK/NACK the three 2os sTTI in a slot (HARQ timing table)? DAI?, Nokia (Klaus) until 15th of Sept.

R1-1712085 Maximum TA and processing time reduction Huawei, HiSilicon
R1-1712793 Maximum TA and processing time Qualcomm Incorporated
R1-1712914 On maximum TA and reduced processing time Ericsson
R1-1712947 On maximum timing advance and processing time Nokia, Nokia Shanghai Bell
R1-1713080 Discussion on maximum TA and processing time LG Electronics
R1-1713519 Reduction of maximum TA and processing time Samsung
R1-1714964 WF on processing time for 2/3-symbol sTTI Huawei, HiSilicon, Ericsson, Nokia, Alcatel-Lucent Shanghai Bell
**R1-1714965 WF on processing time for 1-slot sTTI Huawei, HiSilicon, Ericsson, Nokia, Alcatel-Lucent Shanghai Bell**

Proposed agreement:
The RB set resource granularity is the same as the legacy RBG size for each given system bandwidth.

Agreement:
- For DL 1-slot sTTI length or UL 1-slot sTTI length, a processing time of n+4 slot sTTI assuming a maximum TA Y for DL data to DL HARQ and for UL grant to sPUSCH is supported
  - Y <= 330 us
    - FFS the detailed value
- Note that sTTI refers to
  - sPUSCH sTTI for the UL grant to UL data timing
  - sPDSCH sTTI for the DL data to DL HARQ feedback timingt

Agreement:
- NOTE: In case of {2,7} combination the minimum of the supported maximum TA values for 2/3-os and 1-slot is applied.

#### 5.2.1.4 Other

R1-1712794 Link evaluation of DL data transmission under symbol-dependent puncturing/interference Qualcomm Incorporated

**R1-1712912 DRAFT CR 36.300 Introduction of short TTI and short processing time for LTE Ericsson**
**Decision:** Draft CR endorsed

R1-1714763 List of physical layer related RRC parameters for sTTI and short processing time Ericsson (rev of R1-1712913)
Ericsson: Email approval until 13th of Sept of updated list of RRC parameters after RAN1#90, followed by an LS to RAN2 to inform them about the set of parameters currently agreed.

**R1-1714768 LS on Stage 2 description of short TTI and short processing time RAN1, Ericsson**
**Decision:** The LS is approved.

### 5.2.2 Enhancements to LTE operation in unlicensed spectrum - *WID in RP-170848*

**R1-1715127 Chairman's notes of AI 5.2.2 Enhancements to LTE operation in unlicensed spectrum Ad-Hoc chair (Nokia)**
The document was presented by Timo Lunttila of Nokia.
**Decision:** The document is endorsed, and content is incorporated as below.



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**R1-17175050 WF on additional DL and UL start and end positions in FeLAA Broadcom, CableLabs, Brocade, BlackBerry, Comcast, Sequans**

**R1-1715080 LS on RAN1 agreements on Enhancements to LTE operation in unlicensed spectrum RAN1, Nokia**
**Decision:** The LS is approved.

#### 5.2.2.1 Multiple starting positions in a subframe for DL

R1-1712110 Support for multiple starting positions in a subframe for DL on SCell with frame structure 3 Huawei, HiSilicon
R1-1712476 On the additional downlink starting positions in a subframe for FS3 Intel Corporation
R1-1712948 On multiple DL starting positions in a subframe for feLAA Nokia, Nokia Shanghai Bell
R1-1713024 Multiple starting positions in a subframe in DL Qualcomm Incorporated
R1-1713081 Discussion on multiple starting positions for LAA DL LG Electronics
R1-1713308 Multiple starting positions for LAA in DL Ericsson Japan K.K.
R1-1713520 Multiple starting positions for DL Samsung
R1-1714385 Multiple starting positions in a subframe for DL on LAA Scell WILUS Inc.
R1-1714479 Discussion on multiple starting positions for DL in LAA BROADCOM LIMITED
R1-1714480 Considerations and throughput evaluation of new DL partial subframes PANASONIC

#### 5.2.2.2 Multiple starting and ending positions in a subframe for UL

*Remaining aspects including control signaling, channel access, etc.*

R1-1712111 Support for partial subframe transmission for UL on SCell with frame structure 3 Huawei, HiSilicon
R1-1712477 Remaining details on uplink starting and ending positions in a subframe for FS3 Intel Corporation
R1-1712949 Multiple starting and ending positions in a subframe for UL Nokia, Nokia Shanghai Bell
R1-1713025 Multiple starting and ending positions in a subframe in UL Qualcomm Incorporated
R1-1713082 Discussion on multiple starting and ending positions for LAA UL LG Electronics
R1-1713309 Remaining issues on multiple starting and ending points in UL Ericsson Japan K.K.
R1-1713521 Multiple starting and ending positions for UL Samsung
R1-1713982 Demodulation of PUSCH in partial subframe transmission NTT DOCOMO INC.
R1-1714003 On multiple starting and ending positions in LAA UL subframe Sequans Communications
R1-1714386 Multiple starting and ending position in a subframe for UL on LAA Scell WILUS Inc.
R1-1714478 Discussion on additional starting and ending positions for UL in LAA BROADCOM LIMITED

**R1-1714838 WF on Mode 1 for UL partial subframe Huawei, HiSilicon, Nokia, Nokia Shanghai Bell, Sequans**
R1-1714904 WF on multiple starting positions in a subframe for uplink in FeLAA Huawei, HiSilicon

#### 5.2.2.3 Autonomous uplink access with Frame Structure type 3

**R1-1713307 On the benefits and support of autonomous UL access for LAA Ericsson Japan K.K.**
**R1-1714099 Motivation of autonomous uplink access on LAA Scells Intel Corporation**
**R1-1714832 Way forward on the support of autonomous UL access Intel, Ericsson, Qualcomm, Huawei, HiSilicon, KT, Nokia, Nokia Shanghai Bell, WILUS, LG, Samsung**

Agreement: The support of autonomous uplink access with frame structure type 3 is specified within the scope of Release 15 FeLAA WI.

**R1-1715059 Conclusion of the Study of autonomous UL access Panasonic, Intel, WILUS, Ericsson, Nokia, Nokia Shanghai Bell**

Conclusions:
- RAN1 observes the following for autonomous uplink access
  - UL latency can be lowered due to reduced scheduling control signalling compared to a fully scheduled UL transmission
  - UL throughput performance can be significantly better than scheduled UL at least for low cell loads, where few nodes contend for the channel



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#### 5.2.2.3.1 Resource allocation for autonomous UL access

*Including e.g. configuration of resources for uplink autonomous access, multiplexing of autonomous and scheduled UL transmissions, and related control signaling*

**R1-1712112 Resource allocation for autonomous UL access on unlicensed SCell Huawei, HiSilicon**
**R1-1713026 Resource allocation for automonous UL access Qualcomm Incorporated**
R1-1712478 A framework to enable autonomous uplink access Intel Corporation
R1-1712942 Resource allocation for Autonomous UL Access Nokia, Nokia Shanghai Bell
R1-1713083 Resource allocation and control siganling for autonomous UL access LG Electronics
R1-1713310 on AUL support on LAA sCell Ericsson Japan K.K.
R1-1713522 Resource allocation for autonomous UL access Samsung
R1-1714176 Resource Allocation for Autonomous UL Access in FeLAA ASUSTEK COMPUTER (SHANGHAI)

**R1-1715020 WF on Resource Allocation for Autonomous UL Access Nokia, Ericsson, Intel, Huawei, HiSilicon, Qualcomm, Samsung, Sharp, LG Electronics, Nokia Shanghai Bell, WILUS**

Agreements:

- AUL operation is UE specifically RRC configured
  - The time-domain resources for AUL operation are RRC configured
    - FFS: configuration details (e.g. subframe bitmap or a periodic configuration, etc.)
- Activation and deactivation of AUL operation is supported using a DCI with its CRC scrambled with a specific RNTI
  - FFS which DCI format
  - FFS whether the RNTI is the SPS RNTI or a new RNTI
- FFS: additional limitations to AUL subframes e.g. depending on scheduled transmissions
- FFS: whether in addition to the RRC configured subframes also other subframes can be dynamically enabled for AUL
- Frequency domain resources (i.e. interlaces) for AUL transmissions are indicated to the UE by the eNodeB via the Activation DCI
- The MCS of AUL transmissions is indicated to the UE by the eNodeB via the Activation DCI

#### 5.2.2.3.2 HARQ for autonomous uplink access

*Including necessary enhancements to DL and UL control signaling*

R1-1712125 HARQ for autonomous UL access on unlicensed SCell Huawei, HiSilicon
R1-1712479 Consideration on HARQ for autonomous uplink access Intel Corporation
R1-1713027 HARQ for autonomous UL access Qualcomm Incorporated
R1-1713084 HARQ operation for autonomous UL access LG Electronics
**R1-1713311 on HARQ design for AUL Ericsson Japan K.K.**
R1-1713523 HARQ for autonomous UL access Samsung
R1-1713860 HARQ for autonomous uplink access Nokia, Nokia Shanghai Bell

**R1-1715004 WF on HARQ design for AUL Ericsson**

Agreement:

- Additional HARQ processes are not introduced for AUL transmission (i.e. AUL supports 16 HARQ processes just like Re-14 eLAA)
  - The HARQ process IDs allowed for AUL operation are UE specifically RRC configured
  - All 16 HARQ-processes can be used for scheduled transmissions

Working assumption:

- Both scheduled and autonomous retransmission are supported for AUL transmissions.

#### 5.2.2.3.3 Channel access for autonomous UL access

R1-1712124 Channel access for autonomous UL access on unlicensed SCell Huawei, HiSilicon
R1-1712480 Consideration on channel access mechanism for autonomous uplink access Intel Corporation
R1-1713028 Channel access mechanism for autonomous UL access Qualcomm Incorporated
R1-1713085 Channel access procedure for autonomous UL access LG Electronics
R1-1713312 On Channel Access for AUL Ericsson Japan K.K.
R1-1713524 Channel access for autonomous UL access Samsung
R1-1713861 On channel access for autonomous UL access Nokia, Nokia Shanghai Bell
R1-1714387 Discussion on channel access for autonomous UL access WILUS Inc.
R1-1715005 WF on intra-collision avoidance for AUL UEs Ericsson, Nokia



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**Friday:**
R1-1715191 **WF on channel access for Autonomous UL in FeLAA Nokia, BlackBerry, Broadcom, Ericsson, Huawei, HiSilicon, Intel, LG Electronics, Nokia Shanghai Bell, Panasonic, Qualcomm, Samsung, WILUS**

#### 5.2.2.3.4 Other

R1-1713029 Miscellaneous aspects Qualcomm Incorporated
R1-1714404 On Autonomous UL LAA coexistence with Wi-Fi Ericsson Japan K.K.

### *5.2.3 3GPP V2X Phase 2 - WID in RP-171069*

**R1-1715128 Chairman's notes of AI 5.2.3 3GPP V2X Phase 2 Ad-Hoc chair (Huawei)**
The document was presented by Philippe Sartori of Huawei.
**Decision:** The document is endorsed, and content is incorporated as below.

#### *5.2.3.1 Carrier Aggregation (up to 8 PC5 carriers)*

#### 5.2.3.1.1 Mode-3 support

*Including determining whether any standardization work is needed in RAN1*

**R1-1714924 WF on mode 3 sidelink CA Huawei, HiSilicon, Ericsson, ZTE, NTT DOCOMO, Samsung, Panasonic, LGE, OPPO**
Also supported by Intel

Agreement:
- From RAN1 perspective, no additional standardization work is needed for supporting Mode 3 scheduling in PC5 CA (up to 8 PC5 carriers)
  - Send LS to RAN2.

**R1-1715001 [Draft] LS on RAN1 agreements on mode 3 sidelink CA Huawei, HiSilicon**
**Decision:** Agreed. Li Chao to submit the final LS
**Friday:** The final LS is approved in R1-1715174.

**R1-1714934 WF on supported use case for CAHuawei, HiSilicon, OPPO**

Agreement:
- For the three CA use cases identified in RAN1#89
  - First and third use case are prioritized in RAN1.
  - For the second case, packet duplication can be done at higher layers (up to RAN2 to decide).
- Send an LS to RAN2 to inform them of the decision.

**Friday:**
**R1-1715199 [draft] LS to RAN2 on supported use case for Rel-15 V2X CA on PC5 Huawei**
**Decision:** The final LS is approved in R1-1715282

R1-1712651 On Mode-3 Support for CA Ericsson

R1-1712137 Discussion on Mode 3 support for carrier aggregation of R15 sidelink Huawei, HiSilicon
R1-1712338 Discussion on carrier aggregation for mode 3 in V2X phase 2 CATT
R1-1712923 Sidelink CA in Mode-3 ZTE
R1-1713086 Discussion on carrier aggregation in sidelink mode 3 operationLG Electronics
R1-1713250 Mode 3 support in eV2X carrier aggregation Guangdong OPPO Mobile Telecom
R1-1713525 Mode-3 support in V2X CA Samsung
R1-1714193 Discussion on mode 3 supporting and coexistence with mode 4 in V2XITRI

#### 5.2.3.1.2 Mode-4 support

*Including changes to the sensing procedure*

**R1-1714738 WF on PC5 carrier aggregation for Mode 4 LG Electronics, ZTE, Qualcomm, NTT DOCOMO**

Agreement:


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- At least Rel-14 per-carrier independent sensing procedure and resource (re)selection is supported
- FFS whether other solution is needed.
- FFS if sensing on multiple carriers as a single set of resources is supported
- FFS if sensing can be done on a per-carrier basis, but resource selection can be different than Rel-14 UEs

Working assumption: Any sensing and resource (re)selection procedure uses the Rel-14 PHY UE procedure of determining the subset of resources to be reported to higher layers in PSSCH resource selection in sidelink transmission mode 4. Additional rules for resource exclusion of resources is not precluded after the procedure

Conclusion: RAN1 assumes that the observations in R4-147958 apply for multi-carrier V2X.

**R1-1714942 WF on carrier aggregation in V2X CATT**
**R1-1714943 WF on resource selection for CA in V2X CATT, OPPO**
**R1-1714980 WF on carrier selection for carrier aggregation NTT DOCOMO, LG Electronics**

Agreement:
- Higher layer semi-statically provides potential carrier(s) for Tx and Rx for CA
- FFS how Tx carrier(s) is(are) selected within the set of potential Tx carrier(s)
- Send LS to RAN2 cc SA2 to inform them of this assumption (including the note)

Note: it is RAN1 understanding that the higher layers will take other constraints (e.g., UE capability, services, etc.) into account when providing the set of potential carrier(s)

**Friday:**
**R1-1715186 [Draft] LS on RAN1 agreement on carrier selection for sidelink CANTT DOCOMO**
**Decision:** The final LS is approved in R1-1715283

Conclusion: continue discussion of step 2 and of carrier selection at RAN1#90b

R1-1712132 Discussion on Mode 4 support for carrier aggregation of R15 sidelink Huawei, HiSilicon
R1-1712481 Sidelink carrier aggregation for mode-4 LTE V2V communication Intel Corporation
R1-1713880 On carrier aggregation using mode 4 resource selection NTT DOCOMO, INC.
R1-1713030 Carrier Aggregation for V2X Phase 2 Qualcomm Incorporated

R1-1712339 Discussion on carrier aggregation for mode 4 in V2X phase 2 CATT
R1-1712652 On Mode-4 Support for CA Ericsson
R1-1712924 Sidelink CA in Mode-4 ZTE
R1-1713087 Discussion on carrier aggregation in sidelink mode 4 operation LG Electronics
R1-1713251 Mode 4 support in eV2X carrier aggregation Guangdong OPPO Mobile Telecom
R1-1713526 Mode-4 support in V2X CA Samsung
R1-1713853 Discussion on UE behaviour of mode 4 in case of multiple carriers Panasonic
R1-1714194 Discussion on V2X Sildelink Carrier Aggregation Scheduling in Mode 4 ITRI

#### 5.2.3.1.3 Synchronization

R1-1712131 Discussion on synchronization support for carrier aggregation of R15 sidelink Huawei, HiSilicon
R1-1712340 Discussion on synchronization for carrier aggregation in V2X Phase 2 CATT
R1-1712482 Synchronization aspects for LTE V2V sidelink carrier aggregation Intel Corporation
R1-1712653 On Synchronization Aspects for PC5 CA Ericsson
R1-1712925 Synchronization in Sidelink CA ZTE
R1-1713088 Discussion on synchronization for sidelink CA LG Electronics
R1-1713527 Synchronization in V2X CA Samsung
R1-1713881 Discussion on synchronization for carrier aggregation NTT DOCOMO, INC.
R1-1713993 Discussion on synchronization for V2X carrier aggregation Nokia, Nokia Shanghai Bell
R1-1714195 Discussion on Synchronization Aspects for Sidelink Carrier Aggregation in V2X communication ITRI
R1-1714923 WF on synchronization for sidelink CA Huawei, HiSilicon, Ericsson, OPPO, ITRI, Panasonic
R1-1714925 WF on synchronization in sidelink CA LG Electronics, NTT DOCOMO
R1-1714944 WF on synchronization in V2X CA CATT, OPPO

#### 5.2.3.1.4 Other

R1-1713528 Other considerations on V2X CA Samsung



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R1-1713983 On the use of CA on PC5 Ericsson

#### 5.2.3.2 Support for 64-QAM

**R1-1713031 Support of 64-QAM for 3GPP V2X Phase 2 Qualcomm Incorporated**
**R1-1713529 High order modulation in V2X Samsung**

**R1-1714958 WF on 64QAM support Samsung, Ericsson**
**R1-1715086 WF on solving coderate issue for supporting 64QAM in Rel-15 V2X Huawei, HiSilicon, Qualcomm Incorporated, LG Electronics**
**R1-1715087 WF on rate-matching behavior for Rel-15 V2X UE Huawei, HiSilicon, LG Electronics**
**R1-1714737 WF on support for 64-QAM LGE, ZTE**

Working assumption:
- Differentiation of Rel-15 transmission using 64-QAM and Rel-14 transmission is signaled in the SCI
- No change to the 5-bit MCS field in existing SCI-1 is needed to support 64QAM

Agreement: Select one of the following four options:
- Option 1: Use existing MCS table with TBS scaling
  - Option 1a: with scaling for 64-QAM only
  - Option 1b: with scaling for all MCSs
- Option 2: Introduce a modified MCS table for Rel-15 V2X UE
- Option 3: Use existing MCS table with no TBS scaling

Agreement: Send LS to RAN4 to ask whether psd boosting for PSCCH when associated PSSCH used 64 QAM is feasible, and if yes, up to what level (Seungmin)
**Friday**
**R1-1715209 [Draft] LS on PSCCH PSD boosting with 64 QAM PSSCH LG Electronics**
**Decision:** The final LS is approved in R1-1715284

Conclusion: further discuss rate-matching at RAN1#90b

Conclusion: further discuss at RAN1#90b if a solution needs to be specified for the radio layer to recognize whether or not the use of 64 QAM is allowed

R1-1712096 Discussion on supporting 64QAM for R15 sidelink Huawei, HiSilicon
R1-1712341 Discussion on 64QAM modulation scheme in V2X Phase 2 CATT
R1-1712483 Support of higher order modulations for LTE V2V sidelink communication Intel Corporation
R1-1712654 Supporting 64QAM on PC5 Ericsson
R1-1712926 Support for 64-QAM ZTE
R1-1713089 Discussion on 64QAM support LG Electronics
R1-1713980 Consideration and Evaluation on 64 QAM for LTE V2X Phase 2 Shenzhen Coolpad Technologies

#### 5.2.3.3 Feasibility and gain of PC5 operation with Transmit Diversity

R1-1713530 Transmit diversity transmission on PC5 Samsung
**R1-1714692 WF on Transmit Diversity Ericsson, Huawei, HiSilicon, CATT, Nokia, Nokia Shanghai Bell**

Conclusion: discuss more offline Wednesday, after offline sTTI (Ricardo) using the following as a starting point:

Discuss further offline the proposal for Working Assumption (may be revisited based on RAN4 response) (Ricardo after D2D session)
- For designing PSSCH, RAN1 assumes the use of two-port transmit diversity
  - The use of transmit diversity is configured.
  - Details, including diversity scheme, are FFS
  - Support of transmission and/or reception up to UE capability
  - Send LS to RAN4 to ask their opinion about when non-transparent scheme for transmit diversity is used by Rel-15 UEs:


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  - Impact on Rel-14 UEs of PSSCH RSRP measurement accuracy
  - MPR for Rel-15 UEs
- Transmit diversity is not used in the following cases:
  - When communicating with Rel-14 UEs
  - When there is a high probability of resource collision with Rel-14 UEs

Note: Some companies observe that the performance of MMSE-IRC receiver degrades when a non-transparent Transmit diversity scheme is used in interference limited scenarios with a dominant interferer

**Friday:**

**R1-1715192 Summary of offline discussion on transmit diversity Ericsson, LGE, Huawei, HiSilicon, Nokia, NSB, Samsung, CATT, NTT DoCoMo, ZTE**

Working Assumption (may be revisited based on RAN4 response):

- For designing PSSCH, RAN1 assumes the use of two-port non-transparent transmit diversity
  - The use of non-transparent transmit diversity is configured.
  - Details, including diversity scheme, are FFS
  - Support of transmission and/or reception up to UE capability
    - Note: It is RAN1 understanding that requirements on capabilities can be set at regional level and are outside 3GPP scope
  - Send LS to RAN4 to ask their opinion about when non-transparent scheme for transmit diversity is used by Rel-15 UEs:
    - Impact on Rel-14 UEs of PSSCH-RSRP measurement accuracy
    - MPR for Rel-15 UEs
- Non-transparent Transmit diversity is not used in the following cases:
  - When communicating with Rel-14 UEs
  - When there is a high probability of resource collision with Rel-14 UEs
- Note: Some companies observe that the performance of MMSE-IRC receiver degrades when a non-transparent Transmit diversity scheme is used in interference limited scenarios with a dominant interferer

**R1-1715257 [Draft] LS on transmit diversity for PC5 Ericsson**
**R1-1715290 [Draft] LS on transmit diversity for PC5 Ericsson**
Decision: The final LS is approved in R1-1715308.

#### 5.2.3.3.1 Transmit diversity solutions

*For both PSSCH and PSCCH*

R1-1714922 WF on DMRS for TxD in V2X CATT, Huawei, Hisilicon, OPPO

R1-1712097 Transmit diversity solutions for R15 sidelinkHuawei, HiSilicon
R1-1712342 Discussion on Tx diversity schemes in PC5 CATT
R1-1712484 Candidate transmit diversity schemes for LTE V2V sidelink communication Intel Corporation
R1-1712655 Transmit diversity solutions for Rel-15 PSCCH and PSSCH transmissions Ericsson
R1-1712927 Transmit diversity solutions of TxDZTE
R1-1713249 Transmission diversity schemes for eV2X Guangdong OPPO Mobile Telecom
R1-1713531 Discussion on transmit diversity scheme for PSSCH in V2X Samsung
R1-1713882 Transmission diversity solutions NTT DOCOMO, INC.
R1-1713994 Transmit diversity schemes for V2X PC5 Nokia, Nokia Shanghai Bell

#### 5.2.3.3.2 Evaluation results

*For both PSSCH and PSCCH*

**R1-1712098 Evaluation results of transmit diversity solutions for R15 sidelink Huawei, HiSilicon**
R1-1712343 Evaluations for Tx diversity schemes in PC5 CATT
**R1-1712485 Evaluation of candidate transmit diversity schemes for LTE V2V sidelink communication Intel Corporation**
R1-1712656 Evaluation for transmit diversity for V2X Ericsson
R1-1712928 Evaluation results of TxD ZTE
R1-1713532 Evaluation results for Tx diversity for PSSCH Samsung
R1-1713883 Evaluation results for transmission diversity scheme for PSSCH NTT DOCOMO, INC.
**R1-1713995 Evaluations of transmit diversity schemes for V2X PC5 Nokia, Nokia Shanghai Bell**



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#### 5.2.3.3.3 Conclusion on transmit diversity feasibility and gain

R1-1712121 On further specification work for Transmit Diversity Huawei, HiSilicon
R1-1712344 Feasibility and gain on Tx diversity in PC5 CATT
R1-1712486 Conclusions on LTE V2V transmit diversity feasibility and gain Intel Corporation
R1-1712657 Conclusion on transmit diversity for V2X Ericsson
R1-1712929 Conclusion on transmit diversity feasibility and gain ZTE
R1-1713032 Feasibility and gain of PC5 operation with Transmit Diversity Qualcomm Incorporated
R1-1713090 Discussion on conclusion of transmit diversity feasibility and gain LG Electronics
R1-1713533 Views on Tx diversity transmission in V2X Samsung
R1-1713884 Conclusion on diversity feasibility and gain NTT DOCOMO, INC.
R1-1713996 Conclusions on PC5 transmit diversity Nokia, Nokia Shanghai Bell

#### 5.2.3.3.4 Other

R1-1713534 Control signaling for Tx diversity transmission of PSSCH Samsung
R1-1713990 DMRS design for Rel. 15 V2X transmissions with transmit diversity Ericsson

### *5.2.3.4 Feasibility and gain of PC5 operation with Short TTI*

R1-1713033 Study of short TTI for V2X Phase 2 Qualcomm Incorporated
R1-1713370 Draft LS to RAN on PC5 operation with short TTI for 3GPP V2X Phase 2 Huawei, HiSilicon

**R1-1714933 [Draft] LS to RAN on PC5 operation with short TTI for 3GPP V2X Phase 2 Huawei, CATT**

conclusion: continue offline discussion based on following text: Ying –Wednesday, after D2D sessions

RAN1 has studied the feasibility and gain of PC5 operation with Short TTI, assuming this PC5 functionality would co-exist in the same resource pools as Rel-14 functionality. RAN1 has drawn the following observations:

Observation 1: RAN1 observes that introducing Rel-15 sTTI transmissions into pools with Rel-14 legacy transmissions, Rel-15 V2X UE complexity will be increased by handling two different TTI lengths. Some companies view the increase in complexity as significant.

Observation 2: sTTI deployment impacts the performance of Rel-14 UE transmission. RAN1 has discussed possible solutions to mitigate the impact. No conclusion was reached in RAN1 on whether these solutions can solve the impact on Rel14 performance.

Observation 3: Introducing sTTI by itself cannot reduce the radio layer latency.

Currently, there is no consensus within RAN1 on the benefits of introducing sTTI for V2X UEs based on studies conducted on RAN1 so far.

**R1-1715103 [Draft] LS to RAN on PC5 operation with short TTI for 3GPP V2X Phase 2 Huawei, CATT**

Agreed with the following changes:

- Put correct name in title of final LS
- Observation 1: RAN1 observes that when introducing
- Add the following statement after observation 3: Short TTI reduces transmission time by at most 0.5ms.

Ying to provide the final LS

**Friday:**

**R1-1715187 LS to RAN on PC5 operation with short TTI for V2X phase 2 based on LTE Huawei, CATT**

Decision: The final LS is approved in R1-1715287 with following update

RAN1 respectfully asks RAN to take the above observations into consideration. Note that latency reduction between packet arrival at layer 1 and resource selection is still ongoing

#### 5.2.3.4.1 Short TTI solutions

R1-1712099 Short TTI solutions for R15 sidelink Huawei, HiSilicon
R1-1712345 Discussion on shorten TTI in PC5 CATT
R1-1712487 Short TTI design options for LTE V2V sidelink communication Intel Corporation
R1-1712658 Short TTI for increasing the reliability for PC5-based V2X Ericsson
R1-1712930 Discussion on Short TTI for PC5 ZTE
R1-1713091 Discussion on handling PC5 operation with Short TTI LG Electronics



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R1-1713248 Discussion of sTTI in eV2X Guangdong OPPO Mobile Telecom

#### 5.2.3.4.2 Evaluation results

R1-1712100 Evaluation results of short TTI solutions for R15 sidelink Huawei, HiSilicon
R1-1712488 Performance evaluation of short-TTI LTE-V2V sidelink communication Intel Corporation
R1-1712659 Evaluation results on sTTI for PC5 Ericsson
R1-1712931 Evaluation results of sTTI ZTE
R1-1714556 Evaluation results of PC5 operation with Short TTI LG Electronics
R1-1714558 Additional SLS results for dense scenario LG Electronics
R1-1714597 Evaluations for shorten TTI in PC5 CATT

#### 5.2.3.4.3 Conclusion on short TTI feasibility and gain

R1-1712122 On further specification work for short TTI Huawei, HiSilicon
R1-1712347 Feasibility and gain of short TTI in PC5 CATT
R1-1712489 Conclusions on feasibility and gain of short TTI LTE V2V communication Intel Corporation
R1-1712660 Conclusion on sTTI for PC5 Ericsson
R1-1712932 Conclusion on short TTI feasibility and gain ZTE
R1-1713093 Discussion on conclusion of short TTI feasibility and gain LG Electronics
R1-1713535 Views on short TTI in V2X Samsung

### *5.2.3.5 Other*

*Including reduction of the maximum time between packet arrival at Layer 1 and resource selected for transmission, and radio resource pool sharing between UEs using mode 3 and UEs using mode 4.*

R1-1712348 Discussion on resource pool sharing between mode 3 and mode 4 CATT
R1-1712490 Resource selection latency reduction for LTE V2V sidelink communication Intel Corporation
R1-1712491 Sharing resource pool for eNB-controlled and UE-autonomous V2V transmission modes Intel Corporation
R1-1712661 Reducing time-to-transmit for V2X Ericsson
R1-1712662 Resource pool sharing between mode 3 and mode 4 Ues Ericsson
R1-1712933 Considerations for latency reduction ZTE
R1-1712934 Considerations for shared resource pool between mode 3 and mode 4 ZTE
R1-1712989 On dynamic offloading of traffic between modes NEC
R1-1713034 Reduction of time between packet arrival and transmisison Qualcomm Incorporated
R1-1713035 Resource pool sharing between Mode 3 and Mode 4 Qualcomm Incorporated
R1-1713094 Discussion on maximum time reduction between packet arrival and selected transmission resource LG Electronics
R1-1713095 Discussion on resource pool sharing between UEs using mode 3 and 4 LG Electronics
R1-1713247 Resource pool sharing between UEs using mode 3 and UEs using mode 4 Guangdong OPPO Mobile Telecom
R1-1713359 Discussion on resource pool sharing between Mode 3 and Mode 4 Huawei, HiSilicon
R1-1713360 Discussion on further latency reduction for R15 sidelink Huawei, HiSilicon
R1-1713536 Discussion on latency smaller than 20 Samsung
R1-1713537 Resource pool sharing among mode 3/4 UEs Samsung
R1-1713854 Discussion on resource pool sharing between UEs in mode 3 and UEs in mode 4 Panasonic
R1-1713885 Reducing the maximum time between packet arrival and selected resource for data transmission NTT DOCOMO, INC.
R1-1713886 Resource pool sharing between UEs using mode 3 and UEs using mode 4 NTT DOCOMO, INC.
R1-1714369 Considerations on resource selection latency reduction for V2X China Unicom
R1-1714370 Discussion on resource pool sharing in V2X Phase 2 China Unicom
R1-1714926 WF on reduction of maximum time between packet arrival and transmission LG Electronics, ZTE
R1-1715088 WF on resource pool sharing Samsung, ITRI

## *5.2.4* Further enhancements to CoMP Operation for LTE - *WID in RP-171031*

**R1-1715129 Chairman's notes of AI 5.2.4 Further enhancements to Coordinated Multi-Point Operation Ad-Hoc chair (Intel)**
The document was presented by Alexei Davydov of Intel.
**Decision:** The document is endorsed, and content is incorporated as below.

Email approval on the LS to RAN2/4 capturing all the agreements
Email approval on the LS to RAN2 including RRC parameters



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#### 5.2.4.1 Remaining details on QCL assumptions and PDSCH RE mapping

R1-1712123 Remaining details on QCL assumptions and PDSCH RE mapping Huawei, HiSilicon
R1-1712314 Remaining details on QCL assumptions and PDSCH RE mapping ZTE
R1-1712492 Remaining details on QCL and PDSCH RE maping Intel Corporation
R1-1712620 Discussion on enhancement to resource allocation for NC-JT ASTRI
R1-1713036 Remaining details on QCL assumptions and PDSCH RE mapping for NCJT Qualcomm Incorporated
R1-1713538 Remaining details on QCL assumptions and PDSCH RE mapping Samsung
R1-1714351 Remaining details on QCL assumptions and PDSCH RE mapping Ericsson

**R1-1714730 WF on QCL and PDSCH RE Mapping for NC-JT ZTE**

Agreement:
- PDSCH starting symbol is maximum value across PDSCH starting symbols for 1st and 2nd set

Possible agreements:
- Non-overlapping resource allocation is supported
  - RRC signalling is supported to configure independent indication of RA corresponding to 2 CWs is supported within one RA field. When it is configured,
    - The scheduling granularity is twice coarser, i.e., new RBG size is twice of the original RBG size for code points indicating NC-JT (two sets are indicated by DCI)
    - RA payload is the same
    - RA type 0 is assumed
    - QCL and PDSCH RE mapping in allocated resources corresponding to CW k is done only according to the PQI parameter set of CW k, where k=1,2
    - UE doesn't expect RAs indicating the same sets RBs

Possible agreements:
- 3 bits are supported for PQI in addition 2 bits for PQI
- 2 bits or 3 bits are RRC configured

#### 5.2.4.2 Enhancements to CSI feedback for NC-JT

R1-1712095 CSI measurement and reporting for non-coherent JT Huawei, HiSilicon
R1-1712315 Enhancements to CSI feedback ZTE
R1-1712493 CSI for NC-JT Intel Corporation
R1-1713037 Enhancement to CSI feedback for NCJT Qualcomm Incorporated
R1-1713539 Enhancements to CSI feedback for NC-JT Samsung
R1-1714352 On CSI feedback enhancements supporting non-coherent JT Ericsson

Agreements:
- UE can be configured with K = 2 NZP CSI-RS resources and one CSI-IM resource
  - Two NZP CSI-RS resources are not QCL-ed with each other according to QCL Type B assumptions
  - The number of antenna ports that can be configured for NZP CSI-RS resource are {1,2,4,8}
- CRI = 0 – CSI reporting is performed for the 1st NZP CSI-RS resource following legacy behavior of Class B FD-MIMO
- CRI = 1 – CSI reporting is performed for the 2nd NZP CSI-RS resource following legacy behavior of Class B FD-MIMO
- CRI = 2 CSI reporting is performed for both NZP CSI-RS resources
  - Two sets of CSIs (PMI/CQI/RI) are calculated within single CSI process based on K = 2 NZP CSI-RS resources. Each set of CSI corresponds to each CW
    - Combinations of reported RIs are restricted to the following sets $\{RI_1, RI_2\}$ = {1,1},{1,2},{2,1},{2,2},{2,3},{3,2}{3,3},{3,4},{4,3},{4,4}
  - The PDSCH layers ($\upsilon_1$ layers for CW1 and $\upsilon_2$ layers for CW2) to antenna port mapping (15,…,14+P1 and 15,…,14+P2 ) for corresponding CW is given by:

$$\begin{bmatrix} y_1^{(15)}(i) \\ \vdots \\ y_1^{(14+P_1)}(i) \end{bmatrix} = W_1(i) \begin{bmatrix} x_1^{(0)}(i) \\ \vdots \\ x_1^{(\upsilon_1-1)}(i) \end{bmatrix} \quad \text{for CW1}$$

$$\begin{bmatrix} y_2^{(15)}(i) \\ \vdots \\ y_2^{(14+P_2)}(i) \end{bmatrix} = W_2(i) \begin{bmatrix} x_2^{(0)}(i) \\ \vdots \\ x_2^{(\upsilon_2-1)}(i) \end{bmatrix} \quad \text{for CW2}$$



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  - where P1 and P2 are the number of NZP CSI-RS ports for the two configured CSI-RS resources. W1 and W2 are precoding matrices from legacy codebooks for CW1 and CW2.
  - CSI of one CW is calculated based on interference assumption that inter-CW interference is derived from the CSI-RS resource corresponding to other CW. Inter-CW interference is derived from channel measurement obtained from other NZP CSI-RS resource and precoding matrix according to equation above.
  - Codebook subset restrcition is configured per NZP CSI-RS resource
  - Pc is configured per NZP CSI-RS resource
- For aperiodic CSI reporting, UE reports CSI for single CRI equal to 0, 1 or 2
- For periodic CSI reporting, UE reports CSI for single CRI value equal to 0 or 1 following legacy Rel-14 behavior
- Note: it is up to spec editor how to capture the above agreement

Possible agreements:

- Alt. 1
  - UE configured with new QCL assumption for DM-RS antenna ports supports CSI process configuration that may optionally include configuration of other (reference) CSI process identity (ID)
    - If the ID of the reference CSI process is configured for a given CSI process, UE should use channel measurements obtained from NZP CSI-RS resource of the reference CSI process and reported CSI (i.e., CRI, RI, PMI and CQI) for the reference CSI process to calculate interference for a given CSI process together with interference measurements obtained on the configured CSI-IM resource
    - Only one CSI process can be configured as reference CSI process for a given serving cell
  - For aperiodic CSI reporting, UE should not expect aperiodic CSI request for CSI process configured with ID of the reference CSI process without CSI request for the reference CSI process
  - UE for CSI calculation for a given CSI process configured with ID of the reference CSI process should use CSI components of the fully reported CSI of the reference CSI process to calculate the interference for a given CSI process
- Alt. 2
  - UE configured with new QCL assumption for DM-RS antenna ports supports configuration of up to two NZP CSI-RS resources per CSI process
    - The NZP CSI-RS resources are not QCL-ed with each according to QCL Type B assumptions
    - The supported number of antenna ports per NZP CSI-RS resource is two
    - For CSI feedback that antenna ports from two NZP CSI-RS are indexed by using all antenna ports from 1st NZP CSI-RS resource followed by all antenna ports from the 2nd NZP CSI-RS resource. The antenna port order within NZP CSI-RS resource remains the same.
  - The codebook is constructed by block concatenation of all possible combinations of rank 1 and rank 2 PMIs from two port codebook for $\mathbf{W}_a$ and $\mathbf{W}_b$ as follows

$$\begin{bmatrix} \mathbf{W}_a & 0 \\ 0 & \mathbf{W}_b \end{bmatrix}, \quad i_1 = 0 \qquad \begin{bmatrix} \mathbf{W}_a \\ 0 \end{bmatrix}, \quad i_1 = 1$$

$$\begin{bmatrix} 0 \\ \mathbf{W}_b \end{bmatrix}, \quad i_1 = 2 \qquad \begin{bmatrix} 0 & \mathbf{W}_b \\ \mathbf{W}_a & 0 \end{bmatrix}, \quad i_1 = 3$$

  - $i_1$ is wideband and indicates the structure of the precoding matrix
  - $i_2$ is wideband or subband (depending on the reporting modes) and indicates precoding within the selected matrix structure
  - Codebook subset restriction is bitmap of all states of PMI and RI
  - Aperiodic CSI reporting with above codebook is supported
  - Periodic CSI reporting with above codebook is supported using Rel-13 periodic CSI reporting
- Alt. 3
  - Support configuration of at least one CSI-RS resource that may optionally include configuration of a second CSI-RS resource
    - Each DM-RS antenna port group can be QCL'd with a different CSI-RS resource
    - If the second CSI-RS resource is configured, UE should use channel measurements obtained from the two CSI-RS resources to calculate CSI together with interference measurements obtained on the configured CSI-IM resource
  - A PMI and an RI are reported for each CSI-RS resource, where RI=0 can be reported for one CSI-RS resource
    - One CQI report is produced for up to two codewords
  - Aperiodic CSI reporting contains 2 RIs and up to 2 PMIs if the second CSI-RS resource is configured
    - Otherwise, Rel-14 CSI is reported
  - Rel-14 wideband periodic CSI-reporting is supported
- Alt. 4



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- UE can be configured with K = 2 NZP CSI-RS resources and one CSI-IM resource
  - Two NZP CSI-RS resources are not QCL-ed with each other according to QCL Type B assumptions
  - The number of antenna ports that can be configured for NZP CSI-RS resource are {1,2,4,8}
- CRI = 0 – CSI reporting is performed for the 1st NZP CSI-RS resource following legacy behavior of Class B FD-MIMO
- CRI = 1 – CSI reporting is performed for the 2nd NZP CSI-RS resource following legacy behavior of Class B FD-MIMO
- CRI = 2 CSI reporting is performed for both NZP CSI-RS resources
  - Two sets of CSIs (PMI/CQI/RI) are calculated within single CSI process based on K = 2 NZP CSI-RS resources. Each set of CSI corresponds to each CW
    - Combinations of reported RIs are restricted to the following sets $\{RI_1, RI_2\}$ = {1,1},{1,2},{2,1},{2,2},{2,3},{3,2}{3,3},{3,4},{4,3},{4,4}
  - The PDSCH layers ($\upsilon_1$ layers for CW1 and $\upsilon_2$ layers for CW2) to antenna port mapping (15,…,14+P1 and 15,…,14+P2 ) for corresponding CW is given by:

$$\begin{bmatrix} y_1^{(15)}(i) \\ \vdots \\ y_1^{(14+P_1)}(i) \end{bmatrix} = W_1(i) \begin{bmatrix} x_1^{(0)}(i) \\ \vdots \\ x_1^{(\upsilon_1-1)}(i) \end{bmatrix} \quad \text{for CW1}$$

$$\begin{bmatrix} y_2^{(15)}(i) \\ \vdots \\ y_2^{(14+P_2)}(i) \end{bmatrix} = W_2(i) \begin{bmatrix} x_2^{(0)}(i) \\ \vdots \\ x_2^{(\upsilon_2-1)}(i) \end{bmatrix} \quad \text{for CW2}$$

    - where P1 and P2 are the number of NZP CSI-RS ports for the two configured CSI-RS resources. W1 and W2 are precoding matrices from legacy codebooks for CW1 and CW2.
    - CSI of one CW is calculated based on interference assumption that inter-CW interference is derived from the CSI-RS resource corresponding to another CW. Inter-CW interference for CRI = 2 is derived from channel measurement obtained from other NZP CSI-RS resource and precoding matrix according to equation above.
    - Codebook subset restrcition is configured per NZP CSI-RS resource
    - Pc is configured per NZP CSI-RS resource
- For aperiodic CSI reporting, UE reports CSI for CRI = 0, 1 or 2
- For periodic CSI reporting, UE reports CSI for CRI = 0 or CRI = 1 following legacy Rel-14 behavior
- Note: it is up to spec editor how to capture the above agreement

#### 5.2.4.3 Other enhancements for NC-JT

*Including resource allocation, DMRS port to layer mapping, support of TM9, etc.*

| | | |
|---|---|---|
| R1-1712093 | Discussion on TM9 for non-coherent JT | Huawei, HiSilicon |
| R1-1712094 | DMRS port to layer mapping and resource allocation for non-coherent JT | Huawei, HiSilicon |
| R1-1712316 | Other enhancements for NC-JT | ZTE |
| R1-1712494 | On other enhancements for NC-JT | Intel Corporation |
| R1-1713038 | Other enhancements for NCJT | Qualcomm Incorporated |
| R1-1713540 | On the support of NC-JT for TM9 | Samsung |
| R1-1714353 | On DMRS port to layer mapping for NC-JT | Ericsson |
| R1-1714354 | On feCoMP support for TM9 | Ericsson |

**R1-1714679 WF on DMRS port to layer mapping for NC-JT Ericsson, Huawei, HiSilicon, Intel**

Agreements:

- When UE is indicated with PQI containing two sets of QCL and RE mapping parameters and multiple CW transmission, the following DMRS port to layer mapping is used
  - Note: This implies that layers corresponding to different CWs are mapped to FDMed DMRS ports for rank 3-8. Rank-2 port mapping is the same as legacy to maintain DMRS overhead.



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| Rank | DMRS-to-layer mapping | |
|---|---|---|
| | DMRS group 1 (CW1) | DMRS group 2 (CW2) |
| 1 | N/A | |
| 2 | 7 | 8 |
| 3 | 7 | 9,10 |
| 4 | 7,8 | 9,10 |
| 5 | 7,8 | 9,10,12 |
| 6 | 7,8,11 | 9,10,12 |
| 7 | 7,8,11 | 9,10,12,14 |
| 8 | 7,8,11,13 | 9,10,12,14 |

- Note: For Rank 1 DM-RS ports 7 is used

**R1-1714742 WF on NC-JT support for TM9 Intel Corporation**
Also supported by Softbank

Possible agreements:
- New QCL assumption for DM-RS antenna ports and association with CWs is also supported in TM9
  - Two NZP CSI-RS resources can be configured for the UE
    - NZP CSI-RS resources are not QCL-ed with each other
    - 1st NZP CSI-RS resource is QCL-ed with serving cell CRS wrt to all parameters
    - 2nd NZP CSI-RS resource is QCL-ed with serving cell CRS wrt to Doppler shift and Doppler spread
  - Two PDSCH RE mapping sets
    - 1st PDSCH RE mapping set around serving cell CRS
    - 2nd PDSCH RE mapping set
      - REs corresponding to 1st CW around serving cell CRS
      - RE corresponding to 2nd CW (if present) around CRS
  - 1 bit field is introduced in DCI Format 2C in TM9 to switch between two QCL assumptions for DM-RS antenna ports and two PDSCH RE mapping sets
    - All DM-RS antenna ports are QCL-ed with each other and antenna port of NZP CSI-RS resource QCL-ed with CRS of the serving cell wrt to all parameters. PDSCH RE around according to 1st PDSCH RE mapping set.
    - DM-RS antenna ports associated with 1st CW are QCL-ed with antenna ports of the 1st NZP CSI-RS resource and DM-RS antenna ports associated with 2nd CW (if present) are QCL-ed with antenna ports of the 2nd NZP CSI-RS resource. PDSCH RE mapping according to 2nd PDSCH RE mapping set

### 5.2.5 Enhancements for high capacity stationary wireless link and introduction of 1024 QAM for LTE - *WID in RP-171067*

**R1-1715130 Chairman's notes of AI 5.2.5 Enhancements for high capacity stationary wireless link and introduction of 1024 QAM for LTE Ad-Hoc chair (Huawei)**
The document was presented by Weimin Xiao of Huawei.
**Decision:** The document is endorsed, and content is updated and incorporated as below.

**Friday**
**R1-1712798 Updated TR for 1024QAM Qualcomm Incorporated**
Decision: The TR is endorsed.

#### 5.2.5.1 *Support for 1024QAM for DL channels*

*Including at least the study and conclusion of the feasibility and performance benefit for 1024QAM for DL channels*

**R1-1712495 Performance of 1024QAM Intel Corporation**
**R1-1713357 Evaluation on DL 1024 QAM Huawei, HiSilicon**
**R1-1714821 TP on summary of evaluation for DL 1024 QAM Huawei, HiSilicon**
**R1-1714741 WF on system level evaluations 1024QAM Intel**

**R1-1714779 WF on support of 1024QAM Qualcomm, Huawei, HiSilicon, Ericsson, Dish, AT&T, T-Mobile USA, KDDI, China Telecom, Deutsche Telekom, NTT DOCOMO**
Also supported by ZTE
Proposal:
- Specify 1024QAM for PDSCH in Rel-15.


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Objected by Intel as they think the study is not complete since it does not include system level study and not all aspect of RAN4 LS
Revisit in main session this week.

**Friday**
**R1-1715104 WF on system level evaluations 1024QAM Intel, Samsung, MediaTek**
- The study of 1024QAM in terms of feasibility and benefit to create TR shall include system level evaluation results taking into account practical impairments (Tx/Rx EVMs, additional power backoff, etc) and realistic interference modelling from other TPs (e.g. CRS interference).
  - The SLS assumptions in R1-1715104 for 1024QAM evaluations are used.

**Discussion:** Qualcomm: cannot delay anymore the completion of the WI
**Decision:** The document is noted.

**R1-1715220 WF on support of 1024QAM Qualcomm, Huawei, HiSilicon, Ericsson, Dish, AT&T, T-Mobile USA, KDDI, China Telecom, Deutsche Telekom, NTT DOCOMO, ZTE, Telstra, Nokia, Nokia Shanghai Bell, Sierra Wireless**
**Decision:** The document (revision of R1-1714779) is noted.

Further to offline discussions:
**R1-1715291 WF on support of 1024QAM Qualcomm, Huawei, HiSilicon**
Agreements:
- Followings are conclusions of TR
  - RAN1 has observed different degrees of performance improvement due to support of 1024QAM in some scenarios based on link level evaluations.
  - RAN1 has not conducted system level simulation and thus did not confirm the benefits of 1024QAM on system level.
  - RAN1 has concluded that 1024QAM is beneficial to achieve higher peak data rates than 256QAM and recommends to specify 1024QAM at least for some types of UEs (e.g. CPE)

Email approval of TR until 31st August – Alberto (Qualcomm)

R1-1713226 Evaluation results for 1024QAM ZTE
R1-1712796 Conclusion for 1024QAM evaluation results Qualcomm Incorporated
R1-1712091 Discussion on support of DL 1024QAM Huawei, HiSilicon
R1-1713227 CQI and MCS table design for 1024QAM ZTE

#### *5.2.5.2 DMRS overhead reduction*

*Including at least further details of design considerations for DM-RS overhead reduction using OCC4 for DL SU-MIMO rank3/4 in TM9/10*

**R1-1714744 WF on DMRS density reduction Huawei, HiSilicon, Qualcomm, Ericsson, Nokia, NSB, China Telecom**

Agreements:
- Introduce new entries, i.e., 3/4-layer(port 7, 8 and 11 for 3 layers, port 7,8,11 and 13 for 4 layers) OCC=4 for two enable CWs, to existing 4-bit DMRS table
  - FFS: Support OCC4 for rank 3 and 4 in one enabled CW case

R1-1713228 Design of Further DMRS Overhead Reduction Scheme ZTE
R1-1713979 DL DM-RS overhead reduction Nokia, Nokia Shanghai Bell
R1-1712092 Discussion on DM-RS Overhead Reduction Huawei, HiSilicon
R1-1712496 DM-RS overhead reduction Intel Corporation
R1-1712797 Reduced DMRS overhead Qualcomm Incorporated
R1-1714126 Discussion on DM-RS overhead reduction China Telecommunications
R1-1714355 On further details for DMRS overhead reduction Ericsson

#### *5.2.5.3 Other*

R1-1712497 System level evaluation assumptions for 1024QAM Intel Corporation

### *5.2.6* Even further enhanced MTC for LTE - *WID in RP-171427*

**R1-1715131 Chairman's notes of AI 5.2.6 Even further Enhanced MTC for LTE Ad-Hoc chair (Ericsson)**
The document was presented by Johan Bergman of Ericsson.



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**Decision:** The document is endorsed, and content is incorporated as below.

#### 5.2.6.1 Reduced system acquisition time

*Improved cell search and/or system information (including MIB and SIB1-BR) acquisition performance*

| | | |
|---|---|---|
| R1-1712105 | Cell search and system information acquisition improvements in eFeMTC | Huawei, HiSilicon |
| R1-1712799 | Reduced system acquisition time | Qualcomm Incorporated |
| R1-1712955 | On reduced system acquisition time for efeMTC | Sony |
| R1-1712983 | Reduced system acquisition time for MTC | Ericsson |
| R1-1713006 | Discussion on system acquisition time reduction for MTC | ZTE |
| R1-1713096 | System information acquisition time enhancement in MTC | LG Electronics |
| R1-1713541 | ePSS/eSSS to reduce acquisition time | Samsung |
| R1-1713721 | Reducing system acquisition time for efeMTC | Nokia, Nokia Shanghai Bell |
| R1-1714107 | Reduced Acquisition Time Analysis | Sierra Wireless, S.A. |
| R1-1714120 | System acquisition time reduction for efeMTC | Intel Corporation |

| | | |
|---|---|---|
| R1-1714796 | WF on reducing system acquisition time | Ericsson |
| R1-1714915 | WF on reducing system acquisition time | Huawei, HiSilicon |

#### 5.2.6.2 Downlink channel power efficiency

*Study and, if found beneficial for idle mode paging and/or connected mode DRX, specify physical signal/channel that can be efficiently decoded or detected prior to decoding the physical downlink control/data channel.*

**R1-1714693 WF on Power Saving Signal Sony, Ericsson, Sierra Wireless, ZTE, Huawei, HiSilicon, u-blox, Intel, Nokia, NSB, Sharp, NTT DoCoMo**

Working assumption:

- For idle mode,
  - In specifying a power saving physical signal to indicate whether the UE needs to decode subsequent physical channel(s) for idle mode paging, select a candidate among the following power saving physical signals:
    - Wake-up signal or DTX
    - Wake-up signal with no DTX
  - FFS:
    - Information conveyed by the physical signal
    - Design of the physical signal

**R1-1714731 WF on power saving physical channel LG Electronics, ZTE, Sanechips**

**R1-1714739 Way Forward efeMTC DL Channel Power Efficiency Evaluation Assumptions Ericsson, Sony, Sierra Wireless, Samsung**

Proposal:

- Performance figures should be compared to the reference case of Rel-13 MPDCCH decoding for a similar scenario.
- In addition to previously agreed assumptions (R1-1706704), the following parameters should be used for assessing WUS/GTS+MPDCCH decoding costs:

| **Scenario** | **A** | **B** | **C** |
|---|---|---|---|
| **eDRX cycle [s]** | 5.12 | 40.96 | 1310.72 |
| **DRX cycle [s]** | 0.32 | 0.32 | 0.32 |
| **#POs/PTW** | 1 | 2 | 4 |
| **Timing drift [ms]** | 0 | ±0.042 | ±6.3 |
| **Paging rate [%]** | 10 | 10 | 10 |

- SIBs are assumed to be valid throughout the assessment.
- Erroneous detections:
  - WUS misdetection rate <1%
  - WUS false alarm impact (for up to ±[5] ppm frequency errors when not relying on DL synchronization) should be included in power consumption evaluation result.



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  - WUS false alarm impact from other DL transmission should be included in power consumption evaluation result.
  - The above cases should be evaluated for both AWGN and ETU 1.
- The following should be described:
  - Information conveyed by the physical signal
  - Design of the physical signal
- Impacts from RRM mobility measurements are FFS.

It is proposed to discuss the above proposal for LTE-MTC and the corresponding proposal for NB-IoT (AI 5.2.7.1.1) in a joint email discussion (Magnus, Ericsson).

Not treated.

| | | |
|---|---|---|
| R1-1712106 | On power-saving signal for eFeMTC | Huawei, HiSilicon |
| R1-1712498 | Wake-up signal for efeMTC | Intel Corporation |
| R1-1712800 | Efficient monitoring of DL control channels | Qualcomm Incorporated |
| R1-1712984 | Downlink channel power efficiency for MTC | Ericsson |
| R1-1713014 | Power consumption reduction for physical channels for eMTC | ZTE |
| R1-1713097 | Discussion on wake up singal and wake up channel for eMTC | LG Electronics |
| R1-1713256 | Considerations on the DL power consumption reduction for efeMTC | Guangdong OPPO Mobile Telecom |
| R1-1713542 | DL power consumption reduction for eMTC | Samsung |
| R1-1713722 | Signalling for efficient decoding of physical channels | Nokia, Nokia Shanghai Bell |
| R1-1714106 | Idle Mode Power Efficiency Reduction | Sierra Wireless, S.A. |
| R1-1714576 | Wake up signalling for efeMTC | Sony |
| R1-1715055 | WF on the principle of power saving signal | Huawei |

#### 5.2.6.3 Uplink HARQ-ACK feedback

*Study and, if found beneficial for connected mode, specify physical signal/channel/DCI for HARQ-ACK feedback in DL for data transmission in UL.*

| | | |
|---|---|---|
| R1-1712107 | On HARQ-ACK feedback for PUSCH in eFeMTC | Huawei, HiSilicon |
| R1-1712499 | HARQ-ACK feedback for efeMTC UL transmission | Intel Corporation |
| R1-1712673 | Design of uplink HARQ-ACK and early termination signal | Lenovo, Motorola Mobility |
| R1-1712801 | Uplink HARQ-ACK feedback | Qualcomm Incorporated |
| R1-1712957 | On Uplink HARQ-ACK feedback for efeMTC | Sony |
| R1-1712985 | Uplink HARQ-ACK feedback for MTC | Ericsson |
| R1-1713007 | Evaluation and UL HARQ-ACK feedback enhancement for MTC | ZTE |
| R1-1713098 | Discussion on early termination of uplink repetitions for MTC | LG Electronics |
| R1-1713257 | Discussion on UL HARQ-ACK feedback | Guangdong OPPO Mobile Telecom |
| R1-1713543 | Uplink HARQ-ACK feedback for eMTC | Samsung |
| R1-1713723 | Uplink HARQ-ACK feedback in efeMTC | Nokia, Nokia Shanghai Bell |
| R1-1713887 | Views on UL HARQ-ACK feedback design | NTT DOCOMO, INC. |

**R1-1714747 WF on UL HARQ-ACK feedback enhancement ZTE, Huawei, HiSilicon, Intel, Ericsson, Lenovo, Motorola Mobility**
Also supported by Nokia and NSB

Agreement:

- Explicit HARQ-ACK feedback is supported for the following purpose(s):
  - Early termination of MPDCCH monitoring before going to sleep (details up to RAN2)
  - FFS: Early termination of PUSCH transmission at least in FD-FDD and TDD
- The introduction of explicit HARQ-ACK feedback shall not increase the maximum number of MPDCCH blind decoding attempts.

Draft LS to RAN2 in R1-1714797 (Huiying, ZTE) capturing the above agreements.
**Friday:**
**R1-1714797 [DRAFT] LS on UL HARQ-ACK feedback for Rel-15 LTE efeMTC ZTE**
**Decision:** The final LS is approved in R1-1715299.

#### 5.2.6.4 Increased PDSCH spectral efficiency

*Specify optional support for 64QAM for unicast PDSCH (no UE peak rate increase is intended).*



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R1-1712986 Increased PDSCH spectral efficiency for MTC Ericsson
R1-1713724 Remaining issue on supporting DL 64QAM for efeMTC Nokia, Nokia Shanghai Bell
**R1-1712802 Increased PDSCH spectral efficiency Qualcomm Incorporated**

Agreement:
- The working assumption from RAN1#89 on the CQI table with DL 64QAM is confirmed.

Proposal:
- When the UE is configured with DL 64QAM and R_CSI > 1, and for CQI calculations, the UE uses the agreed 64QAM CQI table, but assumes R_CSI = 1 for the entries corresponding to 64QAM.

It is proposed to have an email discussion on the above proposal (Alberto, Qualcomm).

**Friday:** Email discussion until 6th of Sep. about 64QAM CQI table – Alberto (Qualcomm)

#### 5.2.6.5 *Increased PUSCH spectral efficiency*

*E.g. sub-PRB resource allocation, with no less than 3 subcarriers within a sub-PRB allocation*

R1-1712108 On PUSCH spectral efficiency enhancement Huawei, HiSilicon
R1-1712500 PUSCH spectral efficiency enhancement for efeMTC Intel Corporation
R1-1712803 Increased PUSCH spectral efficiency Qualcomm Incorporated
R1-1712958 PUSCH spectral efficiency techniques for efeMTC Sony
R1-1712987 Increased PUSCH spectral efficiency for MTC Ericsson
R1-1713008 PUSCH spectral efficiency improvement for MTC ZTE
R1-1713323 Increased PUSCH spectral efficiency for efeMTC Sharp
R1-1713725 Increasing PUSCH spectral efficiency in efeMTC Nokia, Nokia Shanghai Bell
R1-1714108 PUSCH Spectral Efficiency Solution Analysis Sierra Wireless, S.A.
R1-1714358 Considerations on improving PUSCH spectral efficiency China Telecommunications

**R1-1714795 WF on UL Spectral Efficiency for eFeMTC Sierra Wireless, Ericsson, Sony, AT&T, Verizon, Qualcomm, Intel, Nokia, Nokia Shanghai Bell, ZTE, Nubia, Virtuosys, Sharp, Orange, NTT DOCOMO, KT Corp, SK Telecom, Interdigital, Sequans**
Proposal (Gus, Sierra Wireless):
- Sub-PRB allocation method shall be specified.
  - Working assumption: at least a 3-subcarrier allocation shall be specified at least for FDD.
    - The number of tones for TDD is FFS.
  - FFS if TTI expansion method used by NB-IoT shall be specified.

Further revised in R1-1715228.

**Friday:**
Agreement: Sub-PRB allocation method shall be specified.

#### 5.2.6.6 *Other*

*Note that data transmission during the random access procedure will be treated with lower priority in RAN1 until RAN2 has achieved sufficient progress*
R1-1712804 Early data transmission Qualcomm Incorporated
R1-1713099 Data transmission during random access procedure in MTC LG Electronics
R1-1713320 On early data transmission for eMTC ZTE
R1-1713361 On early data transmission for eFeMTC Huawei, HiSilicon
R1-1713726 Data transmission during random access procedure Nokia, Nokia Shanghai Bell
R1-1714105 Early Data Transmission Analysis Sierra Wireless, S.A.

R1-1712805 Modulation enhancements for eMTC Qualcomm Incorporated
R1-1712988 Flexible PDSCH/PUSCH resource allocation for MTC Ericsson

### 5.2.7 Further enhancements of NB-IoT - *WID in RP-171428*

**R1-1715132 Chairman's notes of AI 5.2.7 Further enhancements of NB-IoT Ad-Hoc chair (Huawei)**
The document was presented by Matthew Webb of Huawei.
**Decision:** The document is endorsed, and content is incorporated as below.

#### 5.2.7.1 *Latency and power consumption reduction*

*Where solutions are specified, draft CRs to be provided to RAN#78*



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#### 5.2.7.1.1 Power consumption reduction for paging and connected-mode DRX

*Physical signal/channel that can be efficiently decoded or detected prior to decoding NPDCCH/NPDSCH.*

**R1-1713829 Discussion on Light Paging CMCC**

**R1-1714937 WF on power saving signal in NB-IoT Huawei, HiSilicon**

Working assumption:

- For idle mode,
  - In specifying a power saving physical signal to indicate whether the UE needs to decode subsequent physical channel(s) for idle mode paging, select a candidate among the following power saving physical signals:
    - Wake-up signal or DTX
    - Wake-up signal with no DTX
  - FFS:
    - Information conveyed by the physical signal
    - Design of the physical signal
    - Resources which can be used for the physical signal, considering scheduling flexibility, overhead, etc.

**R1-1714960 WF on principles of power saving physical signal/channel LG**

Agreements:

- For idle mode,
  - The power saving signal in a cell supports being applied to FFS between:
    - All the UEs associated to a PO in the cell
    - A group of more than one of the UEs associated to a PO in the cell
    - Both (a) and (b)
  - How many POs the power saving signal applies to from the UE perspective is FFS between
    - A single PO only
    - One or more than one PO (details are FFS)
  - How many POs the power saving signal applies to from the eNB perspective is FFS between
    - A single PO only
    - One or more than one PO (details are FFS)
  - The power saving signal applicable to a UE is sent on the same paging carrier as the associated subsequent physical channel(s)

**R1-1714806 Way Forward FeNB-IoT DL Channel Power Efficiency Evalulation Assumptions Ericsson**
Revision of R1-1714610 Way Forward FeNB-IoT DL Channel Power Efficiency Evalulation Assumptions Ericsson

Email discussion to agree simulation assumptions for NB-IoT and eMTC power consumption evaluation of power saving signal/channel until September 4th (Magnus, Ericsson)

Not treated.

R1-1712113 Consideration and evaluation on power saving signal in NB-IoT Huawei, HiSilicon
R1-1712501 Wake-up signal for feNB-IoT Intel Corporation
R1-1712621 Power consumption reduction for paging and connected-mode DRX for NB-IoT Ericsson
R1-1712806 Efficient monitoring of DL control channels Qualcomm Incorporated
R1-1713015 Power consumption reduction for physical channels for NB-IoT ZTE
R1-1713100 Discussion on wake up singal and wake up channel for NB-IoT LG Electronics
R1-1713258 Considerations on the DL power consumption reduction for feNB-IoT Guangdong OPPO Mobile Telecom
R1-1713544 Power saving for for paging and connected-mode DRX for NB-IoT Samsung
R1-1713789 Signalling for efficient decoding of physical channels Nokia, Nokia Shanghai Bell
R1-1714178 Discussion on wake-up signal for power consumption reduction for feNB-IoT Sequans Communications

#### 5.2.7.1.2 Physical layer scheduling request

R1-1712114 On physical layer SR Huawei, HiSilicon
R1-1712502 Scheduling request for feNB-IoT Intel Corporation
R1-1712622 Physical layer scheduling request for NB-IoT Ericsson
R1-1712807 Physical layer scheduling request Qualcomm Incorporated
R1-1713009 Physical layer scheduling request design for NB-IoT ZTE
R1-1713101 Scheduling request for NB-IoT LG Electronics
R1-1713545 Discussion on scheduling request for NB IoT Samsung



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R1-1713790 Design of physical layer SR Nokia, Nokia Shanghai Bell
R1-1713888 Discussion on SR transmission for NB-IoT NTT DOCOMO, INC.

**R1-1714758 WF on physical layer SR in NB-IoT Huawei, HiSilicon, NTT DOCOMO, Nokia, ZTE, Sanechips**
Also supported by: NSB
Revision of R1-1714936 WF on physical layer SR in NB-IoT Huawei, HiSilicon

**R1-1714611 WF on dedicated Physical layer scheduling request for NB-IoT Ericsson**
**R1-1714759 WF on Piggybacked SR Qualcomm**
Further revised in R1-1715229.

#### 5.2.7.1.3 Semi-persistent scheduling and data transmission during the random access procedure

*Until RAN2 has achieved sufficient progress, companies are encouraged to identify what the physical layer aspects are which need to be considered in the evaluation and design, including e.g. SPS NPDCCH monitoring changes, and Msg3 TBS range.*

SPS
R1-1713319 Considerations on SPS in NB-IoT ZTE
R1-1713791 Support for semi-persistent scheduling in NB-IoT Nokia, Nokia Shanghai Bell
R1-1713546 New SPS mechanism for power saving Samsung
R1-1712808 Early data transmission and SPS Qualcomm Incorporated
Section 6
R1-1712115 On support of semi-persistent scheduling Huawei, HiSilicon
R1-1712503 Semi-persistent scheduling for feNB-IoT Intel Corporation
R1-1712623 Semi-persistent scheduling for NB-IoT Ericsson
R1-1713102 SPS support in NB-IoT LG Electronics

**R1-1714756 WF on SPS for NB-IoT Samsung**
Also supported by: Nokia, NSB

Agreement:
- If SPS is supported in NB-IoT, at least the following physical layer aspects need to be further studied, considering the objective to reduce UE power consumption:
  - DCI format(s), size(s), and purpose(s)
  - Reduction of NPDCCH monitoring occasions
  - Retransmission scheme(s) for UL and DL.
  - Activation/release mechanism(s)
  - Issues between SPS and dynamic scheduling
  - What baseline should be used to compare SPS to

Data during RACH procedure
R1-1712624 Data transmission during random access procedure for NB-IoT Ericsson
R1-1713803 Data transmission during random access procedure Nokia, Nokia Shanghai Bell
R1-1713321 On early data transmission for NB-IoT ZTE
R1-1713363 On early data transmission for NB-IoT Huawei, HiSilicon
R1-1712808 Early data transmission and SPS Qualcomm Incorporated
Sections 2-5
R1-1713103 Data transmission during random access procedure in NB-IoT LG Electronics
R1-1714612 WF on Data transmission during random access procedure for NB-IoT Ericsson

### *5.2.7.2 Narrowband measurement accuracy improvements*

**Friday**
**R1-1715289 Way forward on narrowband measurement accuracy enhancement Huawei, HiSilicon, Ericsson, LGE, Intel, Nokia, NSB**

Working assumption, confirmation depending on RAN4 feedback:
- The ratio of NSSS EPRE to NRS EPRE is configured from {-3, 0, 3, spare} dB.
- Send LS to RAN4 (cc RAN2) to inform the above, and request feedback on the above working assumption.

**R1-1715281 [Draft] LS on narrowband measurement accuracy enhancement Huawei**
**Decision:** The final LS is approved in R1-1715300


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R1-1712116 Further consideration on narrowband measurement accuracy improvement Huawei, HiSilicon, Neul
R1-1712625 Narrowband measurement accuracy improvements for NB-IoTEricsson
R1-1714853 Improvement of PHY measurements Qualcomm Incorporated
R1-1713104 RRM measurement enhancement in NB-IoT LG Electronics
R1-1713792 Improving measurement accuracy in NB-IoT Nokia, Nokia Shanghai Bell
R1-1714613 WF on Narrowband measurement accuracy improvements for NB-IoT Ericsson
R1-1714961 WF on CRS-aided measurement accuracy improvement LG Electronics, Qualcomm

#### 5.2.7.3 NPRACH false alarm and cell range enhancements

R1-1712117 On support of larger cell radius for NPRACH Huawei, HiSilicon
R1-1712118 On NPRACH false alarm probability due to inter-cell interference Huawei, HiSilicon
R1-1712626 NPRACH false alarm reduction for NB-IoT Ericsson
R1-1712627 NPRACH range enhancements for NB-IoT Ericsson
R1-1712810 NPRACH support for large cell access Qualcomm Incorporated
R1-1712811 NPRACH Reliability Ehnancement Qualcomm Incorporated
R1-1713016 NPRACH reliability enhancement for NB-IoT ZTE
R1-1713019 NPRACH range enhancement ZTE
R1-1713105 Preamble structure for NPRACH enhancement LG Electronics
R1-1713106 Resource configuration for NPRACH enhancement LG Electronics
R1-1713547 False alarm reduction and cell range enhancment for NPRACH Samsung
R1-1713793 NPRACH enhancements for NB-IoT Nokia, Nokia Shanghai Bell
R1-1714751 WF on further details of Cat. 3 solution for NPRACH cell range enhancement Huawei, HiSilicon
R1-1715024 WF on Guard time for NPRACH range enhancement LG

**R1-1714948 WF on NPRACH reliability enhancement ZTE, Ericsson,Samsung,Sanechips**
Also supported by: Nokia, NSB, LG

**Possible conclusion**

- Regarding NPRACH false alarm rate reduction and cell range extension, companies are encouraged to explain the potential impacts of the agreed categories/alternatives on implementations.

#### 5.2.7.4 NB-IoT small cell support

R1-1712628 NB-IoT small cell support Ericsson
R1-1712812 Support of small cells Qualcomm Incorporated
R1-1713020 On small cell support for NB-IoT ZTE
R1-1713107 UL power control enhancement for NB-IoT small cell LG Electronics
R1-1713362 On the support of NB-IoT small cell Huawei, HiSilicon
R1-1713548 Power control for extended coverage UE Samsung
R1-1713794 Small cell support in NB-IoT Nokia, Nokia Shanghai Bell
R1-1714614 Way forward on UL power control in NB-IoT small cell support Ericsson, Samsung

#### 5.2.7.5 Reduced system acquisition time

*Where solutions are specified, draft CRs to be provided to RAN#78*

**R1-1712119 On NB-IoT synchronization time reduction Huawei, HiSilicon, Neul**
**R1-1713108 System information acquisition time enhancement in NB-IoT LG Electronics**
**R1-1712629 Reduced system acquisition time for NB-IoT Ericsson**
**R1-1713795 Reducing system acquisition time for feNB-IoT Nokia, Nokia Shanghai Bell**
R1-1712813 Reduced system acquisition time Qualcomm Incorporated
R1-1713010 Consideration on system acquisition time reduction for NB-IoT ZTE
R1-1714121 System acquisition time reduction for feNB-IoT Intel Corporation

**R1-1714749 WF on enhancement of MIB-NB acquisition time in NB-IoT Huawei, HiSilicon, Ericsson**

Agreements:

- For enhancement of MIB-NB acquisition time, the following candidates are considered:
  - Options 1: Using the unused 3-OFDM symbols in subframe#0 on the anchor carrier in standalone and guard-band operation modes
  - Options 2: Introducing additional subframe(s) for NPBCH transmission, FFS if there is a possible restriction to non-anchor carriers
  - Option 3: Enhanced MIB-NB decoding techniques, e.g. combining the NPBCH across several MIB-NB TTIs.



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**R1-1714750 WF on enhancement of SIB1-NB acquisition time in NB-IoT Huawei, HiSilicon, LGE**

Agreement:

- At least the following issues are FFS regarding whether to introduce support for the network to optionally transmit additional repetitions(s) of SIB1-NB, in subframe(s) other than R13 existing SIB1-NB transmission subframes:
  - The position of the subframe(s) for additional Rel-13 SIB1-NB repetitions
  - The scrambling on the new additional repetitions of SIB1
  - The pattern of mapping to resource elements for the additional repetition(s) (e.g., order of coded bits-to-subframe allocation)
  - If a SIB1-NB with additional subframe(s) can be transmitted on a non-anchor
  - How the UE determines if the additional subframe(s) are being transmitted
  - The number of additional subframe(s)
  - How to handle correct understanding of NPDCCH/NPDSCH transmission for legacy NB-IoT UEs.

**R1-1714615 WF on enhanced NPBCH decoder to reduced system acquisition time for NB-IoT Ericsson**

#### *5.2.7.6 TDD*

R1-1713322 On support of positioning for TDD NB-IoT ZTE
R1-1714182 OTDOA for TDD NB-IoT SoftBank, CEWiT, Huawei, HiSilicon, IITH, IITM, KDDI, Nokia, Nokia Shanghai Bell, Reliance Jio, Sprint, Tejas Networks, ZTE

##### 5.2.7.6.1 Downlink aspects

*E.g. DL frame structure, NPSS/NSSS/NPBCH, etc.*

General DL
R1-1712630 On the DL of NB-IoT TDD Ericsson
R1-1712814 Downlink aspects of TDD Qualcomm Incorporated
R1-1713365 On downlink TDD NB-IoT Huawei, HiSilicon
R1-1713011 Considerations on downlink aspects to support TDD NB-IoT ZTE
Sections 2.3, 2.4, 2.5

Focused on synchronization design
R1-1712504 Design of synchronization signals and system information for TDD support in feNB-IoT Intel Corporation
R1-1713727 NB-IoT TDD DL NPSS/NSSS IITH
R1-1713109 Discussion on TDD for NB-IoT in downlink aspects LG Electronics
R1-1712674 TDD downlink aspect for FeNBIoT Lenovo, Motorola Mobility
R1-1713549 Discussion on DL common channel/signal for TDD NB-IoT Samsung
R1-1713797 Downlink aspects of TDD support in NB-IoT Nokia, Nokia Shanghai Bell

**R1-1714725 Way forward on NPSS and NSSS in TDD NB-IoT Huawei, HiSilicon**

Agreements:

- We will position NPSS and NSSS and NPBCH in subframes from among the set: {0, 4, 5, 8, 9} – FFS which precise subframes.
  - If NPSS and NSSS are the same as FDD:
    - The combination of {NPSS in subframe #5 and NSSS in subframe #9} is a precluded option.
  - Subframes 0 and 5 will certainly be used

**R1-1714757 [draft] WF on NB-IoT TDD Reliance Jio, IITH, CEWiT, IITM**

Agreements:

- NPSS uses
  - The last 11 OFDM symbols in one subframe
  - As a working assumption: the lower 11 subcarriers in one subframe
  - As a working assumption: the same cover code as in FDD
- The design shall be decodable within the same signal processing effort as the design used for FDD
- RAN1 intends to prefer NPSS designs for TDD with the smallest practicable impact to FDD NB-IoT UEs' initial cell acquisition



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**R1-1714746 WF on System information transmission for TDD NB-IoT ZTE, Ericsson, Lenovo, Motorola Mobility**

Agreements:

- The transmission of SIB1-NB is FFS between:
  - Always on the same NB-IoT carrier as NPSS/NSSS
  - Always on a different NB-IoT carrier as NPSS/NSSS
  - Can be on a different NB-IoT carrier as NPSS/NSSS
- Other SIBs than SIB1-NB can be transmitted on non-anchor carrier

**R1-1714724 Way forward on NPBCH in TDD NB-IoT Huawei, HiSilicon**

**Friday:**
**R1-1715242 [Draft]LS on TDD NB-IoT Huawei**
Decision: The final LS is approved in R1-1715301.

#### 5.2.7.6.2 Uplink aspects

*E.g. UL frame structure, NPRACH, etc.*

Focus on NPUSCH
R1-1712631 On the UL of NB-IoT TDD Ericsson
Section 3.1.1
R1-1713798 Uplink aspects of TDD support in NB-IoT Nokia, Nokia Shanghai Bell
Section 3
R1-1712815 Uplink aspects of TDD Qualcomm Incorporated
Section 2.2
R1-1713110 Discussion on TDD for NB-IoT in uplink aspects LG Electronics
Section 2.2
R1-1713550 Discussion on UL channel for TDD NB-IoT Samsung
Section 3
R1-1713324 Overview of UL TDD NB-IoT Sharp
Sections 2.1, 2.2
Focus on NPRACH
R1-1713779 NB-IoT TDD NPRACH IITH
R1-1713012 Considerations on uplink aspects to support TDD NB-IoT ZTE
Section 2
R1-1713366 On uplink TDD NB-IoT Huawei, HiSilicon
Section 2
R1-1714122 Design of NPRACH for TDD support in feNB-IoT Intel Corporation
R1-1713550 Discussion on UL channel for TDD NB-IoT Samsung
Section 2
R1-1713798 Uplink aspects of TDD support in NB-IoT Nokia, Nokia Shanghai Bell
Section 2
R1-1712815 Uplink aspects of TDD Qualcomm Incorporated
Section 2.3
R1-1712631 On the UL of NB-IoT TDD Ericsson
Section 3.1.2
R1-1713110 Discussion on TDD for NB-IoT in uplink aspects LG Electronics
Section 2.3

**R1-1714753 WF on NPRACH for NB-IoT TDD Samsung**

Agreements:

- NPRACH for TDD supports single-tone with frequency hopping
  - Multi-tone NPRACH formats can also be considered
  - FFS details of frequency hopping
- One symbol group is defined by one CP, and N symbols.
  - FFS the value(s) of N
  - FFS CP durations, symbol duration
- A preamble is defined by P symbol groups
- FFS: Guard time usage
- Repetition of NPRACH preamble is supported



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- The cell radius target for TDD NPRACH is FFS

R1-1714617 Way Forward on considerations for NPUSCH in NB-IoT TDDEricsson

#### 5.2.7.6.3 Common aspects

*E.g. Relaxations of MCL, latency, capacity targets; UL:DL configurations, special subframe, HARQ, etc.*

**R1-1713780 NB-IoT TDD Common aspects IITH**
**R1-1713013 Considerations on common aspects to support TDD NB-IoT ZTE**
**R1-1713799 Common Aspects of NB-IoT TDD Operation Nokia, Nokia Shanghai Bell**
**R1-1712632 On the other aspects of TDD for NB-IoT Ericsson**

Agreement

- Send a LS to the RAN4 to:
  - Ask what is the minimum time for DL-to-UL and UL-to-DL switching on one NB-IoT carrier for TDD NB-IoT UEs.
  - Prepare draft LS in R1-1714758 (Yutao, Ericsson)

**Friday**
**R1-1715302 [DRAFT] LS on minimum time for DL-to-UL and UL-to-DL switching on one NB-IoT carrier for TDD NB-IoT UEs Ericsson**
Decision: The final LS is approved in R1-1715304

**R1-1715085 WF on UL to DL and UL to DL switching time in NB-IoT TDD Ericsson**

**R1-1713551 Discussion on NB-IoT TDD configuration Samsung**
**R1-1713111 Discussion on TDD for NB-IoT in common aspectsLG Electronics**

Agreements:

- MCL target of 164 dB at an 'application layer' data rate of 160 bps is targeted for at least one UL:DL configuration (FFS which one or more than one).
  - NOTE: The at least one UL:DL configuration may or may not be different for UL MCL target than DL MCL target
- For evaluations, the FDD numbers of repetitions for physical channels are assumed
  - FFS the noise figure (eNB and UE) which will be assumed
  - The 2.6 GHz TDD band is prioritized for evaluations
  - This does not imply that 164 dB MCL or 'application layer' data rate targets will be relaxed
- Targets of latency, and capacity may be relaxed for TDD NB-IoT.

R1-1712505 Overall design for TDD support in feNB-IoT Intel Corporation
R1-1712675 TDD support common issue for FeNBIoT Lenovo, Motorola Mobility
R1-1712816 General considerations on TDD design Qualcomm Incorporated
R1-1713364 Common aspects for TDD NB-IoT Huawei, HiSilicon

**R1-1714618 Way Forward on TDD NB-IoT Configurations Ericsson**

- The proposed alternatives for the TDD configurations to be supported by NB-IoT TDD are:
  - Alt1: In Rel-15, all the LTE configurations are supported by NB-IoT TDD.
  - Alt2: In Rel-15, prioritize LTE TDD configurations having a more adequate number of UL and DL subframes (e.g., TDD configuration #1, #2, #3, #4).
- There should be no difference in the number of TDD configurations supported in different operation modes (i.e., in-band, guard-band, and standalone).
- Non-anchor carriers should be supported in NB-IoT TDD
  - FFS the detailed configurations
- The LTE TDD special subframes should be supported and used by NB-IoT
  - FFS whether all the special subframe configurations can be supported by NB-IoT.

**R1-1714726 Way forward on UL:DL configurations in TDD NB-IoT Huawei, HiSilicon**

- On UL DL configurations for TDD NB-IoT:



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- For in-band and guard-band mode, strive to support as many LTE UL:DL configurations as possible.
- For standalone mode, at least all LTE UL:DL configurations are supported. FFS additional UL:DL configurations for standalone mode.
  - The supported UL:DL configurations for standalone mode can be different with that for in-band/guard-band mode.
- The supported UL:DL configurations may be different if there is one NB-IoT carrier configured than if there is more than one NB-IoT carrier configured.

Agreements:
- For DL: subcarrier spacing, CP length, symbol length, subframe length, and radio frame length are the same in TDD as FDD
- At least NPSS, NSSS are transmitted on the same NB-IoT carrier.
- Non-anchor carriers at least for unicast, paging and RACH are supported in NB-IoT TDD

R1-1714727 Way forward on special subframe in TDD NB-IoT Huawei, HiSilicon
R1-1714774 WF on cross-carrier scheduling in TDD LG Electronics
R1-1715091 WF on UL/DL interlacing in TDD LG Electronics (revision of R1-1714829)

#### 5.2.7.7 Other

R1-1712817 Modulation enhancements for NB-IoT Qualcomm Incorporated
R1-1714548 On NB-IoT System Information acquisition time reduction Huawei, HiSilicon, Neul

### 5.2.8 Study on Enhanced Support for Aerial Vehicles - *SID in RP-171050*

**R1-1715133 Chairman's notes of AI 5.2.8 Enhanced Support for Aerial Vehicles Ad-Hoc chair (Ericsson)**
The document was presented by Siva Muruganathan of Ericsson.
**Decision:** The document is endorsed, and content is incorporated as below.

**R1-1714856 TP for remaining evaluation assumptions and channel modelling Ericsson, NTT DOCOMO, INC.**
**Conclusion:**
Text proposal R1-1714856 is endorsed.

**Friday:**
**R1-1714858 [Draft] LS on TP for remaining evaluation assumptions and channel modelling Ericsson**
**Decision:** Final LS is approved in R1-1715303.
Post meeting: MCC to attach the missing TP (R1-1714856) in the LS.

#### 5.2.8.1 Interference mitigation schemes for aerials

*On the need for interference mitigation schemes (including power control, interference coordination, beamforming, etc) and performance evaluations*

**R1-1712615 Interference Mitigation for Aerial Vehicles Nokia, Nokia Shanghai Bell**
**R1-1714466 Potential enhancements on interference mitigation ZTE**
**R1-1714609 Interference impact in LTE networks with aerial vehicles Ericsson** (Revision of R1-1714101)
**R1-1712818 Interference mitigagion schemes Qualcomm Incorporated**
**R1-1714721 Potential enhancements for drones Huawei, HiSilicon** (Revision of R1-1712103)

**R1-1714675 WF on problem statement on interference in aerial scenarios Ericsson, Sequans, Intel, NTT Docomo, LG**

**Conclusion:**
- For aerial UE uniformly distributed between 1.5 m and 300 m in UMa-AV, it is observed from the 5%ile geometry results that aerial UEs statistically experience worse downlink geometry than terrestrial UEs
  - The degradation is due to more downlink inter-cell interference from multiple cells

**Agreement:** Capture the above conclusion in the TR along with results in Slide 3, 4, and 5 of R1-1714675 in TR.
- Companies are encouraged to update the geometry results with fast fading.


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**Conclusion:**

- Study and identify solutions to address the degraded downlink geometry of aerial UEs
  - Including both standards transparent solutions and standards enhancements
  - companies are encouraged to study the interference impact on both control and data channels
    - if performance degradation is identified, solutions for identified problem should be studied.

**R1-1712506** **On interference mitigation schemes** **Intel Corporation**
Further revised in R1-1714828
**R1-1713831** **Interference analysis for aerial vehicles** **CMCC**
**R1-1714582** **Initial views on interference mitigation schemes for aerials** **NTT DOCOMO, INC.** (Revision of R1-1713889)
Further revised in R1-1714824

**R1-1715066** **WF on potential solution for interference mitigation** **NTT DOCOMO, Ericsson, LG Electronics,Nokia, Nokia Shanghai Bell, Softbank**

Agreements:
Following potential solutions for interference mitigation are further evaluated in RAN1#91

- For Downlink,
  - Network coordination
    - CoMP
      - Note: companies should provide their assumptions on the coordination set size.
    - ICIC/eICIC/FeICIC
      - Note: companies should provide their assumptions on the coordination set size.
    - Resource reservation
  - Receive Beamforming (i.e., IRC receiver)
  - Other solutions are not precluded
- For Uplink,
  - Power control-based mechanisms
  - Transmission beamforming (optional for evaluations)
    - Note 1: proponents are encouraged to provide results for transmission beamforming when the number of UE Tx antennas is larger than 2.
    - Note 2: proponents are encouraged to provide details of channel models.
  - Network coordination
    - CoMP
      - Note: companies should provide their assumptions on the coordination set size.
    - ICIC
      - Note: companies should provide their assumptions on the coordination set size.
    - Resource reservation
  - Other solutions are not precluded
- Implementation based solutions are not precluded in the evaluation

R1-1714071 Interference Mitigation for Aerial Vehicles Sequans Communications
R1-1713112 Potential enhancements for aerial vehicle's interference mitigation LG Electronics
R1-1714055 Interference mitigation techniques for aerial vehicles Sony
R1-1714824 Initial views on interference mitigation schemes for aerials NTT DOCOMO, INC.
R1-1714828 On interference mitigation schemes Intel Corporation
R1-1714927 WF on techniques of interference mitigation Huawei, HiSilicon

#### 5.2.8.2 *Interference detection schemes for aerials*

*On the need for RAN1 solution on interference detection schemes in UL/DL*

**R1-1713890** **Initial views on interference detection schemes for aerials** **NTT DOCOMO, INC.**
**R1-1712507** **On interference detection schemes** **Intel Corporation**

R1-1712101 Considerations on interference detection for drones Huawei, HiSilicon
R1-1712616 Interference Detection for Aerial Vehicles Nokia, Nokia Shanghai Bell
R1-1712819 Interference detection schemes for aerials Qualcomm Incorporated
R1-1714102 Interference detection in LTE networks with low altitude aerial vehicles Ericsson


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**R1-1714928** **WF on interference detection for aerial UEs** **Huawei, HiSilicon**

Agreement:
Companies are encouraged to provide RSRP statistics (for both serving cell and interfering cells) of aerial UEs at various heights for UMi-AV, RMa-AV, and UMa-AV.

**Friday:** Email discussion collecting RSRP statistics for Aerial vehicles until September 7th – Shinpei (NTT DOCOMO)

Proposal: For UL interference detection, the followings are studied:
- interference detection based on SRS or any other uplink signal
- ICIC (OI and HII)
- RSRP based interference detection
  - Impact of channel reciprocity should be considered.
- Other solutions are not precluded

#### 5.2.8.3 Remaining details on channel modelling of aerial UEs

*Including possible convergence on fast fading modeling and other open issues*

**R1-1712617** **Investigation on UAV fast fading models** **Nokia, Nokia Shanghai Bell**

R1-1712120 On remaining issues of channel model for LTE Aerial Huawei, HiSilicon
R1-1712508 On remaining details on channel modelling Intel Corporation
R1-1712820 Fast fading modelling of aerial UEs Qualcomm Incorporated
R1-1714103 On the remaining details of channel modelling for aerial UEs Ericsson
R1-1714465 Remaining issues on channel model for aerial vehicles ZTE

**R1-1714822** **WF on Remaining Details of Channel Modeling** **Ericsson, Nokia, Nokia Shanghai Bell**

Agreement: Proposals 1-4 on slide 3 of R1-1714822 are agreed.

**R1-1714898** **Large-Scale Channel Model Calibration Results in Aerial Vehicles** **Nokia, Nokia Shanghai Bell, Ericsson, NTT DOCOMO, Huawei, HiSilicon, Intel, ZTE**

Agreement: Capture the calibration results in R1-1714857 and the simulation assumptions in Table 1 of R1-1714857 into the TR.

**R1-1714899** **WF on Fast Fading Modelling in UMa-AV** **Nokia, Nokia Shanghai Bell**

Agreement: For baseline evaluation scenario (2Tx-2Rx at the base station, 1/2 Tx-2Rx at the UE), confirm working assumption on fast fading.

**R1-1715095** **WF on link level channel models for LTE Aerials** **Huawei, HiSilicon**

Agreement:
- Whenever a link level channel model is needed in LTE evaluations, one of the link level models specified in TR38.901 is used.

Further discussion on the exact models used and associated scaling parameters.

#### 5.2.8.4 Remaining details of evaluation assumptions

R1-1712509 On remaining details of evaluation assumptions Intel Corporation
R1-1712102 Remaining details of evaluation assumptions Huawei, HiSilicon
R1-1712618 Remaining Issues on Simulation Assumptions for Aerial Vehicles Nokia, Nokia Shanghai Bell
R1-1713891 On latency and reliability for evaluation NTT DOCOMO, INC.
R1-1714104 Remaining evaluation assumptions for low altitude aerial vehicles Ericsson

**R1-1714979** **WF on definition of reliability** **NTT DOCOMO, Ericsson**

Agreement:
Reliability defined in TR38.802 with following modifications is used for evaluation of C&C traffic for aerial vehicles
- X = 1250 bytes



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- L = 50 ms
  - L is decided based on RAN2 agreement on UAV requirement. But it can be different from RAN2 requirement depending on the definition of latency.
- Reliability is evaluated for all the aerial UEs by system level simulation

Agreement:
- For RAN1 system evaluation purpose, followings are assumed on latency for reliability calculation
  - Aerial UE is RRC_CONNECTED
  - Dynamic scheduling in UL and DL

- Following latency components are considered in the system level simulation:
  - DL:
    - eNB processing and scheduling
    - eNB transmission
    - UE L1/L2 processing
  - UL:
    - Transmission of scheduling grant
    - UE processing delay
      (decoding Scheduling grant + L1 encoding of data)
    - UE sends UL transmission
    - eNB receives and decodes the UL data
  - Note: HARQ latency is considered when retransmission occurs
  - Companies to provide the values assumed for the above latency components.

Text Proposal to be provided.
**Friday:** Email approval of TP until August 31st – Siva (Ericsson)

#### *5.2.8.5 Other*

R1-1712104 Positioning for drones Huawei, HiSilicon
R1-1715084 Summary of Email discussion [89-10] on remaining details of channel modelling Ericsson

### *5.2.9* Study on further enhancements to LTE D2D, UE to network relays for IoT and wearables - *SID in RP-170295*

**R1-1715134 Chairman's notes of AI 5.2.9 on further enhancements to LTE D2D, UE to network relays for IoT and wearables Ad-Hoc chair (Intel)**
The document was presented by Alexey Khoryaev of Intel.
**Decision:** The document is endorsed, and content is incorporated as below.

**R1-1714840 Summary of email discussion "[89-14] FeD2D evaluation results collection" Intel Corporation**

**R1-1714841 Draft Text Proposal for 3GPP TR 36.746 Capturing RAN1 Evaluation Results on FeD2D Study Item Intel Corporation**

Agreement
- Text proposal in R1-1714841 is agreed to be captured in TR 36.746

**R1-1715117 Text Proposal for 3GPP TR 36.746 Capturing RAN1 Conclusions on FeD2D Study Item Intel**

Agreement
- Text proposal in R1-1715117 is agreed.

**R1-1715118 Text Proposal for 3GPP TR 36.746 Capturing RAN1 Agreements on FeD2D Study Item Intel**

Agreement
- Text proposal in R1-1715118 is agreed. Incorporate the following agreement to R1-1715173 that was missed in R1-1715118.
- To avoid collisions of SL RX and DL RX from the perspective of remote UE,
  - Legacy DRX procedures can be reused
  - FFS if any enhancements are needed


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- RAN1 consider that it is beneficial for Relay UE to be aware about Remote UE sidelink DRX cycle
- From the relay UE perspective, simultaneous transmission of UL and SL is not supported on the same carrier.

**R1-1715119 Draft LS to RAN2 on Text Proposals for 3GPP TR 36.746 Intel**
**Decision:** Draft LS R1-1715119 is endorsed and final LS is approved in R1-1715120.

#### 5.2.9.1 Evaluation results

*Results are planned to be collected during e-mail discussion [89-14] to be triggered after contribution submission deadline. Companies are encouraged to provide summary of evaluation analysis.*

R1-1712511 Performance Evaluation Summary of Sidelink Communication Enhancements for Wearable-centric Scenario Intel Corporation
R1-1712512 Performance Evaluation Summary of Sidelink Communication Enhancements for IoT-centric Scenario Intel Corporation
R1-1712513 Performance Evaluation Summary of Sidelink Discovery Enhancements for Wearable and IoT Use Cases Intel Corporation
R1-1714600 Evaluation of sidelink enhancements for scenario 1 Sony (Revision of R1-1712980)
R1-1713997 Evaluation results for FeD2D communication in scenario 1 Nokia, Nokia Shanghai Bell
R1-1713998 Evaluation results for FeD2D communication in scenario 2 Nokia, Nokia Shanghai Bell

#### 5.2.9.2 Sidelink design enhancements

##### 5.2.9.2.1 Synchronization aspects

*Including design aspects of SLSS transmission by Remote UEs for discovery and conditions when SLSS based synchronization can be prioritized over eNB.*

R1-1712130 Discussion on synchronization aspects for feD2D Huawei, HiSilicon
R1-1712514 Sidelink Synchronization Enhancements for Wearable and IoT Use Cases Intel Corporation
R1-1712686 Discussion on synchronization aspects of feD2D Lenovo, Motorola Mobility
R1-1712915 Discussion on synchronization aspects for feD2D ZTE
R1-1713039 FeD2D synchronization aspects Qualcomm Incorporated
R1-1713113 Discussion on synchronization enhancement for FeD2D LG Electronics
R1-1713999 Discussion on synchronization for FeD2D Nokia, Nokia Shanghai Bell
R1-1714196 Considerations and Performance Evaluation of Synchronization Aspects for Further Enhanced Device-to-Device Communication ITRI

R1-1714734 WF on remote UE's SLSS/PSBCH transmission for SL discovery LG Electronics, ZTE, Intel
R1-1714842 WF on Relay UE Synchronization Assistance Information Intel, Huawei, HiSilicon
R1-1714843 WF on Sidelink Synchronization Resource Allocation Intel, Sony
R1-1714831 WF on synchronization enhancement for FeD2D LG Electronics, ZTE, Nokia
R1-1714865 WF on synchronization Huawei, HiSilicon, ITRI, ZTE

##### 5.2.9.2.2 Discovery aspects

*Including discovery model aware and discovery model unaware design options and performance analysis.*

R1-1712133 Enhancements on FeD2D discovery Huawei, HiSilicon
R1-1712515 Design Options to Enhance Sidelink Discovery for Wearable and IoT Use Cases Intel Corporation
R1-1712516 Discovery Enhancements to Aid Communication Establishment for UE-to-NW Relaying Intel Corporation
R1-1712916 Discussion on discovery aspects for feD2D ZTE
R1-1713114 Discussion on discovery enhancement for FeD2D LG Electronics
R1-1714000 Discussion on discovery enhancements Nokia, Nokia Shanghai Bell
R1-1714056 Discussion on discovery enhancements for feD2D Sony

**R1-1714844 WF on Discovery Enhancements for Bandwidth Limited UEs Intel, Sony, Huawei, HiSilicon**

Agreement
- RAN1 observes that it is beneficial for the radio-layer to have information about location of resources used for discovery transmission and reception, e.g. to enable the following features
  - Multiple transmissions of the same UE-to-NW Relay discovery message on different frequency resources
  - For Model B discovery sidelink discovery resource(s) for solicitation is/are associated with sidelink discovery resource(s) for response


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        - FFS whether association is predefined by specification or signaled by Relay UE
    - Further discussion is needed whether these enhancements and information about resource locations are defined at radio-layers or higher layers
- When discovery solicitation is sent by Remote UE, eNB can provide additional signaling to assist in UE-to-NW Relay discovery. In this case Relay UE is not expected to send discovery response message on sidelink

Agreement
- RAN1 observes that it is beneficial for the radio-layer to have information about location of resources used for communication transmission and reception, e.g. to enable the following features
    - Sidelink discovery resources are associated with sidelink communication resources
    - Further discussion is needed whether these enhancements and information about resource locations are defined at radio-layers or higher layers

**R1-1714845** **WF on Discovery Enhancements for UE-to-NW Connection Establishment Intel, Sony, Huawei, HiSilicon**
**R1-1714863** **WF on FeD2D discovery enhancements Huawei, HiSilicon, OPPO**

#### 5.2.9.2.3 Communication and UE-to-NW relaying aspects

### 5.2.9.2.3.1 Sidelink UE-to-NW relaying

*Including design aspects whether and how to limit collisions of SL TX/RX with UL TX for Relay UE and DL RX and SL RX for Remote UE.*

R1-1712134 Considerations on sidelink UE-to-NW relaying mode Huawei, HiSilicon
R1-1712517 Discussion on Conflict/Collision-Free Sidelink UE-to-NW Relaying for Wearable and IoT Use Cases Intel Corporation
R1-1712917 Discussion on conflicts between PC5 and Uu ZTE
R1-1712981 Discussion on sidelink UE-to-NW relaying Sony
R1-1713115 Discussion on collision of different links in UE-network relaying operations LG Electronics

**R1-1714735** **WF on handling collisions of SL RX and DL RX for remote UE LG Electronics, ZTE, Intel, Sony**

Agreement
- To avoid collisions of SL RX and DL RX from the perspective of remote UE,
    - Legacy DRX procedures can be reused
    - FFS if any enhancements are needed
- RAN1 consider that it is beneficial for Relay UE to be aware about Remote UE sidelink DRX cycle
- From the relay UE perspective, simultaneous transmission of UL and SL is not supported on the same carrier.

R1-1714864 WF on handling collisions at relay UE and remote UE Huawei, HiSilicon ,OPPO

### 5.2.9.2.3.2 Sidelink resource allocation and configuration

*Including details of eNB controlled and Relay UE assisted resource allocation, analysis of possibility to reuse R12-R14 sidelink resource pool configurations, sidelink SPS support.*

R1-1712135 Discussion on sidelink resource allocation and configuration Huawei, HiSilicon
R1-1712518 Sidelink Resource Allocation and Configuration for Wearable and IoT Use Cases Intel Corporation
R1-1712519 Design Options for eNB-Controlled and Relay UE-Assisted Resource AllocationIntel Corporation
R1-1712687 Discussion on Sidelink resource allocation and configuration Lenovo, Motorola Mobility
R1-1712918 Resource scheme of feD2D Relay ZTE
R1-1712919 Resource pool configuration for feD2D ZTE
R1-1712982 Discussion on sidelink resource allocation and configuration Sony
R1-1713040 Sidelink resource allocation and configuration for bi-directional UE-to-NW relaying Qualcomm Incorporated
R1-1713116 Discussion on sidelin resource allocation and configuration for FeD2D LG Electronics
R1-1714001 Sidelink resource allocation for FeD2D communication Nokia, Nokia Shanghai Bell
R1-1714197 Discussion on Relay Associated Selection and Relay-Assisted eNB Resource Allocation for Sidelink UE-to-NW relaying ITRI
R1-1714198 Mechanisms and Resource Access for Sidelink Feedback ITRI

**R1-1714846** **WF on Resource Configuration for Sidelink Communication Intel, Sony, Huawei, HiSilicon**



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Working Assumption

- FDM between PSCCH / PSSCH pools from system perspective is supported
- FDM between PSCCH / PSSCH pools from single UE perspective is supported
  - FFS for 1 PRB UE
- The LTE R14 PSCCH/PSSCH resource pool configuration is used as a baseline for sidelink resource pool configuration, not precluding additional enhancements
- FFS if PSCCH and PSSCH pools can overlap (e.g. for 1 PRB UEs)

R1-1715027 WF on Frequency Resource Partitioning for Sidelink Communication Intel

**R1-1714847 WF on Relay Assisted Resource Allocation for FeD2D Intel, Sony, Huawei, HiSilicon**

Agreement

- In Relay assisted resource allocation mode
  - Relay UE can use higher layer signaling to configure Remote UE to monitor subset of sidelink communication resources within sidelink resource pools;
    - FFS conditions to enable this operation
    - FFS if additional mechanism beside sidelink DRX are necessary
  - Relay UE can use higher layer signaling to configure sidelink transmission resources of Remote UEs within sidelink resource pools configured by eNB;
    - In this case Remote UE is expected to autonomously select resource for transmission within restricted resources
    - FFS control signaling details (pools, set of resources within pools, SPS configuration, etc.).

**R1-1714848 WF on SPS for FeD2D Intel, Sony**

Agreement

- Multiple SPS configurations can be configured for sidelink operation of Remote and Relay UE
- In eNB controlled resource allocation mode
  - eNB can configure and activate/deactivate sidelink SPS via Relay UE forwarding for the Remote UE linked with the Relay UE
  - eNB can use DL control signaling to configure and activate/deactivate sidelink SPS for the Remote UE linked with the relay UE

**R1-1714862 WF on eNB-controlled Resource Allocation Huawei, HiSilicon, OPPO, Intel**

Agreement

- RAN1 identified that in case of Relay UE forwarding the following needs to be addressed. The solutions can be discussed in normative phase
  - How eNB can indicate and control transmission time of Remote UE via Relay UE forwarding
  - Remote UE identification

R1-1714871 WF on Relay UE assisted Resource Allocation Huawei, HiSilicon, OPPO, Intel Sony
R1-1714872 WF on sidelink SPS Huawei, HiSilicon
R1-1714975 WF on remote UE autonomous resource selection Huawei, HiSilicon

### 5.2.9.2.3.3 Sidelink power control

*Including aspects whether and how UE-UE channel propagation conditions are taken into account in SL power control operation and potential specification impact.*

R1-1712128 Discussion on power control for feD2D Huawei, HiSilicon
R1-1712520 Sidelink Power Control for Wearable and IoT Use Cases Intel Corporation
R1-1712920 Sidelink power control ZTE
R1-1713117 Discussion on sidelink power control for FeD2D LG Electronics
R1-1713855 Discussion on power control in FeD2D Panasonic
R1-1714002 Discussion on sidelink power control Nokia, Nokia Shanghai Bell

R1-1714736 WF on SL TX power control for FeD2D LG Electronics, Intel, ZTE
R1-1714849 WF on Power Control for FeD2D Intel, Huawei, HiSilicon



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R1-1714870 WF on power control in FeD2D Huawei, HiSilicon, Intel, OPPO
R1-1714874 Way Forward on feD2D power control by relay UE Huawei, HiSilicon, OPPO, Intel, Sony

#### 5.2.9.2.3.4 Sidelink feedback information

*Including decoding status, adaptation of MCS, number of (re)transmissions and resource for transmission, SL measurement.*

R1-1712136 Feedback information for sidelink link adaptation Huawei, HiSilicon
R1-1712521 Sidelink Feedback Information and Signalling for Wearable and IoT Use Cases Intel Corporation
R1-1712688 Discussion on Sidelink feedback information Lenovo, Motorola Mobility
R1-1712921 Discussion on feD2D Relay feedback ZTE
R1-1713118 Discussion on feedback information on sidelink LG Electronics
R1-1713856 Discussion on sidelink feedback in FeD2D Panasonic
R1-1714199 On piggyback based feedback in FeD2D ITRI

R1-1714732 WF on SL feedback information for FeD2D LG Electronics, Intel, ZTE
R1-1714850 WF on Signaling for FeD2D Intel, Huawei, HiSilicon
R1-1714868 WF on link adaptation in FeD2D Huawei, HiSilicon, Lenovo, OPPO
R1-1714869 WF on Physical layer ACK in FeD2D Huawei, HiSilicon, ITRI, Lenovo

### *5.2.9.3 Other*

*Including sidelink design aspects for 1 PRB BW limited remote UEs.*

**R1-1712129 Discussion on narrow band feD2D communication Huawei, HiSilicon**
**R1-1712522 Considerations on Sidelink Design Enhancements to Support One PRB BW Limited Remote UEs Intel Corporation**
**R1-1712922 Discussion on Sidelink design aspects for 1PRB ZTE**
**R1-1713119 Views on 1 PRB BW limited UEs LG Electronics**
**R1-1714090 Support of 1 PRB sidelink for FeD2D Apple Inc.**

**R1-1714851 WF on SLSS/PSBCH Format for UEs with one PRB BW Constraints Intel, Huawei, HiSilicon**
**R1-1714852 WF on Discovery Enhancements for UEs with 1 PRB Bandwidth Limitation Intel, Apple, Huawei, HiSilicon**

Agreement
- For Remote UEs with 1 PRB bandwidth limitation new SLSS/PSBCH format is needed
  - PSBCH/SLSS bandwidth is one PRB
  - New PSBCH format includes the legacy PSBCH content
  - Note: for UEs w/o sidelink reception capabilities new SLSS/PSBCH format is not needed

**R1-1715026 WF on Scoping 1 PRB Physical Sidelink Channels Design Intel**

Agreement
- The following is assumed for further design of sidelink communication, synchronization, and discovery for 1 PRB bandwidth limited UEs
  - SC-FDMA waveform can be used for sidelink transmission and reception
    - Capture the following observation in TR:
    - RAN1 discussed the possibility of reducing UE implementation complexity by using OFDM waveform but sufficient study was not conducted on this aspect.
  - TBCC can be used as a channel coding scheme for all sidelink physical channels
  - Support of sub-PRB and 3.75 kHz subcarrier spacing sidelink transmission/reception is deprioritized

Agreement
- For Remote UEs with 1 PRB bandwidth limitation new PSDCH format is needed
- Capture in TR 36.746 that the following discovery design options are identified for UEs with 1 PRB BW limitation
  - Option 1: Define 1 PRB / 1 TTI physical structure and reduce payload size
  - Option 2: Define 1 PRB / 2 TTIs physical structure and keep the same payload size
  - Option 3: Define 1 PRB / 1 TTI physical structure and increase modulation order (e.g. to 16-QAM)
  - Other options are not precluded
- Specific design options can be down-selected in the normative phase

**R1-1714873 WF on supporting 1 PRB sidelink Huawei, HiSilicon, ITRI, Apple, OPPO, KDDI**



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Agreement

- At least the following sidelink enhancements for UEs with 6 PRB bandwidth limitation can be applicable for UEs with 1 PRB bandwidth limitations;
  - eNB controlled and Relay UE assisted resource allocation modes
  - Sidelink SPS
  - Sidelink power control
  - Sidelink feedback
  - Sidelink measurements
- At least the following additional work is needed to support 1 PRB UEs
  - Additional consideration on PSCCH/PSSCH resource pool configuration
  - Restriction of TBS size and/or TTI bundling aspects for sidelink communication
  - Sidelink measurement accuracy

### 5.2.10 UE positioning accuracy enhancements for LTE - *WID in RP-171508*

*Focus on measurements for RTK GNSS. Note that IMU aspects will not be treated in RAN1 until RAN1#90bis.*

**R1-1715135 Chairman's notes of AI 5.2.10 on UE positioning accuracy enhancements for LTE Ad-Hoc chair (Nokia)**
The document was presented by Timo Lunttila of Nokia.
**Decision:** The document is endorsed, and content is incorporated as below.

**R1-1712619 Discussion of UE measurements to support RTK GNSS Nokia, Nokia Shanghai Bell**
R1-1713313 UE Measurements for RTK Qualcomm Austria RFFE GmbH

R1-1712109 Consideration on additional measurements for RTK GNSS Huawei, HiSilicon
R1-1713314 On measurements for UE-assisted GNSS RTK positioning Ericsson India Private Limited

R1-1715096 WF on UE GNSS Carrier Phase Measurement Nokia, Nokia Shanghai Bell, Qualcomm, Ericsson, Huawei, HiSilicon

Agreement:

- Define UE GNSS carrier-phase measurement in TS 36.214.

| | |
|---|---|
| Definition | The number of carrier-phase cycles (integer and fractional parts) of the $i^{th}$ GNSS satellite signal, measured since locking onto the signal. Also called Accumulated Delta Range (ADR). The reference point for the GNSS carrier phase shall be the antenna connector of the UE. |
| Applicable for | Void (this measurement is not related to E-UTRAN/UTRAN/GSM signals; its applicability is therefore independent of the UE RRC state) |

Ericsson to draft a CR for the agreed definition by Friday.
Draft LS to RAN2 Cc RAN4, RAN5 by Nokia (Zhilan) in R1-1715176. Check on Friday

**Friday:**
**R1-1715179 CR on 36.214 for UE carrier phase measurements Ericsson, Nokia, Nokia Shanghai Bell**
**Decision:** CR0044 to 36.214 (Rel-14, B) is agreed.
Post meeting: MCC to correct WI code to LCS_LTE_acc_enh-Core, and remove the link to 36.355 in "other specs affected" field.

**R1-1715176 Draft LS on RAN1 agreements on UE GNSS carrier phase measurement Nokia**
**Decision:** Final LS is approved in R1-1715306.

### 5.2.11 Other

R1-1712757 Fast SCell activation for enhanced CA utilization Qualcomm Incorporated
R1-1713120 Discussion on standardization of narrowband V2X in Rel-15 LG Electronics



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# 6 NR

## 6.1 New Radio Access Technology - WID in RP-171485

R1-1713893 **Draft CR for definitions, symbols and abbreviations in TR38.802** **NTT DOCOMO, INC.**
R1-1714773 **[Draft] CR for definitions, symbols and abbreviations in TR38.802** **NTT DOCOMO**
**Decision:** The draft CR is endorsed and agreed as CR0004 to 38.802 in R1-1714778
Post meeting: MCC to correct source to WG/TSG in CR cover sheet.

R1-1713894 TS38.201 V.0.0.2 NR; Physical layer; General description NTT DOCOMO, INC.
**Decision:** The TS is endorsed as v 0.1.0 in R1-1715069 as the basis for further updates.

R1-1713371 TS 38.202: Services provided by the physical layer Qualcomm Incorporated
**Decision:** The TS is endorsed as v 0.1.0 in R1-1714655 as the basis for further updates.

R1-1712950 TS38.211 v0.1.2 NR; Physical channels and modulation (revision of R1-1712011) Ericsson
R1-1713296 TS38.211 v0.1.3 NR; Physical channels and modulation Ericsson
**Decision:** The TS is endorsed as v 0.2.0 in R1-1714656 as the basis for further updates.

R1-1714553 TS38.213 v0.0.2 NR; Physical layer procedures for control Samsung
R1-1714565 TS38.213 v0.0.3 NR; Physical layer procedures for control Samsung
**Decision:** The TS is endorsed as v 0.1.0 in R1-1714658 as the basis for further updates. Offline discussions in this week

R1-1714234 TS 38.214 v0.0.2 NR; Physical layer procedures for data Nokia, Nokia Shanghai Bell
R1-1714626 TS 38.214 v0.0.4 NR; Physical layer procedures for data Nokia, Nokia Shanghai Bell
**Decision:** The TS is endorsed as v 0.1.0 in R1-1715077 as the basis for further updates.

R1-1714564 TS38.212 v0.0.2 NR; Multiplexing and channel coding Huawei
**Decision:** The TS is endorsed as v 0.1.0 in R1-1714659 as the basis for further updates.

R1-1714100 TS38.215 v0.0.2 NR; Physical layer measurements Intel Corporation (UK) Ltd
**Decision:** The TS is endorsed as v 0.1.0 in R1-1714660 as the basis for further updates.

R1-1713866 **Comment on NR specification** **Panasonic**

**Friday**
Agreements:

- Editors to prepare and submit updated versions of NR specs until August 29th (to include this week agreements/Was);
- Email approval of the specs until 4th of September;
- If RAN1 succeed agreeing them by email, RAN1 will submit it to the next RAN as information.
- Note that even in the case where RAN1 would fail agreeing them, RAN1 should submit the latest versions to the next RAN for information

It is understood that the level of completion is far below the required threshold (60%) as stated in the working procedures.

**RRC parameters**
R1-1714323 **RRC parameters for NR Ericsson**
**Decision:** The excel sheet summarizes the current statuts and will be further revised during the week.
R1-1714322 **[DRAFT] LS on RRC parameters for NR Ericsson**
**Decision:** Continue offline discussion until Wednesday morning – (Ericsson)
**Wednesday**
R1-1714819 **RRC parameters for NR Ericsson**
**Decision:** The document is noted and the list is agreed. Basis for future update, if deemed necessary.
R1-1714820 **[DRAFT] LS on RRC parameters for NR Ericsson**
**Decision:** The draft LS is endorsed and finally approved in R1-1714969.
**Friday**

- Email discussion for updated RRC parameter list from September 4th until September 8th , targetting a distribution to RAN1 email reflector of an updated list by the 5th – Daniel (Ericsson)



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**R1-1714462** **UE Categories for NR and EN-DC** **Ericsson**
**R1-1713865** **Discussion on the options in NR design** **Panasonic**

R1-1713892 Work plan for Rel-15 NR WI NTT DOCOMO, INC.

### 6.1.1 Initial access and mobility

*Refer to R1-1709821 for work plan.*

**Friday**
**R1-1715259** **[Draft] LS on NR initial access and mobility** **NTT DOCOMO**
**Decision:** Final LS is approved in R1-1715316

#### *6.1.1.1 Synchronization signal and initial access procedure*

R1-1714005 Assistance information related to SS blocks Nokia, Nokia Shanghai Bell

##### 6.1.1.1.1 Remaining details on SS block and SS burst set design

*Including mechanism to indicate actual transmitted SS block(s)*

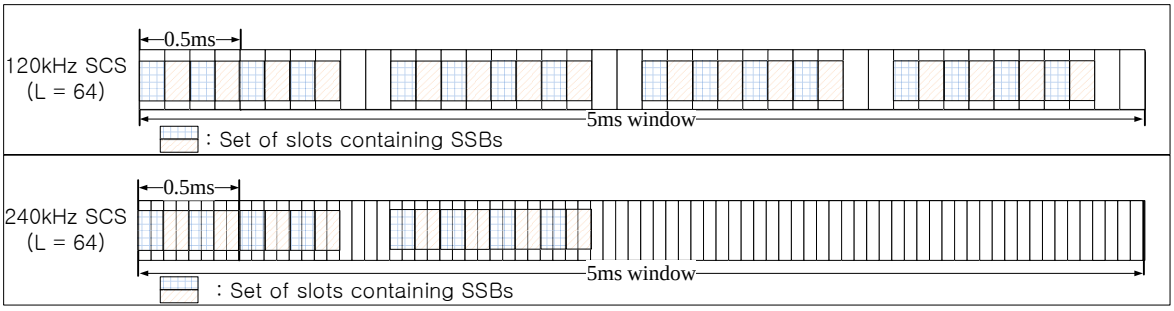
R1-1712057 On SS burst set design ZTE
R1-1712349 Transmitted SS-block indication CATT

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**Wednesday**
**R1-1714621** **WF on Modification of SS/PBCH block position for 120/240kHz SCS** **LGE, DOCOMO**

Agreements:

- Candidate OFDM symbol position within half radio frame for SS/PBCH block for 120/240kHz SCS is modified as below
  - 120 kHz subcarrier spacing
    - The first OFDM symbols of the candidate SS/PBCH blocks have indexes {4, 8, 16, 20} + 28*n. For carrier frequencies larger than 6 GHz, n=0, 1, 2, 3, 5, 6, 7, 8, 10, 11, 12, 13, 15, 16, 17, 18.
  - 240 kHz subcarrier spacing
    - The first OFDM symbols of the candidate SS/PBCH blocks have indexes {8, 12, 16, 20, 32, 36, 40, 44} + 56*n. For carrier frequencies larger than 6 GHz, n=0, 1, 2, 3, 5, 6, 7, 8.




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**R1-1714627** **WF on Actually Transmitted SS Block Indication** **LG Electronics, InterDigital, ZTE, Huawei, HiSilicon, ITL**
R1-1714678 WF on indication of actual transmitted SS blocks Huawei

~~Agreements:~~

- At least for rate matching purpose, for below 6GHz, bitmap (8bits) is used for indication of actual SS/PBCH block transmission
  - FFS: Other purposes
  - FFS: whether the indication can be used for the RACH preamble configurations

Wednesday (above agreement is amended as follows
Agreements:

- At least for rate matching purpose for serving cell, for below 6GHz, full bitmap (8bits) is used for indication of actual SS/PBCH block transmission
  - FFS: whether to support indication of actual SS/PBCH block transmission for mobility measurement at least for neighbour cells, how to indicate it, and whether this indication is applied to mobility measurement for serving cell



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- FFS: whether the indication can be used for the RACH preamble configurations and associations

Continue offline discussion – LGE, Huawei

- For below 6GHz, common signalling configuration is applied for the serving and neighbour cell
  - FFS: indication for neighbouring cells/frequency layers
- For above 6GHz frequency range, down select one method from following alternatives as compressed form of bitmap for actually transmitted SS/PBCH block indication
  - Alt.1: Group-Bitmap + Bitmap in Group
  - Alt.2: Group-Bitmap + The number of actually transmitted SS/PBCH block in Group
  - Alt.3: Group-Bitmap
  - Alt.4: Full Bitmap

**Wednesday**

~~Agreements:~~

- ~~For actually transmitted SS/PBCH block indication, down select signalling method(s) from following alternatives~~
  - ~~Alt.1: RMSI (at least for serving cell)~~
    - ~~Supported by: LGE, ITL, Nokia, Huawei, HiSi, ZTE, InterDigital, Mot. Mob., vivo, ETRI, LENOVO, Sharp, Sony, Xiaomi, CATT~~
  - ~~Alt.2: RRC signalling~~
    - ~~Supported by: Samsung, AT&T~~
- ~~For above 6GHz frequency range, down select one method from following alternatives as actually transmitted SS/PBCH block indication~~
  - ~~Alt.1: Compressed form~~
    - ~~Alt.1-1: Group-Bitmap + Bitmap in Group~~
      - ~~A Group is defined as consecutive SS/PBCH blocks~~
      - ~~Bitmap in Group can indicate which SS/PBCH block is actually transmitted within a Group, each Group has the same pattern of SS/PBCH block transmission, and Group-Bitmap can indicate which Group is actually transmitted~~
      - ~~E.g., [8]+[8] bits in case of 8 Groups and 8 SS/PBCH blocks per Group~~
      - ~~Supported by: Huawei, HiSi, Ericsson, Nokia~~
    - ~~Alt.1-2: Group-Bitmap + The number of actually transmitted SS/PBCH block in Group (with fixed starting index of SS/PBCH block)~~
      - ~~A Group is defined as consecutive SS/PBCH blocks~~
      - ~~Group-Bitmap can indicate which Group is actually transmitted, SS/PBCH blocks within a Group are logically consecutive, the number of actually transmitted SS/PBCH block indicates how many logically consecutive SS/PBCH blocks are actually transmitted starting from the first index, and the number is commonly applied to all transmitted Groups~~
      - ~~E.g., [8]+[3] bits in case of 8 Groups and 8 SS/PBCH blocks per Group~~
      - ~~Supported by: LGE~~
    - ~~Alt.1-3: Bitmap in Group + The number of actually transmitted Groups (with fixed starting index of Group)~~
      - ~~A Group is defined as consecutive SS/PBCH blocks~~
      - ~~Bitmap in Group can indicate which SS/PBCH block is actually transmitted within a Group, each Group has the same pattern of SS/PBCH block transmission, and the number of actually transmitted Groups indicates how many consecutive Groups are actually transmitted starting from the first Group~~
      - ~~E.g., [8]+[3] bits in case of 8 Groups and 8 SS/PBCH blocks per Group~~
      - ~~Supported by: ZTE~~
    - ~~Alt.1-4: Group-Bitmap + The number of actually transmitted SS/PBCH block in each Group~~
      - ~~A Group is defined as consecutive SS/PBCH blocks~~
      - ~~Group-Bitmap can indicate which Group is actually transmitted, SS/PBCH blocks within a Group are logically consecutive, and the number of actually transmitted SS/PBCH block for each Group indicates how many logically consecutive SS/PBCH blocks are actually transmitted starting from the first index~~
      - ~~Minimum [8]+[3] bits, maximum [8]+[3]*[8] bits in case of 8 Groups and 8 SS/PBCH blocks per Group~~
      - ~~Supported by: Mot.mob., Lenovo~~
    - ~~Alt.1-5: The number of actually transmitted SS/PBCH blocks + starting index + gap between two consecutive SS/PBCH blocks~~
      - ~~[6]+[6]+[6] bits~~



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~~• Supported by: Intel~~
~~• Alt.1-6: Group-Bitmap~~
~~• A Group is defined as consecutive SS/PBCH blocks~~
~~• Group-Bitmap can indicate which Group is actually transmitted, and all SS/PBCH blocks within a transmitted Group are actually transmitted~~
~~• E.g., [8] bits in case of 8 Groups and 8 SS/PBCH blocks per Group~~
~~• Supported by: vivo~~
~~• Alt.2: Full Bitmap~~
~~• 64 bits~~
~~• Supported by: Samsung~~

**Thursday** (above tentative agreement is replaced by)
**R1-1715182 WF on Actually Transmitted Transmitted SS Blocks Samsung, AT&T, Deutsch Telecom, Softbank, CMCC, BT, NTT DOCOMO, Intel**

Working assumptions:

- UE-specific RRC signaling with full bitmap can be used for indicating the actually transmitted SS blocks for both sub6GHz and over6GHz cases
- The actually transmitted SS blocks is indicated in RMSI for both sub6GHz and over6GHz cases
  - Indication is in compressed form in above 6 GHz case, and an indication method is down-selected from following alternatives
    - Alt.1: Group-Bitmap + Bitmap in Group
      - A Group is defined as consecutive SS/PBCH blocks
      - Bitmap in Group can indicate which SS/PBCH block is actually transmitted within a Group, each Group has the same pattern of SS/PBCH block transmission, and Group-Bitmap can indicate which Group is actually transmitted
      - E.g., [8]+[8] bits in case of 8 Groups and 8 SS/PBCH blocks per Group
    - Alt.2: Group-Bitmap + The number of actually transmitted SS/PBCH block in Group (with fixed starting index of SS/PBCH block)
      - A Group is defined as consecutive SS/PBCH blocks
      - Group-Bitmap can indicate which Group is actually transmitted, SS/PBCH blocks within a Group are logically consecutive, the number of actually transmitted SS/PBCH block indicates how many logically consecutive SS/PBCH blocks are actually transmitted starting from the first index, and the number is commonly applied to all transmitted Groups
      - E.g., [8]+[3] bits in case of 8 Groups and 8 SS/PBCH blocks per Group
    - Alt.3: Bitmap in Group + The number of actually transmitted Groups (with fixed starting index of Group)
      - A Group is defined as consecutive SS/PBCH blocks
      - Bitmap in Group can indicate which SS/PBCH block is actually transmitted within a Group, each Group has the same pattern of SS/PBCH block transmission, and the number of actually transmitted Groups indicates how many consecutive Groups are actually transmitted starting from the first Group
      - E.g., [8]+[3] bits in case of 8 Groups and 8 SS/PBCH blocks per Group
    - Alt.4: Group-Bitmap + The number of actually transmitted SS/PBCH block in each Group
      - A Group is defined as consecutive SS/PBCH blocks
      - Group-Bitmap can indicate which Group is actually transmitted, SS/PBCH blocks within a Group are logically consecutive, and the number of actually transmitted SS/PBCH block for each Group indicates how many logically consecutive SS/PBCH blocks are actually transmitted starting from the first index
      - Minimum [8]+[3] bits, maximum [8]+[3]*[8] bits in case of 8 Groups and 8 SS/PBCH blocks per Group
    - Alt.5: The number of actually transmitted SS/PBCH blocks + starting index + gap between two consecutive SS/PBCH blocks
      - [6]+[6]+[6] bits
    - Alt.6: Group-Bitmap
      - A Group is defined as consecutive SS/PBCH blocks
      - Group-Bitmap can indicate which Group is actually transmitted, and all SS/PBCH blocks within a transmitted Group are actually transmitted
      - E.g., [8] bits in case of 8 Groups and 8 SS/PBCH blocks per Group
    - Other alternatives are not precluded
- Indicated resources are reserved for actually transmitted SS blocks



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- Data channels are rate matched around actually transmitted SS blocks

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R1-17xxxxx WF on transmitting SS blocks Qualcomm
Continue offline discussion - Qualcomm

- When UE assumes a SS burst set periodicity of X ms (e.g., X = 20ms),
  - UE shall assume the same set of SS blocks is transmitted every X ms.
- When UE assumes a SS burst set periodicity of X ms (e.g. X = 20ms) and network transmits a smaller SS burst set periodicity Y ms (e.g., Y=10ms),
  - UE shall assume the same set of SS blocks is transmitted every Y ms.
- UE assumes that the transmitted SS blocks in a SS burst set are always logically consecutive, i.e., between any two transmitted SS blocks in a SS burst set, there are no gaps of non-transmitted SS block(s)

**R1-1715025 WF on transmitting SS blocks Qualcomm**

Agreements:

- UE assumes a single periodicity i.e., SS burst set periodicity, for all SS/PBCH blocks for a cell
  - At least for rate matching purpose, the single periodicity value is configured for the serving cell separately from SMTC. Otherwise the default periodicity, 5 ms, is assumed
  - Note: UE is not expected to perform rate matching based on SMTC

**R1-1714673 WF on NW assisted SS block repetition ZTE, Sierra Wireless**
Continue discussion

- The network can indicate to UEs that K adjacent SS blocks (within an SS burst set) are transmitted on the same antenna port.
  - The indication of K is valid for all cells on a carrier frequency
  - If the network does not provide indication of SS block repetition level the UE should assume no repetition (K=1).
  - SS block repetition default value for initial cell selection: K=1
  - Note that the repetition level does not affect SS block index
  - FFS supported values of K.

Possible agreements:

- The network can indicate to UEs that different SS blocks (within an SS burst set) with different SS block index from a cell are quasi-collocated with respect to spatial, average gain, delay, and Doppler parameters
  - The indication is valid for all cells on a carrier frequency
  - In case of no indication, by default, UE assumes different SS blocks with different SS block index are not quasi-collocated with respect to spatial, average gain, delay, and Doppler parameters
  - FFS: how to indicate

**R1-1715145 WF on Network Assisted SS Block Repetition ZTE, Sierra Wireless, CMCC**
Possible agreements:

- At least for CONNECTED mode, the network can indicate to UEs that an SS block on frequency location f1 with SS block index i1 is quasi-collocated with respect to spatial, average gain, delay, and Doppler parameters with an SS block on frequency location f2 with SS block index i2.
  - Frequency locations f1 and f2 can be the same or different, but within a wideband CC.
  - SS block indices i1 and i2 can be the same or different
  - The UE may replace or average the RSRP measurements on the quasi-collocated SS blocks

**Friday:**
**R1-1715212 WF on SS block QCL Indication ZTE, Qualcomm, InterDigital, MediaTek, Sierra Wireless**

**R1-1714677 WF on QCL parameters for SS block transmissions Samsung**
~~Agreements:~~

- A UE may assume that antenna ports used for transmissions of SS/PBCH blocks with same index recurring with the SS/PBCH burst set periodicity are quasi-collocated with respect to spatial, average gain, delay, and [Doppler] parameters
- By default, a UE may not assume that antenna ports used for transmissions of SS/PBCH blocks with different indexes are quasi-collocated with respect to spatial, average gain, delay and Doppler parameters
- FFS: Whether the network indication of SS block repetition and the impact on QCL assumption
- FFS: Whether gNB will signal the change of QCL associations and how to signal it

Wednesday (above agreement is amended as follows



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Agreements:

- A UE may assume that antenna ports used for transmissions of SS/PBCH blocks with same index recurring with the SS/PBCH burst set periodicity are quasi-collocated with respect to spatial, average gain, delay, and Doppler parameters
- By default, a UE may not assume that antenna ports used for transmissions of SS/PBCH blocks with different indexes are quasi-collocated with respect to spatial, average gain, delay and Doppler parameters
- FFS: Whether the network indication of SS block repetition and the impact on QCL assumption
- Note: In the above agreements, gNB has the flexibility to use different physical beam(s) and its mapping for the SS/PBCH block transmission
    - Note: The case where antenna ports used for transmissions of SS/PBCH blocks with same index recurring with the SS/PBCH burst set periodicity are not quasi-collocated with respect to spatial, average gain, delay, and [Doppler] parameters is not specified

**R1-1714667 WF on NW adaptation and indication of numerology used for SS block in NSA scenario NTT DOCOMO, AT&T, InterDigital**

Agreements:

- NR supports NW adaptation and indication of SCS used for SS/PBCH block for NSA carrier access
    - RAN1 assumes that NSA carrier is the carrier that UE cannot access without NW assistance information
    - UE can assume a single subcarrier spacing of SS/PBCH block per frequency carrier
    - In case that target NSA carrier is in below 6 GHz range,
        - NW can adapt either 15 kHz or 30 kHz SCS for SS/PBCH block transmission, and NW can indicate selected SCS for SS/PBCH block transmission to UE
    - In case that target NSA carrier is in between 6 GHz and 52.6 GHz range,
        - NW can adapt either 120 kHz or 240 kHz SCS for SS/PBCH block transmission, and NW can indicate selected SCS for SS/PBCH block transmission to UE
    - If there is no indication on SCS used for SS/PBCH block transmission on target NSA carrier, UE assumes default SCS for SS/PBCH block transmission

Not treated.

R1-1712150 Remaining details on SS block and SS burst set design Huawei, HiSilicon
R1-1712523 SS Burst Set signaling design Intel Corporation
R1-1712695 Remaining details of SS block and SS burst set composition AT&T
R1-1712733 Disucssion on remaining details on SS block and SS burst set design Fujitsu
R1-1712822 Remaining issues on SS block and SS burst set composition vivo
R1-1712990 On SS burst set design NEC
R1-1713121 Remaining issues on SS block design and indication method LG Electronics
R1-1713240 Discussion on design of SS block Guangdong OPPO Mobile Telecom
R1-1713325 Indication of actually transmitted SS blocks Sharp
R1-1713372 SS block and SS burst set design considerations Qualcomm Incorporated
R1-1713552 Remaining details on SS block and SS burst set design Samsung
R1-1713895 Discussion on remaining details on SS block and SS burst set design NTT DOCOMO, INC.
R1-1714034 Remaining SS block and SS burst set design Ericsson
R1-1714129 On SS Block and SS Burst Set Design and Indication InterDigital, Inc.
R1-1714212 Discussion on remaining issues of SS block and SS burst set Motorola Mobility, Lenovo
R1-1714405 Remaining details on SS block and timing indication ITL
R1-1714866 WF on SS burst set offset NEC
R1-1715029 WF on SS burst set mapping into radio frame Huawei

#### 6.1.1.1.2 Remaining details on multiple SS block transmissions in wideband CC

*Including number of SS blocks in wideband CC, RRM measurement with multiple SS blocks in wideband CC, and how to inform UE about presence/parameters of SS block(s)*

*Note that all issues in this sub-agendum need to be resolved in this meeting*

R1-1715072 Way forward on the cell id of SS blocks in a wideband CC Huawei
**R1-1715064 Draft LS on multiple SSBs within a wideband carrier Ericsson**
**Decision**: Final LS is approved in R1-1715071 with following updates

RAN1#89 agreed on the possibility for transmitting multiple SS blocks (SSBs) in the frequency domain within a wideband carrier. ~~The multiple SSBs could, for example, be used to enable synchronization and RRM measurements by UEs with a downlink bandwidth capability less than the wideband carrier bandwidth.~~



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**R1-1715160 WF on SS block transmission in wideband CC Qualcomm**

Not treated.
R1-1712058 Multiple SS blocks in wideband CC ZTE
R1-1712154 On initial access for wideband carrier Huawei, HiSilicon
R1-1712350 SS Burst Set Composition and SS Block Configuration CATT
R1-1712524 SS Blocks in wideband CC Intel Corporation
R1-1712696 SS block transmissions in a wideband CC AT&T
R1-1712823 SS block transmissions and RRM measurement in wideband CC vivo
R1-1712954 Multiple SS Blocks per carrier Nanjing Ericsson Panda Com Ltd
R1-1713060 Cell searching with multiple SS blocks in wideband CC Spreadtrum Communications
R1-1713122 Remaining issues on Multiple SS block transmissions in wideband CC LG Electronics
R1-1713252 Remaining details on multiple SS block transmissions in wideband CC Guangdong OPPO Mobile Telecom
R1-1713553 Remaining details on multiple SS block transmissions in wideband CC Samsung
R1-1713682 Discussion on multiple SS block transmission within a wideband CC MediaTek Inc.
R1-1713804 Remaining details on multiple SS block transmissions in a wideband CC ETRI
R1-1713896 Discussion on remaining details on multiple SS block transmissions in wideband CC for NR NTT DOCOMO, INC.
R1-1714006 SS-block transmission in multi CC deployments Nokia, Nokia Shanghai Bell
R1-1714152 Multiple SS block transmissions in a wideband CC ASUSTEK COMPUTER (SHANGHAI)
R1-1714213 SS block transmission in wideband CC Motorola Mobility, Lenovo
R1-1714406 Multiple SS block transmission in wideband CC ITL
R1-1714601 Multiple SS block transmissions design in wideband CC Qualcomm Incorporated

#### *6.1.1.2 Broadcast signal/channel*

##### 6.1.1.2.1 NR-PBCH contents and payload size

*Including NR-PBCH contents, required number of bits for each content and corresponding payload size*

**R1-1714668 WF on NR-PBCH contents and payload size NTT DOCOMO**

Agreements:
- NR strive to support same payload size between below-6 and above-6 GHz
- SS block time index:
  - 3 bits (b5, …, b3) for SS block time index in NR-PBCH payload only in case of above 6 GHz
  - b5, …, b3 for SS block time index are not carried in NR-PBCH payload in case of below 6 GHz
    - 3 bits in NR-PBCH payload in below 6 GHz case may be used for other purpose(s)

Possible agreements:
- Half radio frame timing:
  - Half radio frame timing is indicated by following method irrespective of SS burst set periodicity
  - FFS: 1 bit explicit indication in PBCH payload
    - FFS whether/how to make handover (and neighbor cell CSI-RS measurement) without NR-PBCH reading possible in case of below 6 GHz

Agreement:
- SS burst set periodicity is not carried in NR-PBCH payload

Agreements:
- For frequency location of CORESET for RMSI scheduling and NR-PDSCH for RMSI,
  - CORESET for RMSI scheduling and NR-PDSCH for RMSI does not have to be confined within the same BW of corresponding NR-PBCH
  - Bandwidth for CORESET and NR-PDSCH for RMSI is confined within the UE minimum bandwidth for the given frequency band

Possible agreements:
- NR supports FDM between SS/PBCH block and CORESET/NR-PDSCH
  - Rel-15 UE shall at least support the reception of NR-PDSCH with the same duration as SS/PBCH block



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- FFS: SS/PBCH block, and corresponding CORESET for RMSI scheduling and NR-PDSCH for RMSI are confined within the UE minimum BW [for the case of TDM between SS/PBCH block and RMSI]

**Wednesday**

Agreements:

- The single DL numerology to be used at least for RMSI, Msg.2/4 for initial access and broadcasted OSI is informed in NR-PBCH payload
  - FFS: numerology to be used for paging, Msg.2/4 for other purposes and on-demand OSI

Agreements:

- Discuss further whether NR supports FDM between SS/PBCH block and CORESET/NR-PDSCH
- CORESET is designed at least for TDM

**Thursday**

**R1-1714805 WF on Time Index Indication for Half Radio Frame LG Electronics, ZTE, InterDigital**

**R1-1715238 WF on time index indication for half radio frame and SFN LG Electronics, ZTE, InterDigital, Samsung, Intel, NTT DOCOMO, Nokia, Huawei, HiSilicon, ETRI**

Possible agreements:

- 1 bit of half radio frame timing is indicated by PBCH-DMRS. Also, PBCH-scrambling sequence is initialized by the indication of half radio frame timing.
  - FFS: How to indicate using PBCH-DMRS (e.g. sequence, RE position, mapping rule).
- MSB [7~10]bits of SFN is explicitly indicated in PBCH contents.
  - FFS: Exact bit size of SFN
- LSB [3]bits of SFN is used for PBCH-scrambling sequence for randomization

**R1-1715163 WF on scrambling for NR PBCH Intel**

**Possible working assumption:**

- For NR PBCH,
  - Scrambling based on Cell ID and 3 LSB of SFN or 2nd and 3rd LSB of SFN is applied to prior to encoding process
    - FFS: half radio frame index as part of the initialization
    - Details of scrambling is FFS

**Friday**

**R1-1715246 WF on scrambling for NR PBCH Intel, Huawei, HiSilicon**

Agreements:

- 1st scrambling, initialization based on Cell ID and a part of SFN, is applied to PBCH payload excluding SS block index, half radio frame (if present) and the part of SFN prior to CRC attachment and encoding process
  - The part of SFN is one the following, (to be selected by NR AH3)
    - 3 LSB bits of SFN
    - 2nd and 3rd LSB bits of SFN
  - FFS: half radio frame index as part of the initialization of the 1st scrambling
  - FFS: whether or not half radio frame index is a part of PBCH payload
- FFS: whether or not 2nd scrambling, initialization based on cell ID only, is applied to encoded PBCH bits in a SS block

Not treated.

| | | |
|---|---|---|
| R1-1712059 | NR-PBCH contents | ZTE |
| R1-1712143 | NR-PBCH contents and payload size | Huawei, HiSilicon |
| R1-1712351 | NR PBCH Contents and Payload Size | CATT |
| R1-1712525 | NR PBCH contents | Intel Corporation |
| R1-1712824 | Views on NR-PBCH contents and payload size | vivo |
| R1-1712991 | On NR-PBCH contents | NEC |
| R1-1713123 | Consideration on NR-PBCH contents and payload size | LG Electronics |
| R1-1713374 | PBCH contents and payload size consideration | Qualcomm Incorporated |
| R1-1713554 | NR-PBCH contents and payload size | Samsung |
| R1-1713681 | Further Discussion on PBCH Contents | MediaTek Inc. |
| R1-1713897 | Discussion on NR-PBCH contents and payload size | NTT DOCOMO, INC. |
| R1-1714026 | NR-PBCH content | Nokia, Nokia Shanghai Bell |
| R1-1714035 | NR-PBCH Content and payload size | Ericsson |
| R1-1714131 | On NR-PBCH Contents and Payload | InterDigital, Inc. |



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R1-1714214 Discussion on NR-PBCH contents Motorola Mobility, Lenovo

#### 6.1.1.2.2 NR-PBCH design, PBCH-DMRS design and time index indication mechanism

*Including evaluation and analysis on PBCH-DMRS sequence/mapping design based on email discussion [NRAH2-05], confirmation of WA on SS block index indication, SS block indexing within SS burst set, confirmation of number of PBCH symbols, and PBCH scrambling design,*

*Note that all issues in this sub-agendum need to be resolved in this meeting*

Agreements:

- SS block time locations are indexed from 0 to L-1 in increasing order within a half radio frame according to the agreed SS burst set composition
- For the case of L = 8 or L = 64, 3 LSBs of SS block time index are indicated by 8 different PBCH-DMRS sequences {a_0,…, a_7}
- For the case of L = 4, 2 LSBs of SS block time index are indicated by 4 different PBCH-DMRS sequences {b_0,…, b_3}
  - One remaining bit out of 3 LSBs is set to 0 and not transmitted by PBCH
- {a_0,…,a_3} are same with {b_0, …, b_3} for a given cell ID

Agreement:

- Sequence mapping rule for PBCH-DMRS is frequency-first time-second mapping, in particular lowest to highest frequency mapping

**R1-1714817 Discussion on NR-PBCH DMRS Sequence Ericsson**

Working assumption: (following in red added on Thursday)

- Regarding the number of sequences and sequence mapping rule:
  - Single long sequence is mapped to all PBCH-DMRS REs within a SS block
    - LTE PN generator is reused for PBCH DMRS sequence generation, and related parameters are
      - Gold Code LFSR size: 31
      - Gold Code Polynomials: $x^{31} + x^3 + 1$, $x^{31} + x^3 + x^2 + x + 1$
      - Note that RAN1 may revisit the PN generator for PBCH DMRS if NR supports different PN generator for other usages
- Regarding EPRE offset between PBCH-DMRS and NR-PBCH data:
  - FFS: UE may assume that same EPRE between NR-PBCH DMRS and NR-PBCH data is applied
    - Note that power boosting is up to NW implementation
- Regarding Cell-ID-based frequency shift for PBCH-DMRS RE locations:
  - $v_{shift} = N_{ID}^{cell} \bmod 4$
- Regarding PBCH-DMRS sequence generation:
  - PBCH-DMRS sequence is based on long Gold sequence (e.g., polynomial order >= 30)
    - Sequence modulation is QPSK

Agreement:

- Sequence initialization is based on cell ID and SS block time index carried by PBCH-DMRS

**R1-1713059 PBCH-DMRS design and time index indication mechanism Spreadtrum Communications**
**R1-1713555 NR-PBCH design, PBCH-DMRS design and time index indication mechanism Samsung**
**R1-1713687 Remaining details on NR-PBCH design MediaTek Inc.**
**R1-1713728 DMRS Sequence Design for NR-PBCH and Time Index Indication Huawei, HiSilicon**
**R1-1713375 PBCH and PBCH DMRS design consideration Qualcomm Incorporated**
**R1-1712060 NR-PBCH: DMRS and time index indication ZTE**

R1-1715036 WF on SS block time index indication Huawei, HiSilicon
R1-1715037 Way forward on PBCH DMRS RE Mapping Huawei, HiSilicon

R1-1714916 Way Forward PBCH DMRS Sequence Design Sony, ZTE, InterDigital

Continue offline discussion:

- Regarding the number of sequences and sequence mapping rule:
  - Adopt 2 sequences for PBCH DMRS

**Thursday**

**R1-1715038 Way forward on PBCH DMRS sequence generation Huawei, HiSilicon**

Not treated.

R1-1712275 Discussion on time index indicationFiberHome
R1-1712352 NR PBCH RE mapping in SS Block CATT
R1-1712462 [NRAH2-05] Email discussion on DMRS Sequence for NR PBCH Intel
R1-1712614 Scrambling pattern for partial timing indication over PBCH Sequans Communications
R1-1712959 NR-PBCH DMRS sequence and mapping design Sony
R1-1712992 On SS block indexing NEC
R1-1713124 Discussion on NR-PBCH design and time index indication method LG Electronics
R1-1713291 Discussion on the timing indication of SS block Guangdong OPPO Mobile Telecom
R1-1713898 Discussion on NR-PBCH design and PBCH-DMRS design NTT DOCOMO, INC.
R1-1714027 NR-PBCH DMRS design Nokia, Nokia Shanghai Bell
R1-1714036 Remaining NR-PBCH design with DMRS and scrambling Ericsson
R1-1714132 On NR-PBCH DMRS Design and Time Index Indication InterDigital, Inc.
R1-1714205 Discussion on time index indication of SS block for NR Potevio
R1-1714407 DMRS sequence design for NR-PBCH ITL
R1-1714544 Discussion on SS Block timing Indication Convida Wireless LLC
R1-1714607 NR-PBCH DMRS design and SS block time index indication vivo
R1-1714624 WF on DMRS Indication Samsung
R1-1714636 WF on Indication Method for Half Radio Frame Interval LG Electronics
R1-1714681 NR-PBCH design, PBCH-DMRS design and time index indication mechanism Samsung
R1-1715093 NR PBCH designIntel Corporation

#### 6.1.1.2.3 Remaining minimum system information delivery

*Including numerology used for RMSI delivery and CORESET location indication in NR-PBCH*

R1-1712061 RMSI delivery ZTE
R1-1712147 NR RMSI delivery Huawei, HiSilicon
R1-1712273 Discussion on RMSI delivery Beijing Xinwei Telecom Techn.
R1-1712353 RMSI Delivery CATT
R1-1712527 Remaining Minimun System Information delivery mechanisms Intel Corporation
R1-1712684 Discussion on RMSI delivery Lenovo, Motorola Mobility
R1-1712697 Remaining details of RMSI delivery AT&T
R1-1713125 RMSI delivery and CORESET configurationLG Electronics
R1-1713290 Discussion on the numerology of the RMSI Guangdong OPPO Mobile Telecom
R1-1713376 Remaining system information delivery considerationQualcomm Incorporated
R1-1713556 Remaining minimum system information delivery Samsung
R1-1713683 Further discussion on Remaining minimum system information delivery MediaTek Inc.
R1-1713805 Delivery of remaining minimum system information ETRI
R1-1713832 Common CORESET Design for RMSI scheduling CMCC
R1-1713867 Relation among NR-PBCH, SIBs and subcells Panasonic
R1-1713899 Discussion on remaining minimum system information delivery for NR NTT DOCOMO, INC.
R1-1714028 On Remaining System Information Delivery Nokia, Nokia Shanghai Bell
R1-1714037 NR delivery of remaining minimum system information Ericsson
R1-1714133 On Remaining Minimum System Information Delivery in NR InterDigital, Inc.
R1-1715075 WF on Bandwidth Part for DL common channel transmission LG Electronics, MediaTek, InterDigital, ITL

#### 6.1.1.2.4 Other system information delivery

*Including how to deliver other system information*

Agreement:

- PDSCH carrying the broadcast other system information is scheduled by the PDCCH

Not treated.

R1-1712062 Other SI delivery ZTE
R1-1712151 Discussion on other system information delivery Huawei, HiSilicon
R1-1712354 Delivery of Other System Information CATT
R1-1712685 Discussion on OSI delivery Lenovo, Motorola Mobility
R1-1713126 Other system information delivery LG Electronics



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R1-1713292 Discussion on the on-demand SI Guangdong OPPO Mobile Telecom
R1-1713377 Other system information delivery consideration Qualcomm Incorporated
R1-1713557 Other system information delivery Samsung
R1-1713684 Further discussion on OSI delivery MediaTek Inc.
R1-1713806 Delivery of other system information ETRI
R1-1713900 Discussion on other system information delivery NTT DOCOMO, INC.
R1-1714029 On Other System Information Delivery Nokia, Nokia Shanghai Bell
R1-1714038 NR delivery of other system information Ericsson
R1-1714134 On Other System Information Delivery in NR InterDigital, Inc.

#### 6.1.1.3 Paging design

*Including PO/PF definition, whether/how to multiplex paging DCI and/or message with other signal/channel, spatial QCL assumption with other signal/channel, and paging indication mechanism*

**R1-1715169 WF on paging mechanism Huawei, HiSilicon**

Agreement:
- Paging mechanism should be decided for Rel-15, where the issue of beam sweeping overhead for paging transmission should be considered, especially for high frequency band with up to 64 SS-block beams
  - E.g., paging occasion design with beam sweeping
  - E.g., techniques to reducing the paging sweeping beams

Not treated.
R1-1712063 Paging design in NR ZTE
R1-1714030 Paging in NR Nokia, Nokia Shanghai Bell
R1-1712148 Multi-beam Paging for NR Huawei, HiSilicon
R1-1712355 NR Paging Channel CATT
R1-1712528 NR Paging Design Intel Corporation
R1-1712826 Discussion on NR paging design vivo
R1-1713127 Paging design in NR LG Electronics
R1-1713253 On NR paging design and transmission Guangdong OPPO Mobile Telecom
R1-1713378 Paging design consideration Qualcomm Incorporated
R1-1713558 Paging design Samsung
R1-1713685 Further discussion on paging design MediaTek Inc.
R1-1713833 Discussion on NR paging design CMCC
R1-1713901 Discussion on paging design for NR NTT DOCOMO, INC.
R1-1714039 On NR paging design Ericsson
R1-1714119 NR paging based on paging indication InterDigital, Inc.
R1-1714263 Discussion on paging in NR Xiaomi Technology

#### 6.1.1.4 Physical random access channel and random access procedure

##### 6.1.1.4.1 Remaining details on PRACH preamble formats for long/short sequence length

*Including confirmation of WA on PRACH preamble formats with short sequence, and details on restricted set for PRACH preamble formats with long sequence*

*Note that all issues in this sub-agendum need to be resolved in this meeting*

**R1-1714661 DRAFT WF on Restricted set for PRACH ZTE**

Agreements:
- For NR PRACH preamble L=839 with SCS = 1.25 kHz, Ncs restricted set type B is supported in addition to restricted set type A
- For NR PRACH preamble L=839 with SCS 5kHz, Ncs restricted set type A and type B are supported

**R1-1714729 WF on PRACH Preamble Format for Short sequence with Option 1 LG Electronics, ZTE, NTT DOCOMO**

Agreements:
- At least confirm the working assumption for preamble formats A1, B1, B2, B3



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- ~~Note that A0, C0, C1, and an additional C2 can be discussed in this week~~
- Not define preamble format B0
- Change TCP value from 192 to 216 and TGP value from 96 to 72 for format B1

**Wednesday**

**R1-1714839 WF on Tone Spacings for RACH in Over-6 Qualcomm**

Agreements:

- RACH preamble formats with L = 839 is not supported in over-6 GHz band, and is supported in below-6 GHz
- For short sequence (L = 127/139) based preamble formats, RACH transmission at over-6 GHz band
  - supports 60 and 120 kHz subcarrier spacing, and
  - does not support 15 and 30 kHz subcarrier spacing
- For short sequence (L = 127/139) based preamble formats, RACH transmission at below-6 GHz band
  - supports 15 and 30 kHz subcarrier spacing, and
  - does not support 60 and 120 kHz subcarrier spacing

**R1-1714976 WF on PRACH preamble formats for short sequence length ZTE**

Agreement: Preamble formats for PRACH with short sequence length support preamble formats A0, C0 and C2 in addition to the agreed formats A1, A2, A3, B1, B2, B3 and B4.

| Preamble format | # of seq. | TCP | TSEQ | TGP | Path profile (Ts) | Path profile (us) | Max cell radius (m) | Use case |
|---|---|---|---|---|---|---|---|---|
| C0 | 1 | 1240 | 2048 | 1096 | 144 | 4.69 | 5300 (660 in case of 120 kHz SCS) | Normal cell |
| C2 | 4 | 2048 | 8192 | 2916 | 144 | 4.69 | 9200 (1160 in case of 120 kHz SCS)) | Normal cell |

**Thursday**

**R1-1714801 Ncs for Preamble Generation for PRACH Preamble Format 0-3 LG Electronics, ZTE, InterDigital, NTT DOCOMO**

Agreements:

- Same cyclic shift values as defined in LTE is applied for NR PRACH preamble format 0 and 1.
- FFS: Whether same cyclic shift values as defined in LTE can be applied for NR PRACH preamble format 2 and 3, considering parameters (e.g. delay spread, guard time, filter length, etc.)

Not treated.

R1-1712064 NR-PRACH formats for long/short sequences ZTE
R1-1712274 Discussion on PRACH preamble format design Beijing Xinwei Telecom Techn.
R1-1712356 NR RACH Long and Short Preamble Sequence CATT
R1-1712529 NR PRACH Preamble Design Intel Corporation
R1-1713128 Discussion on PRACH preamble format details LG Electronics
R1-1713339 NR Physical Random Access Channel Nokia, Nokia Shanghai Bell
R1-1713379 PRACH preamble format design for long/short sequence length Qualcomm Incorporated
R1-1713559 Remaining details on PRACH preamble formats for long/short sequence length Samsung
R1-1713730 Remaining details of PRACH formats Huawei, HiSilicon
R1-1713902 Discussion on remaining details on PRACH preamble formats for long/short sequence length NTT DOCOMO, INC.
R1-1714040 Remaining NR-RACH preamble format details Ericsson
R1-1714206 Discussion on supported formats for short sequence and supported restricted set for high speed scenario CMCC

#### 6.1.1.4.2 PRACH preamble format details for capacity enhancement and beam management

*Including necessity and detailed solution for PRACH capacity enhancement, and PRACH design for beam management/recovery*



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R1-1714777 **WF on RACH capacity enhancement** **CATT, Huawei, LGE, Nokia, Qualcomm, InterDigital**
Possible agreements:
- Support PRACH capacity enhancement in Rel-15.
- The following options are considered and the final decision on which option is supported will be determined in RAN1#NR_AH03.
  - *(Option 2)PRACH format design* with OCC across multiple/repeated PRACH preambles
  - *(Option 4)PRACH format design with different ZC sequences* across multiple PRACH preambles
  - *ZC sequences with m-sequence cover*
  - *Sinusoidal modulation on top of Option 1*

Furhter revised in:
R1-1715286 WF on NR PRACH capacity enhancement CATT, Huawei, LGE, Nokia, Qualcomm, InterDigital

Not treated.
R1-1712065 NR-PRACH: capacity enhancements and beam management ZTE
R1-1712152 PRACH preamble sequences and formats for capacity enhancement and beam management Huawei, HiSilicon
R1-1712357 NR RACH Preamble Format for capacity enhancement CATT
R1-1712530 NR PRACH Capacity Analysis Intel Corporation
R1-1712698 PRACH design for beam recovery AT&T
R1-1713129 Discussion on PRACH preamble for capacity enhancement LG Electronics
R1-1713340 PRACH preamble format details for capacity enhancement and beam management Nokia, Nokia Shanghai Bell
R1-1713380 PRACH preamble design for capacity enhancement Qualcomm Incorporated
R1-1713560 PRACH preamble format details for capacity enhancement and beam management Samsung
R1-1713903 Discussion on PRACH preamble format details for capacity enhancement and beam management NTT DOCOMO, INC.
R1-1714041 NR-RACH preamble format details for capacity enhancement and beam management Ericsson
R1-1715272 WF on PRACH preamble short sequence length Nokia, Nokia Shanghai Bell, ZTE, Samsung, LGE, CATT, NTT DOCOMO, Qualcomm, Intel

#### 6.1.1.4.3 Remaining details on power ramping and power control during RA procedure

*Including remaining details on Msg.1 power ramping procedure and Msg.3 power control details*

*Note that all issues in this sub-agendum need to be resolved in this meeting*

R1-1714671 **WF on selection of PRACH resource** **NTT DOCOMO, ZTE, Qualcomm, Sharp, MediaTek, LG Electronics**
Possible agreements:
- It is up to UE implementation how to select the SS block and corresponding PRACH resource for path-loss estimation and (re)transmission based on SS blocks that satisfy threshold(s)
  - FFS: whether threshold(s) for SS block selection is configured or not
  - When UE changes SS block for PRACH resource selection in retransmission, the counter of power ramping keeps unchanged regardless of UE Tx beam switching

**Thursday**
Agreements:
- It is up to UE implementation how to select the SS block and corresponding PRACH resource for path-loss estimation and (re)transmission based on SS blocks that satisfy threshold(s)
  - If UE does not detect a SS block that satisfy threshold(s), it has the flexibility to select any SS block that allows UE to meet the target received power of the RACH preamble with its maximum transmit power
  - UE has a flexibility to select its RX beam to find the list of SS blocks that satisfy the threshold(s)
  - FFS: whether threshold(s) for SS block selection is configured or fixed in the spec
  - Counter of power ramping when UE changes its selected SS-block in message 1 re-transmission is unchanged

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**Wednesday**
R1-1714672 **WF on SS block Tx power and RA Power control ZTE**

Agreements:
- UE computes pathloss based on ”SS block transmit power” and SS block RSRP
- At least one ”SS block transmist power” value is indicated to UE in RMSI
  - FFS: whether and how to support multiple values



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- Note: different SS blocks in an SS burst set can be transmitted with different power and/or with different Tx beamforming gain at least as NW implementation

**Thursday**

**R1-1715230** WF on Maximum Number of PRACH Transmission Mitsubishi

Agreement:

- NR supports the total maximum number of transmissions, M (like LTE), per carrier to indicate Random Access problem
  - M is NW configurable parameter

Not treated.

R1-1712066 Power control during random access procedure ZTE
R1-1712144 Power ramping and power control during RA procedure Huawei, HiSilicon
R1-1712278 On PRACH Msg.1 transmission Mitsubishi Electric Co.
R1-1712358 RACH power control and power ramping procedure in multi-beam configuration CATT
R1-1712531 Power Control for NR PRACH Intel Corporation
R1-1712734 Discussion on power ramping and power control during RA procedure Fujitsu
R1-1712960 On PRACH Msg1 retransmission Sony
R1-1713130 Discussion on Power Control issue for Message 1 and 3 LG Electronics
R1-1713281 Discussion on power ramping and power control during RA procedure Guangdong OPPO Mobile Telecom
R1-1713326 Remaining issues on power ramping in NR Sharp
R1-1713341 Preamble Power Ramping and RACH Message 3 Power Control Nokia, Nokia Shanghai Bell
R1-1713381 Power ramping and power control for RA procedure Qualcomm Incorporated
R1-1713561 Remaining details on power ramping and power control during RACH procedure Samsung
R1-1713700 Power ramping and power control during RA procedure MediaTek Inc.
R1-1713807 Remianing issues on power ramping during RA procedure in NR ETRI
R1-1713904 Discussion on remaining details on power ramping and power control during RA procedure NTT DOCOMO, INC.
R1-1714042 Power ramping and power control during RA procedure Ericsson
R1-1714109 Power ramping for Msg1 preamble re-transmission InterDigital, Inc.
R1-1714215 UE power setting during RA procedure Motorola Mobility, Lenovo
R1-1714867 WF on power ramping and beam switching Huawei, HiSilicon, NTT Docomo, LGE

#### 6.1.1.4.4 4-step RA procedure

*Including RACH parameter sets association details, Msg.2/3/4 channel design (including HARQ), and details on dedicated RACH resource indication (time/frequency/sequence)*

**R1-1715016 WF on RAR window design MediaTek, Qualcomm, Intel**

Agreements:

- At least for initial access, RAR is carried in NR-PDSCH scheduled by NR-PDCCH in CORESET configured in RACH configuration
  - Note: CORESET configured in RACH configuration can be same or different from CORESET configured in NR-PBCH
- For single Msg1 RACH, the RAR window starts from the first available CORESET after a fixed duration from the end of Msg1 transmission
  - The fixed duration is X T_s
  - X is the same for all RACH occasions
  - FFS: whether CORESET starting position is aligned with slot boundary
  - FFS: the value of X
  - FFS: whether X is frequency range dependent
- For a single Msg1 RACH from UE,
  - The size of a RAR window is the same for all RACH occasions and is configured in RMSI
  - RAR window could accommodate processing time at gNB.
    - Maximum window size depends on worst case gNB delay after Msg1 reception including processing delay, scheduling delay, etc
    - Minimum window size depends on duration of Msg2 or CORESET and scheduling delay
- FFS: multiple Msg1 RACH case if supported



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Agreement:

- For initial access, either long sequence based preamble or short sequence based preamble is configured in a RACH configuration

**R1-1714963 WF on NR PRACH Numerology CATT**

Agreements:

- For contention-based NR 4-step RA procedure
  - SCS for Msg 1
    - configured in the RACH configuration
  - SCS for Msg 2
    - the same as the numerology of RMSI
  - SCS for Msg 3
    - configured in the RACH configuration separately from SCS for Msg1
  - SCS for Msg 4
    - the same as in Msg.2
- For contention-free RA procedure for handover, the SCS for Msg1 and the SCS for Msg2 are provided in the handover command

**R1-1715068 WF on SS Block Index Reporting through RACH Procedure Qualcomm, AT&T, Sony**
**R1-1715236 WF on SS Block Index Reporting through RACH Procedure Qualcomm, AT&T, Sony**

Agreements:

- NR studies reporting of SS block index, e.g., strongest SS block index, through Msg3 of contention based random access
- NR studies reporting of multiple SS block indices through Msg1 of contention free random access procedure
  - e.g. network can assign multiple RACH transmission times and RACH preambles to the UE. UE can convey one SS block index by selecting a RACH transmission time and another SS block index implicitly by selecting a RACH preamble

Not treated.

R1-1712067 4-step random access procedure ZTE
R1-1712145 RACH procedures and resource configuration Huawei, HiSilicon
R1-1712359 Further details on NR 4-step RA Procedure CATT
R1-1712532 NR Random Access procedure Intel Corporation
R1-1712699 RACH configuration details AT&T
R1-1712735 Discussion on 4-step RA procedure Fujitsu
R1-1712961 On 4-step RACH procedure Sony
R1-1713131 RACH Procedure LG Electronics
R1-1713282 NR 4-Step Random Access Procedure Guangdong OPPO Mobile Telecom
R1-1713342 NR 4-step RACH procedure Nokia, Nokia Shanghai Bell
R1-1713382 4 step RACH procedure consideration Qualcomm Incorporated
R1-1713562 4-step RACH procedure Samsung
R1-1713701 On 4-step RACH procedure MediaTek Inc.
R1-1713905 Discussion on 4-step RA procedure NTT DOCOMO, INC.
R1-1714043 4-step random access procedure Ericsson
R1-1714110 RACH configuration of Multiple Msg1 transmissions before the end of a monitored RAR window InterDigital, Inc.
R1-1714173 Discussion on RACH configuration and Msg.2 transmission CMCC
R1-1714216 RACH resource configuration and selection Motorola Mobility, Lenovo
R1-1715265 WF on information reporting through RACH procedure Qualcomm

#### *6.1.1.5 Mobility procedure*

##### 6.1.1.5.1 Measurement based on SS block

*Including measurement configuration details, RSRP definition for SS block based measurement, and necessity and definition of signal quality measurement such as RSRQ/SINR based on SS block*

**R1-1714669 WF on SS block based RSRQ/SINR measurements NTT DOCOMO**

Agreements:



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- In NR RRM measurement for L3 mobility,
  - RSRQ based on SS/PBCH block is introduced for both below-6 and above-6 GHz for UE in IDLE and CONNECTED mode
  - RSRQ based on CSI-RS for L3 mobility is introduced for both below-6 and above-6 GHz for UE in CONNECTED mode
  - RS-SINR based on SS/PBCH block is introduced for both below-6 and above-6 GHz for UE in CONNECTED mode
  - RS-SINR based on CSI-RS for L3 mobility is introduced for both below-6 and above-6 GHz for UE in CONNECTED mode
  - SS block based RSRQ/RS-SINR are at least based on SS/PBCH-RSRP, and CSI-RS based RSRQ/RS-SINR are at least based on CSI-RSRP
  - FFS: how to define RSRQ and RS-SINR, e.g.,
    - Which time/frequency resource(s) are used for RSSI/interference measurement
    - Whether/how to indicate the resource(s) for RSSI/interference measurement
    - How to treat UE RX beam for RSRQ/RS-SINR measurement
  - RAN1 strives to have common definition on RSRQ and RS-SINR for below-6 and above-6 GHz

**Thursday**

**R1-1715112 On the UE RX beam assumption in RRM measurement definitions Nokia**

Not treated.

R1-1712068 RRM measurements on SS block ZTE
R1-1712360 IDLE and CONNECTED mode UE mobility based on SS-block measurements CATT
R1-1712533 Signal quality measurements from SS Blocks Intel Corporation
R1-1712700 Measurement based on SS block AT&T
R1-1713061 Discussion on the association between the SMTC and the measurement object Spreadtrum Communications
R1-1713132 SS block based RRM Measurement LG Electronics
R1-1713254 On RRM measurement based on SS block Guangdong OPPO Mobile Telecom
R1-1713383 Measurement based on SS block consideration Qualcomm Incorporated
R1-1713563 Measurement based on SS block Samsung
R1-1713777 Measurement Based on SS Block Huawei, HiSilicon
R1-1713906 Discussion on NR RRM measurement based on SS block NTT DOCOMO, INC.
R1-1714031 Measurements on SS block Nokia, Nokia Shanghai Bell
R1-1714044 Mobility measurements based on SS block Ericsson
R1-1714222 Discussion on signal quality measurements for NR CMCC
R1-1714267 Discussion on measurement based on SS block MediaTek Inc.

#### 6.1.1.5.2 Measurement based on CSI-RS for L3 mobility

*Including additional CSI-RS configuration parameters, methods to obtain CSI-RS configuration parameters, measurement configuration details and RSRP definition for CSI-RS based measurement*

R1-1715030 WF on CSI-RS configuration for C-DRX UE Huawei
Further revised in R1-1715166.

**R1-1715114 On the CSI-RS measurements for L3 mobility in conjunction with C-DRX Nokia**

Agreements:

- UE is not required to measure CSI-RS configured for L3 mobility outside the active time
- Note exact definition of C-DRX active time depends on RAN2
  - In this context the active time referred by RAN1 relates to the time when UE is monitoring PDCCH in onDuration or due to any timer triggered by gNB activity
    - I.e. when any of 'onDurationTimer', 'drx-InactitivityTimer' or ' drx-RetransmissionTimer' is running
- FFS:
  - whether CSI-RS for L3 mobility is configured only within C-DRX UE's active time for C-DRX operation
  - whether UE should not assume that configured CSI-RS resources for L3 mobility are present outside the active time

**R1-1715031 WF on CSI-RS sequence generation for L3 mobility Huawei, HiSilicon**

Agreements:

- Sequence design used for CSI-RS for beam management is baseline



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- For CSI-RS based RRM measurement for L3 mobility, CSI-RS sequence seed to generate CSI-RS sequence is UE-specifically configured
- FFS: sufficient CSI-RS sequence seed size for L3 mobility

**R1-1715106 WF on CSI-RS resources for L3 mobility Ericsson**

Working assumptions:

- Design of [1 or 2] port CSI-RS resources for beam management is reused for CSI-RS for L3 mobility
- Values of D for CSI-RS for beam management are reused for CSI-RS for L3 mobility
- FFS: maximum number of CSI-RS resources in total for L3 mobility that can be configured to a UE
- For one cell, all CSI-RS resources for L3 mobility are confined to X slot(s)
  - FFS: value of X

**R1-1715113 On the CSI-RS based RSRP definition Nokia**

Agreement:

- CSI-RSRP measurement quantity should be defined per configured CSI-RS port

Not treated.

| | | |
|---|---|---|
| R1-1712069 | RRM measurements on CSI-RS for L3 mobility | ZTE |
| R1-1712361 | L3 Mobility based on CSI-RS based measurements | CATT |
| R1-1712534 | CSI-RS based RRM measurements | Intel Corporation |
| R1-1712701 | Measurement based on CSI-RS for L3 mobility | AT&T |
| R1-1712827 | Measurement based on CSI-RS for L3 mobility | vivo |
| R1-1713133 | CSI-RS based RRM Measurement for L3 Mobility | LG Electronics |
| R1-1713255 | On RRM measurement based on CSI-RS | Guangdong OPPO Mobile Telecom |
| R1-1713384 | Measurement based on CSI-RS for L3 mobility consideration | Qualcomm Incorporated |
| R1-1713564 | Measurement based on CSI-RS for L3 mobility | Samsung |
| R1-1713729 | Measurement based on CSI-RS for L3 mobility | Huawei, HiSilicon |
| R1-1713907 | Discussion on NR RRM measurement based on CSI-RS for L3 mobility | NTT DOCOMO, INC. |
| R1-1714032 | Measurements on CSI-RS for L3 Mobility | Nokia, Nokia Shanghai Bell |
| R1-1714045 | Mobility measurements based on CSI-RS | Ericsson |
| R1-1714268 | Discussion on CSI-RS for L3 mobility | MediaTek Inc. |

#### 6.1.1.5.3 Radio link monitoring

*Including relationship between RLM and beam failure recovery and remaining details on RLM such as RLM RS configuration (e.g., single RS or multiple RSs at a time), RLM criterion and conditions for IS/OOS indication (e.g., single resource/beam based or multiple resources/beams based)*

**R1-1714670 WF on configuration of RS used for radio link monitoring NTT DOCOMO**

Agreements:

- NR supports RLM on PCell and PSCell only
- For RLM, NR supports to configure a single type of RS for a CORESET for a UE at a time
  - FFS on interference measurement resource for each RS type
- Signal and interference measurements for a given CORESET may be performed by using same RX beam

Continue offline discussion – Hiroki (DOCOMO)

- FFS whether NR defines Q_in and Q_out thresholds per CORESET
- FFS whether different RS types can be configured to different CORESETs for RLM

**Wednesday**

Agreement: Support to configure single RLM-RS type only to different RLM-RS resources for a UE at a time

Agreements:

- Hypothetical PDCCH BLER is used as the metric for determining IS/OOS conditions for both SS/PBCH block based and CSI-RS based RLM
- UE assumes same antenna port between hypothetical PDCCH and RS used for RLM
- FFS: UE assumes QCL relationship between PDCCH transmitted in a CORESET and RS configured for the CORESET with respect to spatial, average gain, delay and Doppler parameters



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R1-1714674 **WF on IS/OOS for RLM ZTE**

Agreements:

- NR supports to configure X RLM-RS resource(s)
  - One RLM-RS resource can be either one SS/PBCH block or one CSI-RS resource/port
  - The RLM-RS resources are UE-specifically configured at least in case of CSI-RS based RLM
  - FFS: how to configure RLM-RS resources in case of SS/PBCH block based RLM
  - FFS: whether/which the default RLM-RS resource(s) is defined
  - FFS: whether configured RLM-RS resource(s) and RS(s) used for beam failure detection are same or different set
  - FFS: in case of CSI-RS based RLM, which CSI-RS is used, beam management CSI-RS or L3 mobility CSI-RS
  - FFS: if/how to configure interference measurement resource for RLM
    - The symbols used for interference measurement can be same or different from the symbol from RLM-RS resource(s)
- When UE is configured to perform RLM on one or multiple RLM-RS resource(s),
  - Periodic IS is indicated if the estimated link quality corresponding to hypothetical PDCCH BLER based on at least Y RLM-RS resource among all configured X RLM-RS resource(s) is above Q_in threshold
    - FFS: Y is configurable or fixed, and the value, e.g., Y=1

Continue offline discussion

- FFS: Periodic OOS is indicated
  - Option 1: based on beam failure
  - Option 2: if the estimated link quality corresponding to hypothetical PDCCH BLER based on all configured X RLM-RS resource(s) is below Q_out threshold

**Thursday**

Agreements:

- Periodic OOS is indicated
  - If the estimated link quality corresponding to hypothetical PDCCH BLER based on all configured X RLM-RS resource(s) is below Q_out threshold
    - FFS: The evaluation of OOS takes beam failure recovery procedure into account
  - FFS: Aperiodic OOS

R1-1715146 **WF on IS/OOS for RLM ZTE**

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R1-1714962 **WF on RLM threshold CATT**

Continue discussion

- NR supports configurable Q_in/Q_out thresholds per UE
  - A UE is configured with single Q_in threshold and single Q_out threshold
  - Option 1: the network to make adjustment of the RLM out-of-sync and in-sync thresholds for a UE through UE-specific signaling
  - Option 2: the network to make adjustment of the BLERs of PDCCH corresponding to the the out-of-sync and in-sync thresholds for a UE through UE-specific signaling
  - Option 3: the network to select among restricted sets of Qin/Qout thresholds for a UE through UE-specific signaling
  - Other option is not precluded

**Thursday**

R1-1715213 **WF on Q_in and Q_out thresholds for radio link monitoring NTT DOCOMO, Ericsson, AT&T**
R1-1715226 **Way Forward for NR RLM Thresholds CATT, AT&T, NTT DOCOMO**

Agreements:

- NR supports x in-sync BLERs and x out-of-sync BLERs for a hypothetical PDCCH
  - The number of different BLER values x in the range of [1 < x <= 3]
  - FFS: One or more in-synch BLER and one or more out-of-synch BLER is configured per UE at a time
  - FFS: Default one in-synch BLER and one out-of-synch BLER values are used if not configured.
  - FFS: the values of the BLERs of for hypothetical PDCCH corresponding to x In-synch and x out-of-synch thresholds

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R1-1715032 **WF on radio link monitoring Huawei**

Continue discussion:



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- NR supports UE to send aperiodic indications from success of beam recovery procedure to L3 to reset T310.

**R1-1715208 WF on radio link monitoring and beam failure recovery Huawei, HiSilicon, Qualcomm, ATT, MediaTek, CATT**

Not treated.

R1-1712070 Radio link monitoring in NR ZTE
R1-1712146 Radio link monitoring and beam failure recovery Huawei, HiSilicon
R1-1712362 NR Radio Link Monitoring CATT
R1-1712535 NR Radio link monitoring Intel Corporation
R1-1712702 Radio link monitoring AT&T
R1-1712828 Radio link monitoring in NR vivo
R1-1713134 Discussion on Radio Link Monitoring in NR LG Electronics
R1-1713385 Radio link monitoring consideration Qualcomm Incorporated
R1-1713565 Radio link monitoring Samsung
R1-1713908 Discussion on NR RLM and RLF NTT DOCOMO, INC.
R1-1714033 Radio Link Monitoring in NR Nokia, Nokia Shanghai Bell
R1-1714046 Radio link monitoring Ericsson
R1-1714269 Discussion on Radio Link Monitoring MediaTek Inc.

#### *6.1.1.6 Other*

R1-1712149 On numerology determination during initial access Huawei, HiSilicon
R1-1713566 Considerations on PRACH design in high-mobility scenario Samsung
R1-1713567 RAR contents Samsung
R1-1713568 Discussion on SS peirodicity and PBCH TTI Samsung
R1-1713569 Discussion on MSG. 3 tx timing determination Samsung
R1-1713570 Discussion on RACH design Samsung
R1-1713571 Assisted information for MSG. 3 tx beam determination Samsung
R1-1713572 RRM for wider bandwidth operations Samsung
R1-1713731 Minimum UE bandwidth in NR Huawei, HiSilicon
R1-1714047 Consideration of PRACH Configuration in NR Ericsson
R1-1714048 Additional synchronization provision Ericsson
R1-1714363 On Design Aspects for NR-based access to Unlicensed Spectrum Panasonic
R1-1714560 RAR detection for contention free random access Samsung
R1-1714579 On SS/PBCH Block Transmissions Samsung

### 6.1.2 MIMO

#### *6.1.2.1 Multi-antenna scheme*

*Physical control channel related issues are to be discussed in the agenda item for scheduling/HARQ aspects.*

##### 6.1.2.1.1 Remaining details on codeword mapping

**R1-1714662 Summary of Open Issues on Layer Mapping Samsung**

**R1-1714664 WF on CW to layer mapping scheme for CP-OFDM data channels Qualcomm, Nokia, NSB, Intel, ATT, Ericsson, Samsung, KDDI, Panasonic, Verizon, CHTTL , Sharp, NEC, CATT, Interdigital**
Also supported by BT

Agreements:

- For DL data channel, the modulated symbol stream associated with a codeword (CW) is only mapped to the allocated resource with the following order in Rel-15 NR:
  - First across layers associated with the codeword (CW), then across subcarriers (frequency) and then across OFDM symbols (time)
  - For UL data channel with CP-OFDM waveform, support the same layer mapping procedure with DL
- No frequency and/or time interleaving is supported in Rel-15 NR
- FFS for DFT-s-OFDM uplink with and without frequency hopping
- Note that additional layer correspondence can be a separate discussion from 3 to 8 layers

**R1-1714598 Details on Resource Element Mapping NTT DOCOMO**



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Continue offline discussion – Yuichi (DOCOMO)

R1-1715161 **WF on RE mapping for DFT-s-OFDM NTT DOCOMO, Huawei, HiSilicon, Intel, Mediatek, Qualcomm**

R1-1714886 **WF on CW to layer mapping Huawei, HiSilicon, Deutsche Telekom, LGE, ETRI, ZTE, Lenovo, Motorola, China Unicom**
R1-1714879 **WF on codeword mapping MediaTek, ZTE, Vivo**

R1-1713386 **CW to layer mapping and frequency domain interleaving Qualcomm Incorporated**
R1-1712228 **Codeword to layer mapping in NR Huawei, HiSilicon**
R1-1714270 **Remaining details for codeword to layer mapping for DL and UL Ericsson**
R1-1713135 **Discussion on codeword mapping LG Electronics**
R1-1712703 **Codeword to Layer Mapping for NR AT&T**

Not treated.
R1-1712284 Remaining details of codeword mapping and interleaving ZTE
R1-1712363 On codeword mapping CATT
R1-1712536 Remaining details on CW to MIMO layer mapping Intel Corporation
R1-1712670 Discussion on codeword to resource mapping Lenovo, Motorola Mobility
R1-1712829 On remaining details of codeword mapping vivo
R1-1713573 Finalizing Layer Mapping Samsung
R1-1713808 Discussion on codeword mapping ETRI
R1-1714203 Discussion on Codeword Mapping Potevio

#### 6.1.2.1.2 Codebook based transmission for UL

R1-1715147 **Summary of offline session on UL MIMO Ericsson**

Agreements:
- For DFT-S-OFDM, use rank 1 precoders from table below for 2 Tx with wideband TPMI only
  - Note: in the following table "codebook index" should be called "TPMI index"

| Codebook index | Number of layers $\upsilon$ | |
|---|---|---|
| | 1 | 2 |
| 0 | $\frac{1}{\sqrt{2}}\begin{bmatrix}1\\1\end{bmatrix}$ | $\frac{1}{2}\begin{bmatrix}1 & 1\\1 & -1\end{bmatrix}$ |
| 1 | $\frac{1}{\sqrt{2}}\begin{bmatrix}1\\-1\end{bmatrix}$ | $\frac{1}{2}\begin{bmatrix}1 & 1\\j & -j\end{bmatrix}$ |
| 2 | $\frac{1}{\sqrt{2}}\begin{bmatrix}1\\j\end{bmatrix}$ | $\frac{1}{\sqrt{2}}\begin{bmatrix}1 & 0\\0 & 1\end{bmatrix}$ |
| 3 | $\frac{1}{\sqrt{2}}\begin{bmatrix}1\\-j\end{bmatrix}$ | |
| 4 | $\frac{1}{\sqrt{2}}\begin{bmatrix}1\\0\end{bmatrix}$ | |
| 5 | $\frac{1}{\sqrt{2}}\begin{bmatrix}0\\1\end{bmatrix}$ | |

Agreements:
- For CP-OFDM
  - At least TPMI indices 0-3 for rank 1 and TPMI indices 0 and 1 for rank 2 are used
  - One of the two following Antenna port selection mechanisms is supported;
    - Decide among the two alternatives in RAN1# 90bis
    - Alt 1: TPMI indices 4 and 5 for rank 1, and 2 for rank 2, from the above table are used for CP-OFDM
    - Alt 2: SRI indicates selected antenna ports

Agreements:
- For 2 Tx, use single stage DCI with a semi-statically configured size to convey TPMI, SRI, TRI in Rel-15
- Total combined DCI size of TPMI, TRI, and SRI does not vary with PUSCH resource allocation for single stage DCI
- Specify UE capability identifying if UL MIMO capable UE can support coherent transmission across its transmit chains



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- FFS: if UE capability identifies if coherent transmission is supported on all of, vs. none of, vs. on a subset, of its transmit chains
- FFS: how UL MIMO precoding design takes into account the above capability

Not treated.

| | | |
|---|---|---|
| R1-1712285 | Codebook based UL transmission | ZTE |
| R1-1712364 | Discussion on codebook based UL MIMO transmission | CATT |
| R1-1712537 | On codebook based UL tansmission | Intel Corporation |
| R1-1712704 | On Uplink Transmision with Codebook for NR | AT&T |
| R1-1712830 | Discussion on codebook based UL transmission | vivo |
| R1-1713136 | Discussion on codebook based transmission for UL | LG Electronics |
| R1-1713241 | On uplink codebook design | Guangdong OPPO Mobile Telecom |
| R1-1713387 | Codebook based UL transmission | Qualcomm Incorporated |
| R1-1713574 | Codebook-Based UL Transmission | Samsung |
| R1-1713689 | Codebook based transmission in UL | MediaTek Inc. |
| R1-1713766 | Codebook based transmission for UL MIMO | Huawei, HiSilicon |
| R1-1713910 | Codebook based transmission for uplink | NTT DOCOMO, INC. |
| R1-1714135 | TPMI Indication for Frequency Selective UL Precoding | InterDigital, Inc. |
| R1-1714235 | UL Codebook Based Transmission and Codebook Design | Nokia, Nokia Shanghai Bell |
| R1-1714271 | UL MIMO for codebook based transmission | Ericsson |
| R1-1714665 | Summary of Issues and WFs on Codebook based transmission for UL | Intel |
| R1-1715076 | WF on UL codebook design | LG Electronics, Ericsson |

#### 6.1.2.1.3 Non-codebook based transmission for UL

**R1-1714945 WF on Non-Codebook based UL Transmission Huawei, HiSilicon, DOCOMO, Ericsson, InterDigital, LGE, Sharp, China Telecom, ZTE, Sanechips, Nokia, NSB, AT&T, China Unicom, Spreadtrum, Fujitsu, CeWiT, Intel, IITM, Mitsubishi, MediaTek, Lenovo, IITH, Tejas Networks, CATT**
Also supported by Vodafone

**R1-1715235 WF on Non-Codebook based UL Transmission Huawei, HiSilicon, DOCOMO, Ericsson, InterDigital, LGE, Sharp, China Telecom, ZTE, Sanechips, Nokia, NSB, AT&T, China Unicom, Spreadtrum, Fujitsu, CeWiT, Intel, IITM, Mitsubishi, MediaTek, Lenovo, IITH, Tejas Networks, CATT, VDF, Samsung**

Not treated.

| | | |
|---|---|---|
| R1-1712229 | Non-codebook based transmission for UL MIMO | Huawei, HiSilicon |
| R1-1712286 | Non-Codebook based and Hybrid based UL transmission | ZTE |
| R1-1712365 | Discussion on non-codebook based UL MIMO transmission | CATT |
| R1-1712538 | On non-codebook based UL transmission | Intel Corporation |
| R1-1712705 | On Non Codebook based UL Transmisions | AT&T |
| R1-1712831 | Discussion on non-codebook based UL transmission | vivo |
| R1-1713137 | Discussion on non-codebook based transmission for UL | LG Electronics |
| R1-1713242 | Design of uplink non-codebook transmission | Guangdong OPPO Mobile Telecom |
| R1-1713388 | Non-codebook based UL transmission | Qualcomm Incorporated |
| R1-1713575 | Discussion on Non-Codebook-Based UL Transmission | Samsung |
| R1-1713911 | Beam determination for non-codebook based transmission for uplink | NTT DOCOMO, INC. |
| R1-1714236 | Non-codebook based UL-MIMO transmission | Nokia, Nokia Shanghai Bell |
| R1-1714272 | UL MIMO for non-codebook based transmission | Ericsson |
| R1-1715018 | Summary of issues on UL non-codebook based transmissions | Nokia, Nokia Shanghai Bell |

#### 6.1.2.1.4 Diversity transmission for UL

| | | |
|---|---|---|
| R1-1713767 | Diversity-based transmission for UL | Huawei, HiSilicon |
| R1-1714136 | On the Performance of Uplink Transmit Diversity Schemes | InterDigital, Inc. |
| R1-1714603 | On UL diversity transmission scheme | Qualcomm Incorporated (R1-1713389) |

**R1-1715217**

Agreements:

- For CP-OFDM waveform based PUSCH, operation with UL transmission diversity is transparent to specification
- Send an LS to RAN4 to inform the agreements for them to consider for their future work – Cristina (Mitsubishi). LS in R1-1715273, which is endorsed and finally approved in **R1-1715274**



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Agreements:

- For DFTsOFDM waveform based PUSCH, further consider the following alternatives:
  - Alt. 1: Alamouti-based transmit diversity is supported for PUSCH with DFTsOFDM
    - Note: there are several possible schemes proposed in various contributions.
    - FFS exact scheme with the aim to finalize in the next meeting
  - Alt. 2: Time domain beam/precoder cycling is supported for PUSCH with DFTsOFDM
    - FFS exact scheme with the aim to finalize in the next meeting
- If Alt 1 and Alt 2 is not supported or either of them is supported and is not configured
  - Alt. 3: For NR in Rel-15, UL transmit diversity is not explicitly supported for PUSCH with DFTsOFDM.
- Companies are encouraged to further perform analysis and evaluations (link and/or system-level) regarding the above schemes

**R1-1715078 WF on uplink 1Tx transmission mode Nokia, NSB, Qualcomm, Samsung, MediaTek, Ericsson**
Also supported by AT&T, CATT

Not treated.

| | | |
|---|---|---|
| R1-1712269 | UL diversity transmission for DFTsOFDM | Mitsubishi Electric RCE |
| R1-1712287 | Diversity based uplink transmission schemes | ZTE |
| R1-1712366 | Further discussion on transmit diversity scheme in UL | CATT |
| R1-1712539 | On diversity based UL transmission | Intel Corporation |
| R1-1712706 | UL Diversity based Transmisson Scheme for NR | AT&T |
| R1-1712832 | Discussion on diversity transmission for UL | vivo |
| R1-1713138 | Discussion on diversity transmission for UL | LG Electronics |
| R1-1713576 | Diversity transmission for UL | Samsung |
| R1-1713767 | Diversity-based transmission for UL | Huawei, HiSilicon |
| R1-1714136 | On the Performance of Uplink Transmit Diversity Schemes | InterDigital, Inc. |
| R1-1714204 | Discussion on diversity transmission for UL | Potevio |
| R1-1714237 | UL-MIMO diversity-based transmission | Nokia, Nokia Shanghai Bell |
| R1-1714273 | Robust Transmission Scheme for PUSCH | Ericsson |
| R1-1714603 | On UL diversity transmission scheme | Qualcomm Incorporated |
| R1-1715062 | WF on UL transmit diversity indication | vivo |

#### 6.1.2.1.5 PRB bundling for DL

**R1-1712540 On PRB bundling for DL Intel Corporation**
**R1-1713390 Discussion on PRB bundling for DL Qualcomm Incorporated**

Continue offline discussion – Peng (vivo)
**R1-1715180 Summary of Issues on DL PRB bundling vivo**
Proposals:
R1-1715063 WF on DL PRB bundling vivo, Huawei, Hisi, Qualcomm, Nokia, E///, [Samsung]
Further revised in R1-1715222.

Agreement:

- PRB bundle is based on absolute PRB-grid of a component carrier

Agreements:

- For DL unicast data transmission:
  - Case 1 PRB bundling size values are at least 2 and 4
    - FFS whether or not to additionally support PRB bundling size 1 – companies are encouraged to perform analysis and evaluations especially w.r.t. PRB bundling sizes 2 and 4
- FFS: PRG configuration for broadcast PDSCH

Not treated.

| | | |
|---|---|---|
| R1-1712231 | PRB bundling size for DL data precoding | Huawei, HiSilicon |
| R1-1712288 | On PRB Bundling | ZTE |
| R1-1712367 | PRB bundling for DL transmission | CATT |
| R1-1712833 | Discussion on PRB bundling for DL | vivo |
| R1-1713054 | Discussion on PRB Bundling Size Indication for NR DL | Spreadtrum Communications |
| R1-1713577 | PRB bundling for NR DMRS | Samsung |
| R1-1714137 | On Dynamic PRG Size Configuration in NR | InterDigital, Inc. |


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R1-1714238 On remaining issues on PRB bundling Nokia, Nokia Shanghai Bell
R1-1714274 PRB bundling for DL Ericsson
R1-1715222 WF on DL PRB bundling vivo

#### 6.1.2.1.6 Multi-TRP and multi-panel transmission

**R1-1712230 Multiple NR-PDCCH for multiple TRP transmission Huawei, HiSilicon**
**R1-1712368 Considerations on DL multi-panel and multi-TRP transmission CATT**

Continue discussion offline – Xin (CATT)
**R1-1715046 Summary of views on multi-TRP/panel transmission CATT**
**R1-1714956 WF on multi-TRP transmission Huawei, HiSilicon**

Agreements:

- The maximum supported number of NR-PDCCHs corresponding to scheduled NR-PDSCHs that a UE can be expected to receive in a single slot is 2 on a per component carrier basis in case of one bandwidth part for the component carrier
  - FFS the case of multiple BWPs for the component carrier if supported
  - (Working assumption) In this case, at most a total of 2 CWs over the scheduled NR-PDSCHs
- For multiple NR-PDCCH reception for scheduled NR-PDSCHs:
  - FFS whether or not there is any impact on # of HARQ processes and/or soft buffer management
  - FFS the mapping between PUCCH conveying ACK/NACK signalling and PDSCH
  - Note: this topic is more suitable for discussion under scheduling/HARQ session

**R1-1715165 WF on CSI feedback for NCJT LGE**

Not treated.
R1-1712289 Multi-TRP Transmission and interference coordination ZTE
R1-1712541 Discussion on uplink multi-panel and multi-TRP operation Intel Corporation
R1-1712542 Support of downlink NC-JT in NR Intel Corporation
R1-1712707 On the details of multi-TRP and multi-panel transmission AT&T
R1-1712736 Discussion on multiple NR-PDCCHs in NC-JT scheme Fujitsu
R1-1712834 Discussion on Multi-panel Multi-TRP transmission for UL vivo
R1-1712962 Considerations on Multiple TRP/Panel Transmission Sony
R1-1713139 Discussion on cooperative transmission LG Electronics
R1-1713283 Discussion on NR Downlink Multi-TRP and Multi-panel Transmission Guangdong OPPO Mobile Telecom
R1-1713284 Discussion on NR Uplink Multi-TRP and Multi-panel Transmission Guangdong OPPO Mobile Telecom
R1-1713391 On multi-TRP and multi-panel transmission Qualcomm Incorporated
R1-1713578 Discussions on NR DL network coordination Samsung
R1-1713579 Discussions on NR UL multi-panel/multi-TRP Samsung
R1-1713691 Multi-TRP and panel transmission MediaTek Inc.
R1-1713836 Discussion on multi-layer transmission with analog beam CMCC
R1-1714138 DCI Design for Multi-TRP/Panel Transmission for DL InterDigital, Inc.
R1-1714188 Discussion on multi-TRP transmission ITRI
R1-1714239 Remaining details on multi-TRP transmission Nokia, Nokia Shanghai Bell
R1-1714240 NC-JT for uplink multi-panel multi-TRP operation Nokia, Nokia Shanghai Bell
R1-1714275 DL multi-TRP and multi-panel transmission Ericsson
R1-1714276 UL multi-panel transmission Ericsson
R1-1714345 Discussion on UL multi-panel/TRP operation Huawei, HiSilicon
R1-1715014 WF on Single DCI based NCJT LG Electronics

#### 6.1.2.1.7 Rate matching

**R1-1714932 Summary of views on PDSCH and PUSCH rate matching LGE**
**R1-1715033 WF on PDSCH and PUSCH rate matching behaviour LG Electronics, Intel, Samsung, Ericsson, NTT DOCOMO**
Conclusion:

- FFS PDSCH rate matching/puncturing w.r.t. at least the following signals.
  - NZP CSI-RS resource(s) for channel measurement
  - DMRS for PDSCH for the UE.
  - DL PTRS
  - TRS
  - FFS: NZP CSI-RS for interference measurement



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  - Impact due to CLI if any
  - Note: PDSCH rate matching for DL control channel, SS block, reserved resource are out of MIMO scope
- FFS PUSCH rate matching/puncturing w.r.t. at least the following signals
  - DMRS for PUSCH for the UE.
  - SRS
  - UL PTRS
  - Impact due to CLI if any
  - Note: PUSCH rate matching for UL control channel, reserved resource are out of MIMO scope

Not treated.

R1-1712233 Rate matching for data channels Huawei, HiSilicon
R1-1712290 Discussion on rate matching ZTE
R1-1712543 Rate matching for NR Intel Corporation
R1-1712708 On the need of per RE level PDSCH rate-matching and RE mapping signalling AT&T
R1-1712737 CSI-RS resource indication for rate matching Fujitsu
R1-1712835 Discussion on rate matching vivo
R1-1713048 Discussion on rate matching for data channel Spreadtrum Communications
R1-1713140 Discussion on rate matching LG Electronics
R1-1713243 PDSCH and PUSCH Rate matching for RS Guangdong OPPO Mobile Telecom
R1-1713392 On PDSCH and PUSCH RE mapping Qualcomm Incorporated
R1-1713580 On PDSCH/PUSCH rate matching for NR Samsung
R1-1713975 RE resources for PDSCH rate matching PANASONIC
R1-1714241 Configuration and signalling of resources for rate matching Nokia, Nokia Shanghai Bell
R1-1714277 On rate matching Ericsson
R1-1715034 WF on RMR types LG Electronics

#### 6.1.2.1.8 Other

R1-1712232 Discussion on transmission parameter sets Huawei, HiSilicon
R1-1712291 On Transmission Setting ZTE
R1-1713581 Multi-TA procedures for Multi-TRP Samsung
R1-1713582 CSI Feedback Overhead Reduction for NCJT Samsung
R1-1713583 Discussion on transition between NR network coordination schemes Samsung
R1-1713584 Discussion on transmission parameter sets Samsung
R1-1713585 Continuous precoding for NR DMRS in time domain Samsung
R1-1714242 Transmission modes for UL MIMO Nokia, Nokia Shanghai Bell
R1-1714278 On transmission parameter sets Ericsson
R1-1714344 On the performance of the multi-subband UL MIMO and channel rank properties Huawei, HiSilicon
R1-1714577 Discussions on Implication of Beam Measurement and Reporting on Interference Management Samsung
R1-1714578 System level evaluation for non-fully overlapped NCJT Samsung
R1-1714974 Evaluation results of codeword to layer mapping in NR Huawei HiSilicon

### *6.1.2.2 CSI acquisition and beam management*

**R1-1714885 Offline Discussion on Beam Management Qualcomm**

Agreements:

- For the purposes of beam indication for at least NR unicast PDSCH, support an N-bit indicator field in DCI which provides a reference to a DL RS which is spatially QCL'd with at least one PDSCH DMRS port group
  - An indicator state is associated with at least one index of a DL RS (e.g., CRI, SSB Index) where each index of downlink RS can be associated with a given DL RS type, e.g., aperiodic CSI-RS, periodic CSI-RS, semi-persistent CSI-RS, or SSB,
    - Note: L1-RSRP reporting on SSB is not yet agreed
    - Note: One possibility to determine DL CSI-RS type is through the resource setting ID, other options are not precluded
  - The value of N is FFS, but is at most [3] bits
  - FFS: The case of more than one DMRS port group
  - FFS: Whether or not to indicate more than one beam indicator, NR strive to minimize the indicator overhead
- FFS: Signalling mechanism for the association of a DL RS index (e.g., CRI, SSB index) to an indicator state, e.g.,
  - The association is explicitly signaled to the UE
  - The association is implicitly determined by the UE



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- Combination of the above is not precluded
- FFS: An indicator state may or may not also include other parameter(s), e.g., for PDSCH to RE mapping purposes analogous to PQI in LTE, other QCL parameters
- FFS: Whether or not an indicator state may be associated with more than one DL RS index
- FFS: PDCCH beam indication may or may not be based on the beam indication states for PDSCH

**R1-1715143 Offline Discussion on Beam Management Qualcomm**

Agreements:
- After entering RRC CONNECTED mode, UE assumes the DM-RS ports of UE-specific PDCCH to be spatially QCL-ed with the SS block identified during initial access by default unless indicated otherwise
  - Note: The above QCL assumption may or may not be used for MSG2 and MSG4 – for discussion in initial access session
  - FFS: Details
  - FFS: Whether or not the default QCL assumption is contained in a default indicator state if supported
    - Note: This does not necessarily mean that the PDCCH beam indication is through DCI
- In RRC CONNECTED mode,
  - RRC only or RRC+ MAC CE signaling is used to indicate QCL relation (at least w.r.t spatial RX parameters) between DMRS port(s) of UE-specific PDCCH and either SS Block or P/SP CSI-RS resource(s)
    - FFS: necessity of DCI signalling
    - FFS: Use of Aperiodic CSI-RS
  - FFS: RAN1 to study impact of delay (including determination of Rx beam) and reliability on the beam mgmt scenarios aiming to provide input to RAN2 with regard to higher layer protocols

R1-1715011 WF on CSI-RS for Beam Management Samsung, Intel, Ericsson, KT, MTK

Working assumption:
- CSI-RS resource(s) with 2-port with D>1 for beam management is not supported in Rel-15

Agreement:
- Support of CSI-RS resource(s) with 2-port with D=1 for beam management in Rel-15 is subject to RAN4 feedback

**R1-1714772 Discussion on Beam ManagementQualcomm**

R1-1715216 WF on Reduced PMI Payload in Type II Codebook Nokia, Nokia Shanghai Bell

#### 6.1.2.2.1 General framework

*Unified design for CSI acquisition and beam management*

**R1-1713141 Framework for CSI acquisition and beam management LG Electronics**

**R1-1714243 On the general framework of CSI and beam management Nokia, Nokia Shanghai Bell**

Continue offline discussion – Xiaoyi (ATT)

**R1-1715309 Offline discussion summary on general CSI framework AT&T**

Proposals:
- Support RRC + DCI signaling for aperiodic CSI-RS transmission (as working assumption and could be revisited according to the final decided maximum CSI-RS resources)
- Support RRC + DCI signaling for aperiodic CSI reporting
- Support RRC + MAC CE signaling for semi-persistent CSI-RS transmission
- Support RRC + MAC CE signaling for semi-persistent CSI reporting

Discuss till next meeting

Not treated.
R1-1712226 General framework for CSI acquisition and beam management Huawei, HiSilicon
R1-1712292 On CSI framework and beam management framework ZTE
R1-1712369 Discussion on general CSI framework CATT



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R1-1712544 Discussion on framework for CSI acquisition and beam mangement Intel Corporation
R1-1712709 Discussion on the channels to carry CSI report AT&T
R1-1712963 Considerations on CSI Framework Sony
R1-1713393 Details of CSI framework Qualcomm Incorporated
R1-1713586 CSI Acquisition and Beam Management Framework Samsung
R1-1713692 CSI framework considerations for beam management and timing requirement MediaTek Inc.
R1-1713912 Framework for CSI acquisition and beam management NTT DOCOMO, INC.
R1-1714139 On CSI framework for NR InterDigital, Inc.
R1-1714279 Signaling and overhead analysis for CSI and beam management framework Ericsson

#### 6.1.2.2.2 CSI measurement

*Including channel and interference measurement; including reciprocity based operation*

**R1-1712293 Details of CSI measurement ZTE**
**R1-1714281 On CSI acquisition for reciprocity-based operation Ericsson**
**R1-1714245 On the channel reciprocity support for CSI acquisition Nokia, Nokia Shanghai Bell**

**R1-1714907 Way forward on reciprocity based CSI ZTE, Ericsson, Samsung, LG Electronics, Nokia, NSB**
Further revised in R1-1715250.

Agreements:
- For non-PMI feedback:
  - Alt 1: Port selection codebook is used for CQI calculation for non-PMI feedback
    - Each column of each precoding matrix in the port selection codebook contains only one non-zero entry
      - FFS other details of the port selection codebook
    - Codebook subset restriction is supported to indicate a single precoder per rank in the codebook used for CQI calculation
      - FFS whether this indication can be dynamic using L1/L2 signaling
    - Support at least up to 8 CSI-RS ports and 8 layers
  - Alt 2: The UE shall assume a codebook for RI and CQI determination where for each rank, R, the codebook contains only one precoder which is the first R columns of an identity matrix
  - Alt 3: An existing codebook is used for CQI calculation for non-PMI feedback
    - FFS details
- To down-select one of the above alternative in the next meeting

**R1-1715232 Summary of CSI measurement ZTE**

**R1-1714884 WF on Antenna Switching for SRS Transmission Huawei, HiSilicon, Deutsche Telekom, Qualcomm, Samsung, CMCC, CeWiT, SONY, NEC, IITM, China Unicom, OPPO, IITH, Spreadtrum, InterDigital, Tejas Networks, ZTE, KDDI, vivo, China Telecom, LGE, Intel**

Agreements:
- Support antenna switching for SRS transmission within a carrier for the following UE antenna configuration:
  - UE configured with 2Tx (transmit antenna ports)
  - UE configured with 1Tx (transmit antenna ports)
  - Note: 1Tx and 2Tx is dependent on UE's capability for SRS transmission
- FFS: details

Continue discussion offline for other issues – Yuichi (DCM)/Ruyue (ZTE)

Not treated.
R1-1712294 On reciprocity based CSI acquisition ZTE
R1-1712370 Further discussion on reciprocity based operation CATT
R1-1712371 Consideration on interference estimation in NR CATT
R1-1712545 Discussion on interference measurement for CSI Intel Corporation
R1-1712710 On the details of CSI acquisition AT&T
R1-1712964 Considerations on interference measurement Sony
R1-1713142 Discussion on interference measurement LG Electronics
R1-1713143 Discussion on CSI acquisition for reciprocity based operation LG Electronics
R1-1713394 Details of CSI measurement Qualcomm Incorporated
R1-1713395 CSI acquisition for reciprocity based operation Qualcomm Incorporated


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R1-1713587 CSI Reporting for Reciprocity Operation Samsung
R1-1713588 Discussions on channel and interference measurements for NR Samsung
R1-1713778 On UE emulation for interference measurement Huawei, HiSilicon
R1-1713913 Views on CSI measurement for NR NTT DOCOMO, INC.
R1-1714244 Remaining aspects on interference estimation options and configuration Nokia, Nokia Shanghai Bell
R1-1714280 On CSI measurement Ericsson
R1-1714340 Channel and interference measurement restriction Huawei, HiSilicon
R1-1715194 WF on NZP CSI-RS for interference measurement Huawei, HiSilicon, Intel, Qualcomm, Spreadtrum
R1-1715250 WF on reciprocity based CSI ZTE

#### 6.1.2.2.3 CSI reporting

*Including PMI, CQI, MCS related aspects*
*Including type I/II codebook based scheme and other potential use cases, e.g., semi-open-loop*

**R1-1712374 Discussion on CSI feedback mechanism CATT**
**R1-1712546 Discussion on codebook subset restriction for NR Intel Corporation**
**R1-1714810 WF on codebook subset restriction for NR Intel, Ericsson, LGE, AT&T, ZTE, CATT**

Agreements:

- Codebook subset restriction (CSR) is supported for Type I single-panel
  - CSR supports DFT beam restriction and rank restriction
  - Beam restriction is bitmap of length $N_1O_1N_2O_2$ where each bit is associated with DFT beam
    - If a PMI is comprising of at least one restricted DFT beam, this PMI is considered as restricted
    - FFS: Beam restriction for rank 3-4 codebooks for 16,24 and 32 ports
- CSR is supported for Type I multi-panel
  - CSR supports at least rank restriction and beam restriction
    - FFS: Details
    - FFS beamforming direction restriction, e.g., it can include at least DFT beam
- FFS CSR for Type II
  - CSR supports DFT beam restriction and rank restriction and FFS power restriction
    - FFS: Details
- FFS: Impact of CSR on CSI reporting payload size
- FFS CSR for 2Tx

**R1-1712711 CSI Reporting for supporting semi open loop and Closed loop MIMO Switching AT&T**
**R1-1713146 CSI feedback for OL and semi-OL MIMO LG Electronics**

Further discussion remaining details – Mark (Ericsson)

**R1-1715298 Summary of offline session on CSI reporting Ericsson**
**R1-1715288 WF on CSI Format Design Samsung, Ericsson, NTT DOCOMO, Qualcomm, CATT, Nokia, NSB, Huawei, HiSilicon, ZTE, Interdigital, CHTTL, Verizon, BT, KDDI, CEWiT, IITH, Tejas Networks, IITM, Reliance Jio, Deutsche Telekom, AT&T, Vodafone, Sharp, Softbank, Fujitsu, Panasonic, LG Electronics, Mediatek**

Agreement:

- R1-1715288 is agreed
  - Note: the ordering of UCI bits is to be decided by channel coding session

Proposals:

- A subband is defined as N contiguous PRBs, the value of N depends on the bandwidth of the active bandwidth part
  - FFS if value of N is fixed for a certain bandwidth or configurable from a set of values or if it depends on RBG /PRG size
- A CSI report setting configuration defines a CSI reporting band as either one of the two options below
  - 1. A subset of subbands of the bandwidth part
    - The UE is not expected to be configured with a CSI reporting band which contains subbands where RSs for channel and interference are not present
  - 2. The CSI reporting band always corresponds to the CSI-RS bandwidth
  - Note: CSI-RS frequency domain occupancy is expected to be addressed under the CSI-RS agenda item
- Only wideband and subband CSI reporting is defined
  - Wideband and partial band CSI reporting granularities are merged
  - If the UE is configured with wideband reporting, a single CSI is reported for the entire CSI reporting band


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Continue discussion till next meeting

Not treated.

| | | |
|---|---|---|
| R1-1712295 | Overhead reduction for Type II CSI | ZTE |
| R1-1712296 | CSI feedback mechanism on PUSCH | ZTE |
| R1-1712317 | CSI feedback mechanism on PUCCH | ZTE |
| R1-1712372 | Consideration on semi-open-loop CSI enhancement | CATT |
| R1-1712373 | Consideration on hybrid CSI | CATT |
| R1-1712375 | Discussion on CSI feedback for multi-TRP transmission | CATT |
| R1-1712547 | On Type I and Type II CSI reporting | Intel Corporation |
| R1-1712548 | On CSI feedback for open-loop and semi-open-loop | Intel Corporation |
| R1-1713049 | Discussion on CSI feedback for open/semi-open loop transmission | Spreadtrum Communications |
| R1-1713055 | Multi panel CSI feedback | Spreadtrum Communications |
| R1-1713144 | Discussion on overhead reduction for Type II codebook | LG Electronics |
| R1-1713145 | Discussions on CSI reporting contents | LG Electronics |
| R1-1713147 | UL channel utilization for CSI reporting | LG Electronics |
| R1-1713396 | On Type I and Type II CSI reporting | Qualcomm Incorporated |
| R1-1713397 | On Type-I and Type-II CSI parameters encoding | Qualcomm Incorporated |
| R1-1713398 | On CSI feedback for open- or semi-open-loop transmission | Qualcomm Incorporated |
| R1-1713589 | CSI Reporting and UCI Multiplexing | Samsung |
| R1-1713590 | Remaining details of Type I and Type II CSI codebooks | Samsung |
| R1-1713591 | Differential reporting of Type II CSI | Samsung |
| R1-1713592 | On higher rank (3 and 4) Type II CSI | Samsung |
| R1-1713593 | Discussions on CSI measurements and reporting for NR | Samsung |
| R1-1713693 | UCI design for CSI reporting | MediaTek Inc. |
| R1-1713759 | Full reciprocity based CSI acquisition mechanism | Huawei, HiSilicon |
| R1-1713760 | CSI acquisition details for NCJT | Huawei, HiSilicon |
| R1-1713761 | CSI acquisition details for hybrid CSI | Huawei, HiSilicon |
| R1-1713762 | Details of CSI reporting on PUCCH/PUSCH | Huawei, HiSilicon |
| R1-1713763 | CSI feedback for Type I codebook | Huawei, HiSilicon |
| R1-1713764 | CSI feedback for Type II codebook | Huawei, HiSilicon |
| R1-1713776 | Codebook subset restriction | Huawei, HiSilicon |
| R1-1713914 | CSI Feedback Design for NR MIMO | NTT DOCOMO, INC. |
| R1-1713915 | Feedback design for NR CSI Type I | NTT DOCOMO, INC. |
| R1-1713916 | Feedback design for NR CSI Type II | NTT DOCOMO, INC. |
| R1-1714217 | Discussion on higher rank Type II codebook and feedback overhead reduction | Motorola Mobility, Lenovo |
| R1-1714282 | CSI feedback and Transparent PDSCH TxD | Ericsson |
| R1-1714283 | On codebook subset restriction | Ericsson |
| R1-1714284 | Type I/II CSI report | Ericsson |
| R1-1714285 | Encoding and mapping of CSI parameters | Ericsson |
| R1-1714286 | CSI feedback for multi-TRP | Ericsson |
| R1-1714287 | On partial bands and CSI acquistion | Ericsson |
| R1-1714288 | On semi-persistent CSI reporting on PUSCH | Ericsson |
| R1-1714338 | Partial reciprocity based CSI acquisition mechanism | Huawei, HiSilicon |
| R1-1714339 | CSI acqusition for DL robust transmission | Huawei, HiSilicon |
| R1-1714341 | Remaining issues for multiple-panel codebook | Huawei, HiSilicon |
| R1-1714342 | Category 2 codebook design for type II codebook | Huawei, HiSilicon |
| R1-1714343 | Codebook design for beamformed CSI-RS | Huawei, HiSilicon |
| R1-1714583 | On multi-panel codebook extension | Ericsson |
| R1-1714906 | WF on multi-panel codebook extension | Ericsson, Samsung, Huawei, HiSilicon |
| R1-1714908 | Way forward on SB reporting for Type II CSI | ZTE, MediaTek, ASTRI |
| R1-1714918 | WF on CSI Format Design | Samsung |
| R1-1715008 | WF on Partial PMI Reporting | Samsung |
| R1-1715045 | WF on defining frequency-granularities for CSI reporting and CSI-RS | Ericsson |
| R1-1715100 | WF on hybrid CSI feedback | Huawei |
| R1-1715181 | Summary on views on CSI reporting for Type I and Type II | Ericsson |

#### 6.1.2.2.4 Beam measurement and reporting

**R1-175040 WF on the use of SS-block for beam management Qualcomm, Samsung, Ericsson, ZTE , vivo, NTT Docomo, Lenovo, Motorola Mobility, LGE, Sharp, MTK, AT&T, CEWiT, IITM, Reliance Jio, IITH, BT Group, National Instruments, NEC Corp., Idaho National Labs, Vodafone, Verizon, KT, Intel, Interdigital, Oppo**



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Agreements:

- Support L1-RSRP reporting of measurements on SS block for beam management procedures
- The following configurations for L1-RSRP reporting for beam management are supported
  - SS block only (with mandatory support by UE)
  - CSI-RS only (with mandatory support by UE)
  - SS block + CSI-RS independent L1 RSRP reporting
    - Joint L1-RSRP using QCL-ed SS-block + CSI-RS is optionally supported by UE (with optionally support by UE)

**R1-1712221** **DL beam management framework** **Huawei, HiSilicon**
R1-1713594 Measurement and reporting for beam management Samsung
R1-1713917 Details on beam measurement and reporting NTT DOCOMO, INC.
**R1-1714909** **WF on group-based beam reporting** **ZTE, Samsung, NTT DOCOMO, Huawei, HiSilicon, vivo**

Agreements:

- Support the following for group based beam reporting, if group based beam reporting is configured:
  - In a beam reporting instance, a UE can be configured to report N different Tx beams that can be received simultaneously
    - Note: UE may report N or fewer beams in a given reporting instance
    - N is configured by the gNB where N<= Nmax
      - Nmax depends on UE capability
        - FFS: how to define the UE capability
        - N =2 is supported. Further study {4,8}
      - Notes: Information indicating group is not required to be reported in Rel-15
  - Note:
    - From the perspective of Alt-1, the UE reports one group with N Tx beams.
    - From the perspective of Alt-2, the UE reports N group with one Tx beam per each group.
  - Note: Mechanisms to reduce UE complexity for beam pair search should be further studied

Continue offline discussion – Sundar (Qualcomm)

**R1-1715177** **WF on CSI-RS configuration for beam management** **Ericsson, ZTE, Intel, Nokia, NSB, AT&T, Huawei, HiSilicon, CATT, Qualcomm, Sony, Mediatek, vivo**

Working assumption:

- For beam management CSI-RS, NR supports higher layer configuration of a set of single-symbol CSI-RS resources where
  - The set configuration contains an information element (IE) indicating whether repetition is "on/off"
- Note: In this context, repetition "on/off" means:
  - "On": The UE may assume that the gNB maintains a fixed Tx beam
  - "Off": The UE can not assume that the gNB maintains a fixed Tx beam
- Note: This does NOT necessarily mean that the CSI-RS resources in a set occupy adjacent symbols

**R1-1714798** **WF on Beam Reporting** **NTT DOCOMO, AT&T, ZTE, MediaTek, Mitsubishi, LGE, NEC, Intel, Huawei, Sony**

Agreements:

- At least for non-grouping based beam reporting, taking the following parameter values for further consideration
  - For maximal TX beam numbers for a UE to measure for a given reporting instance: candidate value is, e.g., around K = [64]
  - For maximal TX beam numbers reported by a UE per reporting instance are, e.g., N = [1, 2, 4, 8]
  - For L1-RSRP levels, candidate value is, e.g., around [100]
    - Considering maximal L1-RSRP range, e.g., from X dBm to Y dBm
    - Considering step-size of L1-RSRP, e.g., Z dB
- Companies are encouraged to evaluate/analyze appropriate values considering
  - P1, P2, and P3 procedures
  - The values could be different for aperiodic reporting, and semi-persistent/periodic reporting if supported
  - The values could be different for PUCCH and PUSCH based reporting, if supported
  - CSI-RS and/or SS-block related measurement/reporting



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Email discussion on the set of possible parameters for beam management, and the corresponding possible value(s) till next meeting by using the following list as a starting point (the list is subject to further update) – Sundar (Qualcomm)

- Minimum time between aperiodic CSI-RS for beam management and its DCI shall be at least $K_B$ symbols. Symbols measured from last symbol containing the DCI to first symbol of CSI-RS.
- The number of slots between a CSI-RS burst for beam management and the associated report shall be at least $R_B$ slots.
- Number of slots between indication of the spatial QCL for PDSCH and application of the PDSCH beam switch shall be at least $D_B$
- Number of slots between indication of the spatial QCL for PDCCH and application of the PDCCH beam switch shall be at least $S_B$
- Maximum number of beam changes a UE has to conduct during a slot shall not exceed $B_B$.
- The number of measurement reports with L1-RSRP only per slot, per TRP, per component carrier shall not exceed $C1_B$
- For beam mgmt and CQI, the number of antenna ports per CSI-RS burst, for which the UE measures the channel, shall not exceed $P_B$
- The number of simultaneously triggered CSI report settings is no greater than $C2_B$

Not treated.

| | | |
|---|---|---|
| R1-1712267 | Discussion on Group-based Beam Reporting | Beijing Xinwei Telecom Techn. |
| R1-1712297 | Discussion on beam measurement and reporting | ZTE |
| R1-1712376 | Consideration on beam measurement and reporting | CATT |
| R1-1712549 | Discussion on beam reporting | Intel Corporation |
| R1-1712671 | DL beam measurement and reporting | Lenovo, Motorola Mobility |
| R1-1712712 | Beam measurement and reporting | AT&T |
| R1-1712738 | On SS block for DL beam management | Fujitsu |
| R1-1712836 | Beam management and beam reporting | vivo |
| R1-1712965 | Considerations on beam measurement and reporting | Sony |
| R1-1712997 | Differential L1-RSRP reporting | NEC Corporation |
| R1-1713050 | On RSRP report for beam management | Spreadtrum Communications |
| R1-1713148 | Discussion on beam measurement and reporting | LG Electronics |
| R1-1713285 | Discussion on the DL Beam Management | Guangdong OPPO Mobile Telecom |
| R1-1713399 | Beam management for NR | Qualcomm Incorporated |
| R1-1713594 | Measurement and reporting for beam management | Samsung |
| R1-1713694 | Discussion on SS-block measurement and beam reporting | MediaTek Inc. |
| R1-1713810 | Discussion on beam reporting for CSI acquisition | ETRI |
| R1-1713837 | Discussion on DL beam management | CMCC |
| R1-1713917 | Details on beam measurement and reporting | NTT DOCOMO, INC. |
| R1-1714124 | Discussion on use of SS block for beam management | CHTTL, ITRI |
| R1-1714140 | On beam measurement and reporting | InterDigital, Inc. |
| R1-1714248 | Beam indication | Nokia, Nokia Shanghai Bell |
| R1-1714290 | On beam group reporting | Ericsson |
| R1-1714371 | Discussion on group based beam reporting | China Unicom |
| R1-1714954 | Way forward on CSI-RS for beam management | ZTE, LG Electronics |
| R1-1715219 | WF on Group-based Beam Reporting | Intel |

#### 6.1.2.2.5 Beam indication

| | | |
|---|---|---|
| R1-1713400 | Tagging and indication of DL beams | Qualcomm Incorporated |
| R1-1714291 | DL beam indication for periodic and aperiodic reference signals | Ericsson |

Continue offline discussion – Sundar (Qualcomm)

| | | |
|---|---|---|
| R1-1712222 | Beam indication for control and data channels | Huawei, HiSilicon |
| R1-1712298 | Discussion on beam indication | ZTE |
| R1-1712377 | Downlink beam indication | CATT |
| R1-1712550 | Discussion on beam indication | Intel Corporation |
| R1-1712837 | Discussion on beam indication | vivo |
| R1-1713149 | Discussion on beam indication | LG Electronics |
| R1-1713286 | Discussion on the Beam Indication | Guangdong OPPO Mobile Telecom |
| R1-1713595 | On beam indication | Samsung |
| R1-1713918 | Views on beam indication | NTT DOCOMO, INC. |
| R1-1714141 | On beam indication for PDCCH and PDSCH | InterDigital, Inc. |
| R1-1714249 | On beam grouping and reporting | Nokia, Nokia Shanghai Bell |
| R1-1714562 | Beam Indication with low-overhead consideration | MediaTek Inc. |



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R1-1714910 WF on DL beam indication ZTE, ASTRI
R1-1715007 WF on beam indication for PDCCH Samsung

#### 6.1.2.2.6 UL beam management

**R1-1713150 Discussion on UL beam management LG Electronics**
R1-1713696 Details on UL beam management MediaTek Inc.

Continue offline discussion – Sundar (Qualcomm)

Agreements:
- Support UE to provide information to gNB to assist UL beam management
  - The information can be a number representing the amount of SRS resources required for UE Tx beam training
    - FFS the supported number(s), taking into account performance and implementation complexity aspects
    - Note: these set of SRS resources are associated with a set of Tx beams
  - FFS: signaling method
    - E.g., capability signaling, or msg3, or dynamic signalling
  - FFS: impact of multi-panel
  - FFS: if to support the antenna structure with both omni-directional antenna panel and directional antenna panel, whether or not there is any additional impact

Not treated.
R1-1712223 UL beam management Huawei, HiSilicon
R1-1712299 Discussion on UL beam management ZTE
R1-1712378 Consideration on UL beam management CATT
R1-1712551 Details for UL Beam Management Intel Corporation
R1-1712838 Discussion on uplink beam management vivo
R1-1712966 Considerations on UL beam management Sony
R1-1713287 Discussion on the UL Beam Management Guangdong OPPO Mobile Telecom
R1-1713596 Discussion on UL beam management Samsung
R1-1714143 On efficient UL beam management InterDigital, Inc.
R1-1714250 SRS transmission for beam management Nokia, Nokia Shanghai Bell
R1-1714292 On UL beam management Ericsson
R1-1714383 Considerations on UE Beamforming Management ASUSTEK COMPUTER (SHANGHAI)
R1-1714911 WF on UL beam management ZTE
R1-1714919 WF on SRS beam sweeping behavior LG, Intel Corp.
R1-1715097 WF on UE assistance information for UL Beam Management MediaTek
R1-1715183 WF on SRS beam sweeping behavior LG, Intel Corp., Huawei, HiSilicon

#### 6.1.2.2.7 Mechanism to recover from beam failure

**R1-1712300 Discussion on mechanism to recovery from beam failure ZTE**
R1-1713919 Further views on mechanism to recover from beam failure NTT DOCOMO, INC.
R1-1714251 Beam Recovery in NR Nokia, Nokia Shanghai Bell

**R1-1715012 Offline Discussion on Beam Recovery Mechanism MediaTek Inc**

Agreements:
- Beam failure is declared only when all serving control channels fail.
- When a subset of serving control channels fail, this event should also be handled
  - Details FFS

Discuss discussion offline – Chia-Hao (MTK)
**R1-1714771** Offline Discussion Summary on Beam Recovery Mechanism MediaTek

Agreements:
- In addition to periodic CSI-RS, SS-block within the serving cell can be used for new candidate beam identification



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- The following options can be configured for new candidate beam identification
  - CSI-RS only
    - Note: in this case, SSB will not be configured for new candidate beam identification
  - SS block only
    - Note: in this case, CSI-RS will not be configured for new candidate beam identification
  - FFS: CSI-RS + SS block

Working assumption:

- For beam failure recovery request transmission on PRACH, support using the resource that is CDM with other PRACH resources.
  - Note that CDM means the same sequence design with PRACH preambles.
  - Note that the preambles for PRACH for beam failure recover request transmission are chosen from those for content-free PRACH operation in Rel-15
  - Note: this feature is not intended to have any impact on design related to other PRACH resources
  - Further consider whether TDM with other PRACH is needed

Not treated.

R1-1712224 Procedure details for beam failure recovery Huawei, HiSilicon
R1-1712268 Discussion on Beam Failure Recovery Beijing Xinwei Telecom Techn.
R1-1712379 Beam failure detection and recovery CATT
R1-1712552 Discussion for Mechanism to Recover from Beam Failure Intel Corporation
R1-1712672 Discussion on beam failure recovery Lenovo, Motorola Mobility
R1-1712713 Mechanism to recover from beam failure AT&T
R1-1712839 On beam failure recovery vivo
R1-1712967 Considerations on beam recovery Sony
R1-1712998 Discussion on beam failure recovery NEC Corporation
R1-1713047 Discussion on UE initiated recovery from beam failure Spreadtrum Communications
R1-1713151 Discussion on beam failure recovery LG Electronics
R1-1713288 On Beam Recovery Mechanism Guangdong OPPO Mobile Telecom
R1-1713327 Discussion on mechanisms for beam failure recovery Sharp
R1-1713402 Beam recovery procedures Qualcomm Incorporated
R1-1713597 Beam failure recovery Samsung
R1-1713697 Discussion on Beam Recovery Mechanism MediaTek Inc.
R1-1713838 Relationship between RLF and beam recovery CMCC
R1-1713919 Further views on mechanism to recover from beam failure NTT DOCOMO, INC.
R1-1714142 On remaining details of beam failure recovery InterDigital, Inc.
R1-1714180 On remaining aspects of beam recovery National Instruments Corp.
R1-1714251 Beam Recovery in NR Nokia, Nokia Shanghai Bell
R1-1714293 Mechanism to recover from beam failure Ericsson
R1-1714912 WF on new beam identification ZTE
R1-1714931 WF on beam failure conditions LG Electronics, Samsung
R1-1714955 WF on PRACH for beam failure recovery request transmission Huawei, HiSilicon
R1-1715178 WF on new candidate beam identification ZTE, InterDigital
R1-1715225 WF on beam recovery request transmission LG Electronics, Samsung, OPPO, Nokia, Nokia Shanghai Bell, InterDigital

#### 6.1.2.2.8 CQI and MCS

**R1-1712553 CQI/MCS design for NR Intel Corporation**
**R1-1713403 Consideration for MCS table Qualcomm Incorporated**
**R1-1714294 Discussion on CQI and MCS Ericsson**

Continue offline discussion – Sai (AT&T)
Discuss till next meeting

R1-1712732 Adaptive CQI and MCS Indication in NR AT&T
R1-1713152 Discussion on CQI and MCS tables LG Electronics
R1-1713293 Beam association relationship between data and control channels Guangdong OPPO Mobile Telecom
R1-1713489 On NR CQI reporting ZTE
R1-1713598 CQI Definition Samsung



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#### 6.1.2.2.9 Other

| | | |
|---|---|---|
| R1-1712225 | Considerations on timing advance design in NR | Huawei, HiSilicon |
| R1-1712227 | Channel and interference measurement for CSI acquisition | Huawei, HiSilicon |
| R1-1712301 | Beam grouping evaluation for beam management | ZTE |
| R1-1712554 | Discussion on control signaling for DL beam management | Intel Corporation |
| R1-1712555 | On Timing Advance for multi-beam operation | Intel Corporation |
| R1-1713756 | Multi-beam transmission for DL control channel | Huawei, HiSilicon |
| R1-1713757 | Beam reporting for beam management | Huawei, HiSilicon |
| R1-1713758 | A holistic procedure for beam failure recovery | Huawei, HiSilicon |
| R1-1714295 | On the use of SS for beam management and beam recovery | Ericsson |
| R1-1714296 | Beam management in C-DRX | Ericsson |
| R1-1714297 | Analysis of beam indication signalling options | Ericsson |
| R1-1714298 | Performance of baseline beam management | Ericsson |
| R1-1714299 | On Dynamic Triggering for CSI Reports and CSI-RS | Ericsson |
| R1-1714300 | A comparison of CSI-RS activation schemes based on MAC CE and DCI | Ericsson |
| R1-1714301 | Further details of CSI framework | Ericsson |
| R1-1714302 | Further details of measurement restriction | Ericsson |
| R1-1714303 | Performance impact of inactive antenna ports | Ericsson |
| R1-1714304 | NR CSI Computation Capability | Ericsson |
| R1-1714305 | Frequency parametrization for Type II CSI codebook | Ericsson |
| R1-1714334 | Relationship between beam failure recovery and RLF | Huawei, HiSilicon |
| R1-1714335 | Robust transmission for UL control channel | Huawei, HiSilicon |
| R1-1714336 | Cross-carrier beam management | Huawei, HiSilicon |
| R1-1714337 | Measurement RS for beam management | Huawei, HiSilicon |
| R1-1714511 | Discussion on Group based beam reporting | Samsung |
| R1-1714512 | Discusssion on Tx beam grouping configuration for multi-panel TRP and multi-TRP | Samsung |
| R1-1714513 | Discussion on beam indication for PDSCH | Samsung |
| R1-1714514 | Discussion on joint CLI measurement and beam management | Samsung |
| R1-1714515 | CSI support for transparent precoder cycling | Samsung |
| R1-1714516 | Discussions on service specific CSI for NR | Samsung |
| R1-1714517 | Discussion on beam indication for UL transmission | Samsung |
| R1-1714518 | Discussion on cross-carrier beam management | Samsung |
| R1-1714519 | Discussion on CSI-RS Resource Allocation | Samsung |
| R1-1714520 | L1-RSRP measurement duration | Samsung |
| R1-1714521 | On SS-block based beam management | Samsung |
| R1-1714522 | DL beam management configuration | Samsung |
| R1-1714523 | QCL associations for beam management RS | Samsung |
| R1-1714524 | System level evaluation results for beam management | Samsung |
| R1-1714525 | Link level evaluation results for beam management | Samsung |
| R1-1714526 | Link level simulation assumptions for beam management | Samsung |
| R1-1714527 | System level simulation assumptions for beam management | Samsung |
| R1-1714528 | On BPL update procedure | Samsung |
| R1-1714529 | L1 RSRP reporting for beam management | Samsung |
| R1-1714550 | Investigation on beam pattern design for beam management | NTT DOCOMO |
| R1-1714551 | Performance investigation on beam reporting | NTT DOCOMO |
| R1-1714563 | Beam management for PDCCH | Samsung |

### *6.1.2.3 Reference signals and QCL*

*Highest priority in NR MIMO agenda items*

#### 6.1.2.3.1 Multiplexing of different types of RSs

*Including multiplexing and RE mapping of RSs and prioritization, e.g., dropping rules*

**R1-1712380 Discussion on RS multiplexing CATT**
Discuss further offline – Rakesh (CATT)

**R1-1714770 WF on CSI-RS and DMRS multiplexing CATT, Ericsson, Qualcomm, Intel**

**R1-1713711 On multiplexing of different reference signals MediaTek Inc.**
Conclusion:

- Regarding CSI-RS and TRS multiplexing/sharing, discuss after the TRS design is mature (target later this week)



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Not treated.

| | | |
|---|---|---|
| R1-1712250 | Multiplexing different types of DL RS | Huawei, HiSilicon |
| R1-1712251 | Multiplexing different types of UL RS | Huawei, HiSilicon |
| R1-1712302 | Discussion on multiplexing of different RSs | ZTE |
| R1-1712556 | On multiplexing of different RS types | Intel Corporation |
| R1-1712714 | Multiplexing of RSs | AT&T |
| R1-1712840 | On multiplexing of different types of RSs | vivo |
| R1-1713051 | On RS multiplexing | Spreadtrum Communications |
| R1-1713153 | On multiplexing of different types of RSs | LG Electronics |
| R1-1713404 | On multiplexing of different types of RSs | Qualcomm Incorporated |
| R1-1713599 | Discussions on multiplexing of different dypes of RSs for DL | Samsung |
| R1-1713600 | Discussions on multiplexing of different dypes of RSs for UL | Samsung |
| R1-1713839 | Discussion on multiplexing of different types of RSs | CMCC |
| R1-1714252 | On multiplexing of different RS types | Nokia, Nokia Shanghai Bell |
| R1-1714306 | On Multiplexing of RS types for downlink | Ericsson |
| R1-1714307 | On Multiplexing of RS types for uplink | Ericsson |
| R1-1715061 | Summary of views on multiplexing of different types of RS | Huawei, HiSilicon |

#### 6.1.2.3.2 Remaining details on CSI-RS

**R1-1712303 On CSI-RS for CSI acquisition ZTE**
**R1-1712557 On CSI-RS for beam management Intel Corporation**
**R1-1714309 Remaining details on CSI-RS design for beam management Ericsson**

**R1-1714881 WF on Remaining Details of CSI-RS NTT DOCOMO, CATT, Ericsson, Samsung**
**R1-1714891 WF on CSI-RS aggregation LGE, Samsung**

**R1-1715023 WF on Remaining Details of CSI-RS NTT DOCOMO**

Agreement:
- For CSI acquisition, the number of CSI-RS ports can be configured as 24 ports

Agreements:
- Support following CSI-RS RE patterns for CSI acquisition.

| X | Density [RE/RB/port] | N | (Y, Z) | CDM |
|---|---|---|---|---|
| 1 | >1, 1, 1/2 | 1 | N.A. | No CDM |
| 2 | 1, 1/2 | 1 | (2,1) | FD-CDM2 |
| 4 | 1 | 1 | (4,1) | FD-CDM2 |
| 8 | 1 | 1 | (2,1) | FD-CDM2 |
| 8 | 1 | 2 | (2,2) | FD-CDM2, CDM4 (FD2,TD2) |
| 12 | 1 | 1 | (2,1) | FD-CDM2 |
| 12 | 1 | 2 | (2,2) | CDM4 (FD2,TD2) |
| 16 | 1, 1/2 | 2 | (2,2) | FD-CDM2, CDM4 (FD2,TD2) |
| 24 | 1, 1/2 | 4 | (2,2) | FD-CDM2, CDM4 (FD2, TD2), CDM8 (FD2, TD4) |
| 32 | 1, 1/2 | 4 | (2,2) | FD-CDM2, CDM4 (FD2, TD2), CDM8 (FD2, TD4) |

- TD4 in CDM8 in the above table always spans 4 adjacent symbols
- FFS until next meeting whether or not components are allowed to be non-adjacent in frequency

**R1-1715295 WF on CSI-RS Bandwidth NTT DOCOMO, Qualcomm, Ericsson**
Proposals:
- CSI-RS density of less than 1 is not supported, if CSI-RS transmission bandwidth is less than M PRBs (FFS: M(>=1))

Discuss till next meeting

**R1-1715211 WF on Multiplexing of CSI-RS and CORESET NTT DOCOMO, CATT, Huawei, HiSilicon, InterDigital, LGE, Qualcomm, ZTE**

Agreements:
- For UE's perspective,
  - For REs that is configured as a CORESET,



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- NZP CSI-RS is not multiplexed.

– For REs that is in the same OFDM symbol of configured CORESET but outside of the CORESET,
  - FFS: Whether NZP CSI-RS can be multiplexed or not

Discuss further offline for other issues – Xi (HW)

Not treated.

R1-1712248 CSI-RS design in NR Huawei, HiSilicon
R1-1712249 CSI-RS design for beam management Huawei, HiSilicon
R1-1712304 On CSI-RS for beam management ZTE
R1-1712381 Design of CSI-RS for CSI acquisition CATT
R1-1712382 Design of CSI-RS for beam management CATT
R1-1712558 On CSI-RS for CSI acquisition Intel Corporation
R1-1712731 Align the CSI-RS design for mobility, beam management and CSI acquisition purposes AT&T
R1-1712841 Discussion on CSI-RS vivo
R1-1713154 On CSI-RS design for beam management LG Electronics
R1-1713155 On CSI-RS design for CSI acquisition LG Electronics
R1-1713244 Disussion on CSI-RS design Guangdong OPPO Mobile Telecom
R1-1713405 Discussion on CSI-RS design Qualcomm Incorporated
R1-1713601 Remaining details on NR CSI-RS Samsung
R1-1713602 CSI-RS for beam management Samsung
R1-1713920 Remaining details on CSI-RS for beam management NTT DOCOMO, INC.
R1-1713921 Details on CSI-RS for CSI acquisition NTT DOCOMO, INC.
R1-1714174 Discussion on CSI-PTRS CMCC
R1-1714231 Consideration on the CSI-RS design for NR CATR
R1-1714253 On the CSI-RS configurations for NR CSI acquisitionNokia, Nokia Shanghai Bell
R1-1714308 Remaining details on CSI-RS design for CSI acquisition Ericsson
R1-1714682 WF on 24-port CSI-RS LG Electronics, Samsung
R1-1715013 Summary of views on NR CSI-RS Huawei, HiSilicon
R1-1715039 WF on CDM-8 configuration of CSI-RS for CSI acquisition LG Electronics, CATT, Samsung
R1-1715079 WF on CSI-RS configurations for beam management Samsung
R1-1715159 Overview of WFs on CSI-RS Huawei, HiSilicon

#### 6.1.2.3.3 Remaining details on DMRS

**R1-1713406 Discussion on UL DMRS design Qualcomm Incorporated**
**R1-1713923 Views on DM-RS NTT DOCOMO, INC**
**R1-1714312 On UL DMRS design Ericsson**

Agreements:
- For CP-OFDM waveform based PUSCH and DFT-S-OFDM waveform based PUSCH without frequency hopping, the possible locations of UL DMRS symbol(s) are the same for a same number of DMRS symbol(s) for PUSCH
  - FFS the case of DFT-S-OFDM waveform based PUSCH with frequency hopping

Agreements:
- DMRS sequence for CP-OFDM based PDSCH and PUSCH is resource-specific, and is a function of at least the following parameters: scrambling ID and offset
  - FFS how to define the offset parameter (e.g., via signalling, implicitly derived, etc.)
  - FFS the details of resource-specific (e.g., w.r.t to the wideband of a carrier, or a BWP, etc.)
  - FFS the values of scrambling ID
  - FFS other parameters

**R1-1712243 Design of DL DMRS for data transmission Huawei, HiSilicon**
**R1-1713409 Evaluation of DL DMRS design Qualcomm Incorporated**
**R1-1714311 Evaluations for DL DMRS Ericsson**

**R1-1714625 Remaining issues on NR DM-RS Qualcomm**

Agreements:
- For broadcast/multicast PDSCH:
  - Additional DMRS is always present (Alt. 1)
    - FFS: location and number of additional DMRS



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Further discussion offline – Alex (Qualcomm) – particularly summarizing performance differences and complexity

Proposed working assumption:
- For broadcast/multicast PDSCH (other than PBCH), the PDSCH is transmitted with a single DMRS port:
  - Support using only one-symbol front-load DMRS Configuration 1
- Supported by: Nokia, NSB, E///, SS, Intel, QC, LGE
- Objected by: HW, HiSi, MTK

Conclusion:
- For broadcast/multicast PDSCH (other than PBCH), the PDSCH is transmitted with a single DMRS port:
  - Companies are encouraged to perform more analysis/evaluations. To conclude the DM-RS pattern in the next RAN1 meeting

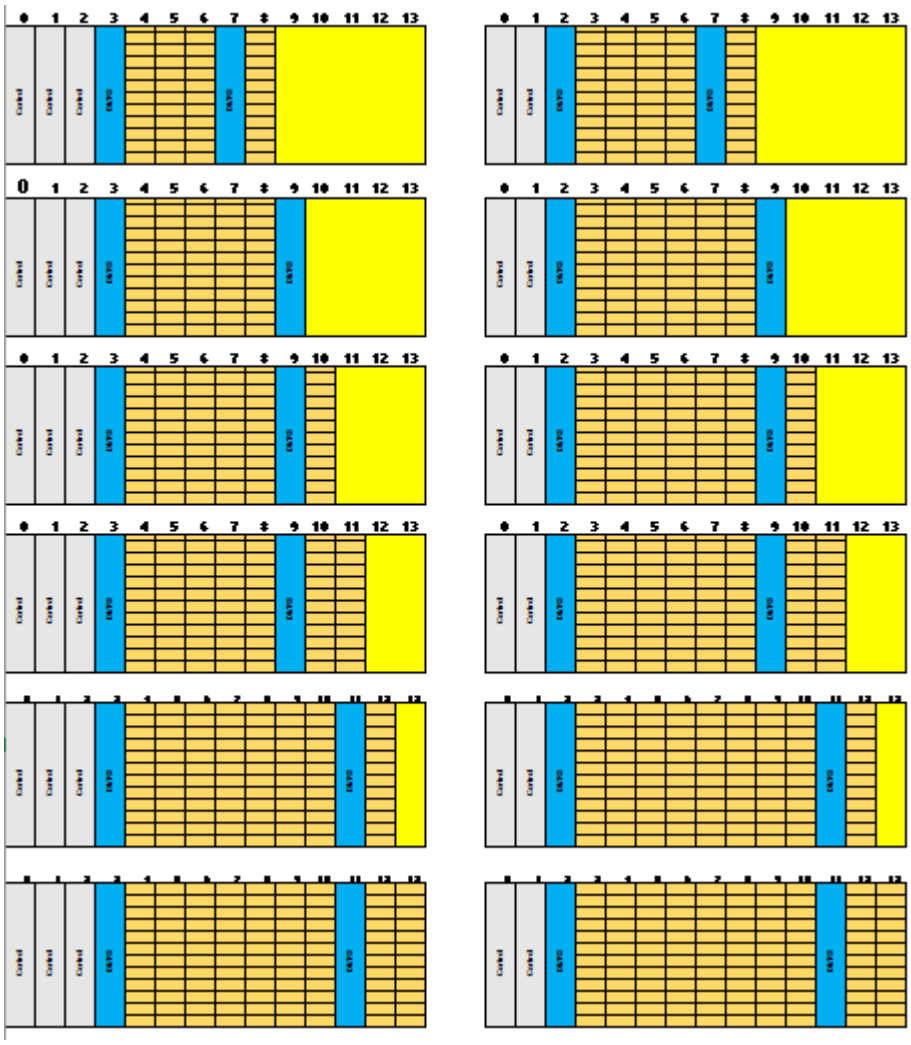
Agreements:
- A UE is configured with the number of additional DMRS for PDSCH and as a working assumption for PUSCH with the following signaling method:
  - By UE-specific higher layer signaling
  - For PUSCH, companies are encouraged to perform analysis/evaluations taking into account T/F sync impact particularly for front-loaded DM-RS

**R1-1715082 Remaining issues on NR DM-RS Qualcomm**

Agreements:
- For PDSCH, when one additional DMRS symbol is configured for the 1-symbol front-load DMRS in a 14-symbol slot with front-load DMRS on the 3rd or 4th symbol, the additional DMRS symbol can be configured in the 12th, 10th, 8th symbol,
  - FFS the applicability of each additional DMRS location depending on slot format or last PDSCH symbol, etc.
  - Note: See the agreed positions in the figure.
    - The yellow region in the figure below does not contain PDSCH.



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Working assumption:

- For 14-symbol slot and 2-symbol front-load DMRS
  - One 2-symbol additional DMRS can be configured
  - Companies are encouraged to perform additional evaluations and design analysis, also taking into account 1-symbol front-load DM-RS

Agreements:

- For 14-symbol slot and 1-symbol front-load DMRS
  - At least two 1-symbol additional DMRS may be configured
  - FFS whether or not to additionally support three 1-symbol additional DMRS may be configured
    - Companies are encouraged to perform additional evaluations and design analysis

**R1-1714787 WF on DMRS port mapping ZTE, LG Electronics, vivo**
**R1-1714883 WF on DL DMRS mapping Huawei, HiSilicon, CATT, Spreadtrum**
**R1-1715214 WF on DMRS port numbering/indexing sequence Panasonic**
Continue offline discussion considering the above 3 WFs, especially taking into account the intended operation (SU/MU-MIMO) with antenna port indexing – Alex (Qualcomm)

**R1-1715261 WF on Remaining issues on DMRS Qualcomm**

Agreements:

- Slide 6 in R1-1715261 is agreed

**R1-1714836 WF on DMRS and data multiplexing LGE, Huawei, HiSilicon, Ericsson**

Agreements:

- NR supports FDM between DMRS and PDSCH for CP-OFDM at least for some cases



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- FFS the conditions for this feature
- NR supports FDM between DMRS and PUSCH for CP-OFDM at least for some cases
  - FFS the conditions for this feature
- NR supports signaling for PDSCH rate matching in DMRS symbols
  - FFS details

**R1-1714785 WF on signalling DMRS configuration LGE, ZTE**

**R1-1715195 WF of DMRS for ECP Huawei, HiSilicon, Intel, MediaTek, vivo**

Agreement:
- For DMRS for CP-OFDM with ECP (at least 60kHz SCS), configuration type 1 as in NCP is supported.

**R1-1714815 WF on configurable density for DL DMRS Mitsubishi Electric, ETRI**
Conclusion:
- Frequency-domain DM-RS density reduction or increase for both configuration type 1 and configuration type 2 is not supported in Rel-15. Can be further discussed in future releases.

Not treated.

| | | |
|---|---|---|
| R1-1712245 | UL DMRS design for data transmission | Huawei, HiSilicon |
| R1-1712305 | Remaining details on DL DMRS | ZTE |
| R1-1712306 | Evaluation results on DL DMRS | ZTE |
| R1-1712307 | Remaining details on UL DMRS | ZTE |
| R1-1712337 | On layer mapping and signaling aspects of front-loaded DMRS for CP-OFDM | PANASONIC |
| R1-1712383 | On DMRS design for DL | CATT |
| R1-1712384 | On DMRS design for UL | CATT |
| R1-1712560 | On the remaining details of UL DM-RS | Intel Corporation |
| R1-1712680 | Discussion on DL DMRS indication | Lenovo, Motorola Mobility |
| R1-1712681 | Discussion on DMRS symbol number determination | Lenovo, Motorola Mobility |
| R1-1712682 | Discussion on UL DMRS indication | Lenovo, Motorola Mobility |
| R1-1712715 | Remaining Details of DM-RS for NR PDSCH | AT&T |
| R1-1712751 | Views on DL DMRS designs | Mitsubishi Electric Co. |
| R1-1712842 | Details on DMRS design | vivo |
| R1-1712882 | DMRS Design Considerations for Mini-Slots | TCL Communication Ltd. |
| R1-1712999 | Discussion on DMRS configurations | NEC Corporation |
| R1-1713052 | Considerations on DMRS for CP-OFDM | Spreadtrum Communications |
| R1-1713156 | On DL and UL DMRS design | LG Electronics |
| R1-1713407 | Discussion on DL DMRS design | Qualcomm Incorporated |
| R1-1713603 | Remaining details on DL DMRS | Samsung |
| R1-1713604 | Remaining details on UL DMRS | Samsung |
| R1-1713712 | Views on the remaining issues of downlink DMRS | MediaTek Inc. |
| R1-1713772 | Signaling of DMRS ports for SU/MU-MIMO | Huawei, HiSilicon |
| R1-1713774 | DMRS design for URLLC | Huawei, HiSilicon |
| R1-1713922 | Evaluation results on DM-RS | NTT DOCOMO, INC. |
| R1-1714127 | Multiplexing between front-load DMRS and data for CP-OFDM | China Telecommunications |
| R1-1714144 | Remaining Issues on DM-RS | InterDigital, Inc. |
| R1-1714255 | On remaining issues of DL DM-RS for NR physical data channels | Nokia, Nokia Shanghai Bell |
| R1-1714256 | DL DM-RS patterns link level simulation | Nokia, Nokia Shanghai Bell |
| R1-1714310 | On DL DMRS design | Ericsson |
| R1-1714313 | Evaluations for UL DMRS | Ericsson |
| R1-1714464 | Remaining details on DMRS configuration for NR | ITL |
| R1-1714467 | Discussion on details of DMRS design | KT Corp. |
| R1-1714561 | On the remaining details of DL DM-RS | Intel Corporation |
| R1-1714599 | Discussion on DMRS design | ETRI |
| R1-1714663 | WF on DM-RS for Broadcast PDSCH | Qualcomm |
| R1-1715231 | WF on DMRS port mapping table | Panasonic |
| R1-1715241 | Evaluation of DL DMRS designs | Mitsubishi Electric Co. |
| R1-1715262 | Remaining issues on NR DM-RS | Qualcomm |



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#### 6.1.2.3.4 PT-RS

R1-1713157 **On DL PT-RS design** **LG Electronics**
R1-1714314 **On DL PTRS design** **Ericsson**

R1-1712242 **PTRS for DFT-s-OFDM** **Huawei, HiSilicon**
R1-1712266 **PTRS insertion methods and patterns for UL DFTsOFDM waveform** **Mitsubishi Electric RCE**

R1-1714920 **WF on PT-RS for DFTsOFDM** **Mitsubishi Electric, Qualcomm, Huawei, Hi-Silicon, Ericsson, InterDigital, Sony, IITH, CEWiT, IITM, Tejas Networks, Reliance Jio, Nokia, Nokia Shanghai Bell, AT&T, Vivo, Sharp, Spreadtrum**
Also supported by DCM

Agreement:
- Confirm the Working assumption:
  - Support Pre-DFT PT-RS insertion for UL DFT-S-OFDM

Agreements:
- For pre-DFT PTRS insertion for DFTsOFDM
  - Define for the sake of discussion the pre-DFT pattern as X chunks of K>=1 adjacent PTRS samples
  - The chunk sizes K can be {1,2,Y}, values to be down-selected at RAN1#90bis
    - Y is a single value, larger than 2, FFS the exact value
    - At most two K values is supported after down-selection
    - FFS: configuration of K is by higher layer or implicit by DCI depending on e.g. allocation size and/or MCS
  - The supported number of chunks : X includes at least {2, Z}
    - Z is larger than 2, FFS the exact value
    - FFS: configuration of X is by higher layer or implicit by DCI depending on e.g. MCS
  - FFS: the exact positions of the chunks and sequence
  - Note: K=1 corresponds to distributed allocation

Continue offline discussion for other issues – Mattias (Ericsson)
R1-1715205 **Summary of PTRS way forwards and offline discussions** **Ericsson**
R1-1714875 **WF on PT-RS frequency density table** **LG Electronics, Ericsson, InterDigital, Samsung, ZTE, Nokia, Nokia Shanghai Bell, KT, Huawei**

Working assumption:
- PT-RS frequency density table for 60 and 120 kHz SCS
  - The listed BW thresholds are only for the predefined (default) table.
  - As agreed before, the BW thresholds (N_RBi,i=1,…) in this predefined table can be replaced by RRC configuration
  - If frequency density is 1/n, then every n:th RB in the scheduled BW carry a PTRS port
    - FFS on RB location offset in steps of one RB

| Contiguous Scheduled BW | Frequency density (1/n) |
|---|---|
| $N_{RB}$ < [3 or 1] | No PT-RS |
| [3 or 1]≤ $N_{RB}$ < [5] | [1] |
| [5]≤ $N_{RB}$ < [10] | [1/2] |
| [10]≤ $N_{RB}$ < [15] | [1/3] |
| [15]≤ $N_{RB}$ | 1/4 |

  - FFS; the case of non-contiguous resource allocation
  - FFS: bracketed values to be decided

Agreements:
- When one or more of PT-RS RE(s) is overlapped with CSI-RS
  - The one or more overlapping PT-RS RE(s) is punctured

R1-1715116 **WF on PTRS port** **ZTE, vivo, LG Electronics, NEC, ASTRI**

R1-1715275 **Summary of PTRS way forwards and offline discussions** **Ericsson**



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Agreements:

- For DL, if one PT-RS port is configured for an DM-RS port group,
  - For 1 CW case, the PT-RS port is associated with the lowest DM-RS port index among the ports assigned to the DMRS port group for PDSCH demodulation.
  - For 2 CW case, down-selected between
    - Alt.1: The PT-RS port is associated with the lowest DM-RS port index among the DM-RS ports assigned for PDSCH demodulation of the CW with highest MCS.
      - If MCS of the 2 CWs is the same, CW 0 is selected
    - Alt.2: The PT-RS port is associated with the lowest DM-RS port index among the DM-RS ports assigned for PDSCH demodulation (across both CWs)
  - FFS: UE can provide some information to facilitate gNB to map the PT-RS port onto the layer with higher received SINR.
    - FFS: information details, e.g. signaling carried by MAC-CE or UCI, UL signal e.g. SRS
  - FFS: Which subcarrier to be used for PTRS mapping in RB assigned to contain PTRS

Agreements:

- PTRS is not mapped to RBs that are not scheduled for the UE

Working assumption:

- For non-consecutive scheduling, RBs are indexed among the scheduled RBs only
  - For the purpose of identifying RB containing PTRS, RB indexing within scheduled RBs is common for contiguous and non-contiguous scheduling
  - Companies are encouraged to check whether or not there are significant issue(s) for the case of non-continugous scheduling taking into account PTRS density

**R1-1713158 On UL PT-RS design LG Electronics**
**R1-1713606 On UL PTRS for DFT-s-OFDM Samsung**

Not treated.

R1-1712241 PTRS for CP-OFDM Huawei, HiSilicon
R1-1712308 Discussion on RS for phase tracking ZTE
R1-1712385 Considerations on RS for phase tracking CATT
R1-1712561 On PT-RS for CP-OFDM Intel Corporation
R1-1712562 On PT-RS for DFT-s-OFDM Intel Corporation
R1-1712683 Discussion on PTRS/DMRS port association Lenovo, Motorola Mobility
R1-1712843 Discussion on PTRS vivo
R1-1713021 PT-RS design Panasonic Corporation
R1-1713053 Considerations on PT-RS for CP-OFDM Spreadtrum Communications
R1-1713410 DL PTRS considerations Qualcomm Incorporated
R1-1713411 UL PTRS considerations Qualcomm Incorporated
R1-1713841 Discussion on PT-RS design CMCC
R1-1713924 Views on PT-RS NTT DOCOMO, INC.
R1-1714257 On details on PT-RS design for CP-OFDM Nokia, Nokia Shanghai Bell
R1-1714258 On details of the PT-RS design for DFT-S-OFDM Nokia, Nokia Shanghai Bell
R1-1714315 On UL PTRS design Ericsson
R1-1714554 On UL PTRS for DFT-s-OFDM Samsung
R1-1714608 On PTRS design for NR InterDigital, Inc.
R1-1714622 On UL PT-RS design LG Electronics
R1-1714788 WF on PTRS port ZTE
R1-1714876 WF on PT-RS collision avoidance LG Elecronics
R1-1714977 Way forward on PT-RS antenna port association Intel
R1-1715049 WF on pre-DFT PT-RS pattern for DFTsOFDM Mitsubishi Electric, Huawei, Hi-Silicon, Ericsson, Nokia, Nokia Shanghai Bell, Sharp, Spreadtrum, InterDigital
R1-1715053 On Post DFT PTRS for DFT-s-OFDM Samsung
R1-1715054 On ZP PTRS Samsung
R1-1715157 WF on association table pair for PTRS for CP-OFDM Huawei, HiSilicon
R1-1715158 WF on UE assistance for PTRS port configuration for CP-OFDM Huawei, HiSilicon
R1-1715196 WF on PT-RS frequency density table LG Elecronics
R1-1715215 WF on RBs for mapping PTRS for CP-OFDM Huawei



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#### 6.1.2.3.5 SRS

*Including SRS carrier based switching*

**R1-1712309** **Discussion on SRS design for NR ZTE**
**R1-1713159** **On SRS design and related operations LG Electronics**
R1-1713607 SRS design for NR Samsung

Continue offline discussion – Takano (SONY)

**R1-1715136** **Summary of SRS SONY**

Working assumption:

- SRS sequence for NR is supported for up to [272] PRBs by using LTE SRS sequences generation equation
- Companies are encouraged to evaluate PAPR and cross correlation properties of these sequences
- Note [272] PRBs corresponds to the maximum bandwidth support by NR
- FFS On the set of supported SRS bandwidths

**R1-1715058** **WF on collision avoidance between short PUCCH and SRS Mitsubishi Electric, ZTE, Nokia, NSB, AT&T, Qualcomm, Samsung, Ericsson, ETRI, CATT, Panasonic**

Agreements:

- For collision avoidance between short PUCCH and SRS, from a UE perspective, NR supports at least the following two options on a given carrier
  - Collision is defined whenever SRS and PUCCH are transmitted in the same symbol, regardless of whether there are overlapped REs or not
  - Option 1-1: symbol level TDM
  - (Working assumption) Option 2: Prioritize SRS or short PUCCH transmission, i.e., drop SRS or short PUCCH in case of collision
    - FFS whether to have one prioritization rule, or configurable prioritization
    - Examples of prioritization rules
      - Example 1
        - Always prioritize PUCCH over SRS
      - Example 2
        - If PUCCH contains ACK/NACK, prioritize PUCCH
        - Otherwise prioritize SRS
  - FFS the case of FDM SRS and short PUCCH

**R1-1714940** **WF on SRS ZTE, Ericsson, Huawei, HiSilicon, CMCC, ASTRI, CATR, Mitsubishi, China Telecom, Intel, Qualcomm, Nokia, NSB, LG Electronics, AT&T, MediaTek, vivo**

Agreements:

- A given X-port SRS resource spans N = 1,2, or 4 adjacent symbols within a slot where all X ports are mapped to each symbol of the resource, at least the following is supported:
  - Within the resource, each of the X ports are mapped to the same set of subcarriers in the same set of PRBs in the N SRS symbols
  - FFS for the case with frequency hopping depending on RAN4 LS reply

**R1-1714957** **WF on SRS configuration details Huawei, HiSilicon, Ericsson, CATT**

Agreements:

- SRS transmitted in an active UL BWP has the same numerology as that configured for that BWP.
- For LTE SRS sequences:
  - NR should support UE specific configured bandwidth based on tree-like SRS bandwidth sets (analogues to LTE)
    - FFS the parameters used for configuring bandwidth allocation, e.g. whether or not $C_{SRS}$ and $B_{SRS}$ can be reused in a UE specific manner
  - NR should support to sound substantially all UL PRBs in a BWP
    - FFS details of SRS bandwidth sets and RE mapping methods
    - Note that the design shall consider the maximum allowed bandwidth of a BWP



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**R1-1714941 Summary of SRS Sony**
**R1-1714259 SRS design considerations in NR Nokia, Nokia Shanghai Bell**
**R1-1714917 WF on SRS Sequence Design Ericsson, Huawei, Nokia, ASB, Panasonic**
**R1-1714894 WF on SRS sequence generation for partial overlapping LG Electronics, Intel Corporation, ZTE, NEC**

Not treated.
R1-1712238 UL SRS design for beam management and CSI acquisition Huawei, HiSilicon
R1-1712386 Discussion on remaining issues on SRS design CATT
R1-1712563 Discussion on SRS for NR Intel Corporation
R1-1712750 Views on SRS designs Mitsubishi Electric Co.
R1-1712968 Considerations on SRS design Sony
R1-1712993 NR SRS Sequence Design NEC
R1-1713245 Further discussion on SRS design for NR Guangdong OPPO Mobile Telecom
R1-1713343 Discussion on SRS sequence generation for NR Panasonic Corporation
R1-1713412 Discussion on SRS design Qualcomm Incorporated
R1-1713607 SRS design for NR Samsung
R1-1713698 SRS design in NR MediaTek Inc.
R1-1713925 Discussion on NR SRS design NTT DOCOMO, INC.
R1-1714146 On SRS for NR InterDigital, Inc.
R1-1714316 On SRS design Ericsson
R1-1714957 WF on SRS configuration details Huawei, HiSilicon, Ericsson, CATT
R1-1715206 WF on SRS frquency hopping ZTE, ASTRI
R1-1715234 Way Forward on SRS Switching among CCs and Bandwidth Parts Huawei, HiSilicon

#### 6.1.2.3.6 TRS

**R1-1714855 Summary of views on TRS Mediatek**

Working assumptions:

- At least **X**=2 is supported
  - FFS on **X**= 1 and 4
  - Check whether **X**=1 can provide sufficient Doppler spread estimation performance
- Total symbol number summed over **X**=2 slots is 4 (Consider further 2+2 and 3+1, support one or both (FFS)).
- Consider further the positions, taking into account DMRS

Agreements:

- Consider further supporting the bandwidth of TRS to be configured up to the bandwidth of the BWP in addition to ~24, ~50 RBs, and make decision in next meeting
- $\mathbf{S_f}$=4
- **Y**>=160ms is not supported. Consider further down-selection on other values agreed in RAN1AdHoc2

Continue offline discussions – Chiao-Yao (Mediatek)

**R1-1715144 WF on TRS MediaTek, Ericsson, Huawei, HiSilicon, Qualcomm, Samsung**

Agreements:

- A UE can be configured multiple TRS at least if the UE supports multi-TRP/multi-panel deployment
  - Details FFS
- TRS can be QCLed with PDSCH DMRS, regarding at least delay spread, average delay, Doppler shift and Doppler spread.
  - Configuration / signalling details FFS
    - Note: The QCL assumption may be implicit via QCL assumption with other RS
  - FFS for other QCL parameters
- TRS sequence is based on PN generator
- Study whether TRS is needed in idle mode
  - For example, paging, RMSI, RAR demodulation performance by considering without TRS for Doppler spread estimation
- Study whether TRS needs to be configured on a BWP/carrier without SS block
- Study the relationship between SS burst, TRS, and DRX ON duration especially with longer DRX cycle


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- The slots with TRS can be immediately after SS burst before the starting point of DRX ON duration. The DRX ON timing is aligned with SS burst within a number of slots
- There is timing offset between TRS and SS burst. The DRX ON timing is aligned with SS burst, or with TRS within a number of slots
- Configure aperiodic TRS before the starting point of DRX ON duration, so that DRX ON timing is independent of SS burst appearance
- Other solutions are not precluded

Agreements:

- For a connected mode UE, UE is expected to receive UE-specific RRC configuration of TRS at least for sub-6 GHz
  - Before receiving the RRC configuration of TRS, FFS

**R1-1713713 On TRS design MediaTek Inc.**
**R1-1714317 On time and frequency tracking of the channel Ericsson**

Not treated.
R1-1712236 Reference signal for fine time and frequency tracking Huawei, HiSilicon
R1-1712310 Discussion on fine time and frequency tracking of channel ZTE
R1-1712564 Discussion on TRS Intel Corporation
R1-1712969 Considerations on TRS Sony
R1-1713160 Discussion on fine time/frequency tracking of channel LG Electronics
R1-1713608 Discussions on fine time/frequency tracking for NR Samsung
R1-1714232 Consideration on the TRS design for NR CATR
R1-1714260 Views on the fTFT-RS in NR Nokia, Nokia Shanghai Bell

#### 6.1.2.3.7 QCL

**R1-1712311 QCL design for UL and DL MIMO ZTE**
**R1-1714261 On QCL Framework and Configurations in NR Nokia, Nokia Shanghai Bell**

**R1-1715074 Summary of AI 6.1.2.3.7 QCL Nokia, Nokia Shanghai Bell**
**R1-1714913 WF on QCL indication for DM-RS of PDSCH ZTE, Intel, Nokia, NSB, LG Electronics, MediaTek**
Also supported by NEC
**R1-1715207 WF on QCL indication for DM-RS of PDSCH ZTE, Intel, Nokia, NSB, vivo, LG Electronics, MediaTek, NEC, ASTRI, Spreadtrum, Interdigital, Ericsson, Huawei, HiSilicon**

**R1-1715293 Summary of offline QCL discussion Nokia, NSB**

Agreements:

- Support the QCL indication of DM-RS for PDSCH via DCI signaling:
  - The N-bit indicator field in the agreed WF R1-1714885 is extended to support:
    - Each state refers to one or two RS sets, which indicates a QCL relationship for one or two DMRS port group (s), respectively
      - Each RS set refers to one or more RS(s) which are QCLed with DM-RS ports within corresponding DM-RS group
      - Note: The RSs within a RS set may be of different types
      - If there are more than one RS per RS set, each of them may be associated with different QCL parameters, e.g. one RS may be associated with spatial QCL while another RS may be associated with other QCL parameters, etc
      - Configuration of RS set for each state can be done via higher layer signaling
        - E.g., RRC/RRC + MAC CE
  - FFS the timing when the QCL is applied relative to the time of the QCL indication

Agreements:


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- FFS the indicator state referred in below text may or may not be the indicator state defined in R1-1714885
- Following ways of configuring QCL relations between a reference RS and a targeted RS are supported
  - If configured, at least spatial QCL relation between SS Block (ref) and at least P/SP CSI-RS is signaled
    - FFS signaling details, e.g., by RRC, etc.
    - FFS: AP CSI-RS for targeted RS
  - If configured, at least spatial QCL relation between a P/SP CSI-RS resource (ref) and another (different) at least P/SP CSI-RS resource is signaled
    - FFS signaling details, e.g., by RRC, etc.
    - FFS: AP CSI-RS for targeted RS
  - FFS : Other candidate relations

Discuss further offline for remaining issues – Mihai (Nokia)

Agreements:

- For single CC/BWP and single TRP, at least the following is supported:
  - Antenna port(s) of NZP CSI-RS can be QCL-ed with antenna port(s) of other RS wrt to the following parameters:
    - TRS w.r.t . {average delay, delay spread, Doppler shift, Doppler spread} and one of SSblock w.r.t {spatial Rx parameters} or NZP CSI-RS w.r.t. {spatial Rx parameters)
  - FFS Antenna ports of DM-RS can be QCL-ed with SSblock w.r.t. to the following parameters {average delay, delay spread, Doppler shift, Doppler spread, spatial Rx parameters} for PDSCH demodulation before TRS configuration
    - FFS for PDCCH
  - FFS the case where antenna port(s) of NZP CSI-RS can be QCL-ed with antenna port(s) of other RS:
    - SS block: w.r.t .{average delay, FFS delay spread, Doppler shift, FFS Doppler spread, spatial Rx parameters}
    - Especially regarding whether this case must be supported if there is potential absence of TRS or not
  - FFS Antenna ports of DM-RS can be QCL-ed with NZP CSI-RS w.r.t. to the following parameters {average delay, delay spread, Doppler shift, Doppler spread, spatial Rx parameters}
  - FFS Antenna ports of DM-RS can be QCL-ed with TRS w.r.t. to the following parameters {average delay, delay spread, Doppler shift, Doppler spread, FFS spatial Rx parameters}
  - Other cases are FFS
  - Companies are encouraged to perform analysis and evaluations to finalize the supported case(s)

**R1-1715070 WF on cross carrier QCL support Intel, AT&T**

Not treated.

R1-1712237 Details of QCL assumptions and related RS design considerations Huawei, HiSilicon
R1-1712387 On QCL for NR CATT
R1-1712565 On QCL for NR Intel Corporation
R1-1713161 Discussion on QCL for NR LG Electronics
R1-1713414 Discussion on QCL Qualcomm Incorporated
R1-1713609 On QCL for NR Samsung
R1-1713926 General views on QCL design for NR NTT DOCOMO, INC.
R1-1714147 On QCL for NR InterDigital, Inc.
R1-1714318 The QCL framework in NR Ericsson
R1-1715006 WF on spatial QCL signaling Samsung
R1-1715156 WF on Spatial QCL Relation Signaling Samsung

#### 6.1.2.3.8 Other

**R1-1712244 Evaluation results of DMRS design for DL data channel Huawei, HiSilicon**

R1-1712161 SRS switching among CCs and bandwidth parts Huawei, HiSilicon
R1-1712239 UL SRS sequence design in NR Huawei, HiSilicon
R1-1712240 SRS antenna switching Huawei, HiSilicon
R1-1712246 Evaluation results of DMRS design for UL data channel Huawei, HiSilicon
R1-1712247 Common UL/DL DMRS design Huawei, HiSilicon
R1-1713415 Discussion on Bursty Interference Measurement Resources Qualcomm Incorporated
R1-1713768 Discussion on UL DMRS power boosting Huawei, HiSilicon
R1-1713769 Discussion on UL SRS transmission power Huawei, HiSilicon
R1-1713771 UL SRS mapping and hopping Huawei, HiSilicon



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R1-1713773 Considerations on UE-specific RS Sequence Design Huawei, HiSilicon
R1-1713927 Views on DM-RS for mini-slot NTT DOCOMO, INC.
R1-1714319 On the collision between DMRS and DC subcarrier Ericsson
R1-1714530 SRS transmission for wider bandwidth Samsung
R1-1714531 Evaluations on pre-dft PTRS Samsung
R1-1714574 On PT-RS Schemes for post DFT-s-OFDM Samsung
R1-1714575 Discussion on above 40GHz PT-RS design Samsung

#### *6.1.2.4 Other*

*Including MIMO calibration*

R1-1712388 Calibration results for Phase 2 NR MIMO link level simulation CATT
R1-1712389 Calibration results for Phase 2 NR MIMO system level simulation CATT
R1-1713162 Phase 3 SLS Calibration Results for NR MIMO LG Electronics
R1-1713163 Phase 2 LLS Calibration Results for NR MIMO LG Electronics
R1-1713485 Calibration results for Phase 3 NR MIMO system level calibration ZTE
R1-1714532 Evaluation results for dense urban on 30GHz frequency band Samsung
R1-1714533 SLS MIMO calibration results Samsung
R1-1714534 Evaluation results on penetration loss in below and above 6GHz frequency bands Samsung
R1-1714594 Composite Beam Transmission for SS blocks Samsung
R1-1714595 Beamforming Gain for Spatial Channels with Angular Spread samsung
R1-1715251 Calibration results for Phase 1 NR MIMO system level calibration ZTE
R1-1715252 Calibration results for Phase 1 NR MIMO link level calibration ZTE
R1-1715253 Calibration results for Phase 2 NR MIMO system level calibration ZTE
R1-1715254 Calibration results for Phase 2 NR MIMO link level calibration ZTE
R1-1715255 Calibration results for Phase 3 NR MIMO calibration ZTE

R1-1713486 TR38.802_CR_Section_7.1.6_MIMO calibration ZTE
**R1-1715256 TR38.802_CR_Section_7.1.6_MIMO calibration ZTE**
**Decision:** CR0005 to 38.802 (Rel-14, F) is agreed.

### 6.1.3 Scheduling/HARQ aspects

#### *6.1.3.1 Physical downlink control channel*

##### 6.1.3.1.1 PDCCH structure

#### 6.1.3.1.1.1 CCE-to-REG mapping and PDCCH-to-CCE mapping

*Including REG bundle size/structure*

Agreements:
- Working assumptions are confirmed with the following details.
  - For 1/2/3-symbol CORESET, REG bundle size of 6 is supported.
  - A REG bundle size is as part of CORESET configuration for a CORESET configured by UE-specific higher-layer signalling.
    - FFS: CORESET(s) configured by non UE-specific signaling.
- ~~FFS:~~ UE assumes that precoder granularity in frequency domain is equal to the REG bundle size in the frequency domain
  - FFS: gNB can inform to the UE whether or not to assume the same precoder over multiple REG bundles.
- Note: more than one CORESET(s) with the UE-specific higher-layer signaling can be configured for the same UE

Agreements:
- Interleaving operates on REG bundles
  - FFS: interleaving in the case if and when gNB informs to the UE to assume the same precoder over multiple REG bundles

**Friday**
**R1-1715243 Design goals for CCE-REG inter-leaver vivo**

Agreements:
- For interleaving CORESET, the interleaving pattern is derived by the CORESET configuration and is not dependent on other CORESET configuration.



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- Note: Following metrics can be considered
  - Good frequency distribution of REG bundles within the CORESET
  - Blocking probability for potential overlapped CORESET(s)
  - Inter-cell/inter-TRP interference randomization

| | | |
|---|---|---|
| R1-1712181 | On PDCCH-CCE-REG mapping and REG bundle | Huawei, HiSilicon |
| R1-1712566 | Remaining details of PDCCH strcuture | Intel Corporation |
| R1-1712390 | Further details of NR-PDCCH mapping structure | CATT |
| R1-1712663 | REG bundle size and REG mapping for NR-PDCCH | ZTE |
| R1-1712844 | Discussion on REG bundling size and CCE-REG mapping | vivo |
| R1-1713000 | Discussion on CCE-to-REG mapping | NEC Corporation |
| R1-1713164 | Disccusion on NR-PDCCH structure | LG Electronics |
| R1-1713328 | Frequency first CCE-to-REG mapping for NR PDCCH | Sharp |
| R1-1713416 | Remaining open issues on DL control channel mapping | Qualcomm Incorporated |
| R1-1713610 | Resource Mapping for PDCCH | Samsung |
| R1-1713811 | REG bundle size and interleaving for distributed NR-PDCCH | ETRI |
| R1-1713928 | Remaining issues of resource mapping for NR-PDCCH | NTT DOCOMO, INC. |
| R1-1714057 | On PDCCH mapping | Nokia, Nokia Shanghai Bell |
| R1-1714183 | On the remaining issues of PDCCH structure | InterDigital, Inc. |
| R1-1714189 | Discussion on REG bundle size | ITRI |
| R1-1714218 | On CCE and PDCCH mapping structure | Motorola Mobility, Lenovo |
| R1-1714408 | On NR-PDCCH Structure | Ericsson |

#### 6.1.3.1.1.2 RS structure/mapping

| | | |
|---|---|---|
| R1-1712664 | About DMRS density and impact of MU-MIMO | ZTE |

Agreements:

- DMRS density for a CORESET is down-selected between 1/3 or 1/4.
  - FFS: need of additional DMRS density.
- Sequence, density, and applicability of MU-MIMO is still under discussion

**Friday**

**R1-1715109 WF on RS configuration for NR-PDCCH LG Electronics, ETRI, MediaTek, InterDigital, Nokia, NSB, Sharp, Intel, vivo, OPPO**

Working assumption:

- DM-RS density per REG is 1/4 at least for normal CP
  - FFS: orthogonal DMRS for MU-MIMO at RAN1 NR AH#3.
  - FFS: URLLC

| | | |
|---|---|---|
| R1-1712391 | Further details of NR-PDCCH RS structure | CATT |
| R1-1712567 | On DMRS for NR PDCCH | Intel Corporation |
| R1-1712845 | DMRS design for NR-PDCCH | vivo |
| R1-1712883 | Common RS for control and data of Mini-Slots | TCL Communication Ltd. |
| R1-1713165 | Discussion on reference signal for NR-PDCCH | LG Electronics |
| R1-1713268 | On NR PDCCH RS design | Guangdong OPPO Mobile Telecom |
| R1-1713417 | RS for DL control channel | Qualcomm Incorporated |
| R1-1713611 | DMRS Structure for PDCCH | Samsung |
| R1-1713674 | Evaluations for PDCCH RS structure | MediaTek Inc. |
| R1-1713742 | DMRS for NR-PDCCH | Huawei, HiSilicon |
| R1-1713812 | Views on DMRS for NR-PDCCH | ETRI |
| R1-1713842 | Density Evaluation for NR-PDCCH DMRS | CMCC |
| R1-1713929 | DM-RS for NR-PDCCH | NTT DOCOMO, INC. |
| R1-1714058 | On the remaining details of PDCCH reference signal structure | Nokia, Nokia Shanghai Bell |
| R1-1714190 | Discussion on RS density for PDCCH | ITRI |
| R1-1714230 | Consideration on DM RS design for NR-PDCCH | CATR |
| R1-1714409 | On DM-RS for NR-PDCCH | Ericsson |



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#### 6.1.3.1.2 Search space

R1-1712277 Discussion on configuration of the set of aggregation levels FiberHome

### 6.1.3.1.2.1 CORESET configuration

*Including relationship between CORESET and search space*

Agreement:

- The CORESET used to schedule the PDSCH containing the RMSI can be configured to contain also UE-specific PDCCH(s)

Working assumptions:

- For slot-based scheduling, the first DMRS position either on 3rd symbol or 4th symbol is configured by [PBCH].
  - Maximum time duration of a CORESET is 2 symbols if the first DMRS position of a PDSCH with slot-based scheduling is on 3rd symbol, and is 3 symbols otherwise
- This replaces the past working assumption linking DMRS position to bandwidth X

R1-1712182 Configuration of control resource set Huawei, HiSilicon
R1-1712392 Configuration aspects of the NR-PDCCH CATT
R1-1712441 NR-PDCCH CORESET configuration ZTE
R1-1712568 On PDCCH CORESETs Intel Corporation
R1-1713166 Discussion on CORESET configuration LG Electronics
R1-1713259 Some remaining issues on CORESET configuration Guangdong OPPO Mobile Telecom
R1-1713418 Control resource set and search space Qualcomm Incorporated
R1-1713612 CORESET Configurations Samsung
R1-1713675 Discussion on CORESET configuration MediaTek Inc.
R1-1713843 Discussion on CORESET configuration for search space monitoring CMCC
R1-1713875 Configuration of CORESET Panasonic
R1-1713930 Control resource set configuration for NR-PDCCH NTT DOCOMO, INC.
R1-1714059 On the PDCCH control resource set and its connection to the search space for NR Nokia, Nokia Shanghai Bell
R1-1714111 CORESET Monitoring Under Dynamic Change of BWP InterDigital, Inc.
R1-1714365 Discussion on the CORESET configuration Xiaomi Technology
R1-1714410 On Configuration of Control Resource Sets Ericsson
R1-1714584 Remaining issues for CORESET configuration vivo

### 6.1.3.1.2.2 Search space design

*Including possible nested search space. Both common search space and UE-specific search space should be considered*

Agreements:

- Supported aggregation levels for NR-PDCCH are at least 1, 2, 4, 8
- FFS 16 and 32 aggregation levels and also other numbers

Agreements:

- A PDCCH search space at an aggregation level in a CORESET is defined by a set of PDCCH candidates
- For the search space at the highest aggregation level in the CORESET, the CCEs corresponding to a PDCCH candidate are derived as following
  - The first CCE index of a PDCCH candidate is identified by using at least some of the followings
    - (1) UE-ID, (2) candidate number, (3) total number of CCEs for the PDCCH candidate, (4) total number of CCEs in the CORESET, and (5) randomization factor
  - The other CCE indexes of the PDCCH candidate are consecutive from the first CCE index
- Searching space design for the lower aggregation level can be discussed separately

**R1-1713874 Search space design Panasonic**
**R1-1712575 Ultra-reliability for NR PDCCH Intel Corporation**
**R1-1714417 On PDCCH for Ultra-Reliable Transmission Ericsson**

**R1-1714411 On Search Space and Blind Decoding Design Ericsson**

**Thursday**
**R1-1714804 Way Forward on NR-PDCCH Blind Decoding MediaTek, OPPO, Nokia, Nokia Shanghai Bell, Qualcomm**



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Working assumptions:

- In the case when only CORESET(s) for slot-based scheduling is configured for UE, the maximum number of PDCCH blind decodes per slot per carrier is X
  - The value of X does not exceed 44
  - FFS the exact value of X
  - FFS for multiple active BWP, multiple TRP, multiple carriers, multi beams
  - FFS for non-slot based scheduling
  - FFS numerology specific X

| | | |
|---|---|---|
| R1-1713167 | Discussion on hierarchical search space structure | LG Electronics |
| R1-1712183 | Search space and blind decoding design | Huawei, HiSilicon |
| R1-1712276 | Discussion on nested search space design | FiberHome |
| R1-1712393 | Search space design for NR-PDCCH | CATT |
| R1-1712442 | Search space design for NR-PDCCH | ZTE |
| R1-1712569 | PDCCH search spaces and monitoring | Intel Corporation |
| R1-1712847 | Discussion on search space and blind decoding design | vivo |
| R1-1713269 | NR PDCCH search space design with nested structure | Guangdong OPPO Mobile Telecom |
| R1-1713419 | Nested search space design | Qualcomm Incorporated |
| R1-1713613 | Search Space Design | Samsung |
| R1-1713844 | Discussion on PDCCH aggregation level for Macro coverage | CMCC |
| R1-1713931 | Search space design for NR-PDCCH | NTT DOCOMO, INC. |
| R1-1714060 | On the search space design and UE blind detection | Nokia, Nokia Shanghai Bell |

#### 6.1.3.1.2.3 Multi-beam operation for PDCCH

| | | |
|---|---|---|
| R1-1712716 | Control channel configuration for multi-TRP and multi-panel transmission | AT&T |
| R1-1712184 | Multi-beam operation for PDCCH | Huawei, HiSilicon |
| R1-1712394 | Discussion on multi-beam operation for NR-PDCCH | CATT |
| R1-1712443 | Supporting Multi-beam in NR-PDCCH | ZTE |
| R1-1712570 | On multi-beam operation for PDCCH | Intel Corporation |
| R1-1712739 | Multi-beam operation for NR-PDCCH | Fujitsu |
| R1-1712848 | Multi-beam PDCCH monitoring | vivo |
| R1-1713168 | Discussion on multi-beam operation for NR-PDCCH | LG Electronics |
| R1-1713270 | Search space design consideration for NR PDCCH with BF | Guangdong OPPO Mobile Telecom |
| R1-1713420 | Multi-beam control operation | Qualcomm Incorporated |
| R1-1713614 | Multibeam Transmission for PDCCH | Samsung |
| R1-1713676 | Multi-beam operation for PDCCH | MediaTek Inc. |
| R1-1713813 | Multi-beam support for UE-specific NR-PDCCH | ETRI |
| R1-1713845 | PMI feedback for unicast PDCCH transmission | CMCC |
| R1-1713932 | Multi-beam operation for NR-PDCCH | NTT DOCOMO, INC. |
| R1-1714061 | PDCCH support for multi-beam system | Nokia, Nokia Shanghai Bell |
| R1-1714148 | On the impact of multi-beam operation on PDCCH structure | InterDigital, Inc. |
| R1-1714412 | On Multi-beam and Multi-TRP Operation for PDCCH | Ericsson |
| R1-1714541 | Discussion on Multi-beam Design for PDCCH | Convida Wireless LLC |

#### 6.1.3.1.3 Resource sharing between PDCCH and PDSCH

Agreements:

- A UE can be configured by RRC signaling with one or more resource set(s)
  - The UE shall assume that the scheduled PDSCH is rate-matched around the resource set(s) when the scheduled PDSCH overlaps
  - FFS: exact configuration of a resource set including granularity.

Agreements:

- A UE can be configured by UE-specific RRC signaling to identify resource set(s) for which the PDSCH may or may not be mapped based on the L1 signaling.
  - For a scheduled PDSCH overlapping with given resource set(s), L1 signalling indicates whether the scheduled PDSCH is rate-matched around the resource set(s) or is mapped to the resources in the resource set(s).
  - FFS: details of the L1 signaling
  - FFS: exact configuration of a resource set including granularity



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Possible working assumption:

- At least following is supported:
  - When the scheduled PDSCH overlaps with the PDCCH scheduling the PDSCH, the UE shall assume that the scheduled PDSCH is rate-matched around the PDCCH scheduling the PDSCH
    - Note: There is no DCI level signaling involved. The only purpose is to rate match around the UE's own PDCCH, not some other's UE's PDCCH. No decision about granularity of L1 signaling is taken with this bullet.
  - If wideband RS for PDCCH is supported, the UE shall assume that the scheduled PDSCH is rate-matched around the wideband RS for the configured CORESET
  - Other forms of resource sharing between PDCCH and PDSCH is not precluded.

**Friday**

**R1-1715224 WF on PDCCH / PDSCH resource sharing ZTE, Ericsson, Nokia, Intel, LGE, Interdigital, TCL, Samsung**

Also supported by CATT, NTT DOCOMO

Agreements:

- At least the following is supported
  - When the scheduled PDSCH overlaps with the PDCCH scheduling the PDSCH, the UE shall assume that the scheduled PDSCH is rate-matched around the PDCCH scheduling the PDSCH
    - Other forms of resource sharing between PDCCH and PDSCH are not precluded

| | | |
|---|---|---|
| R1-1714098 | Resource sharing between PDCCH and PDSCH in NR | Nokia, Nokia Shanghai Bell, ZTE, Ericsson |
| R1-1712185 | Dynamic resource multiplexing between PDCCH and PDSCH | Huawei, HiSilicon |
| R1-1712395 | Flexible reuse of DL control resources for data transmission | CATT |
| R1-1712571 | Resource sharing between control and data | Intel Corporation |
| R1-1712717 | Resource sharing between PDCCH and PDSCH | AT&T |
| R1-1712881 | Data Multiplexing in the control region | TCL Communication Ltd. |
| R1-1713001 | Resource sharing between PDCCH and PDSCH | NEC Corporation |
| R1-1713056 | On the resource sharing between NR-PDCCH and NR-PDSCH | Spreadtrum Communications |
| R1-1713169 | Discussion on resource sharing between PDCCH and PDSCH | LG Electronics |
| R1-1713271 | On resource sharing between PDCCH and PDSCH | Guangdong OPPO Mobile Telecom |
| R1-1713329 | Indication of PDSCH starting position for NR | Sharp |
| R1-1713421 | Resource reuse for data in DL control region | Qualcomm Incorporated |
| R1-1713615 | Multiplexing NR-PDCCH and PDSCH | Samsung |
| R1-1713677 | Resource sharing between PDCCH and PDSCH | MediaTek Inc. |
| R1-1713814 | Discussion on PDSCH start symbol indication | ETRI |
| R1-1713869 | Resource sharing between PDCCH and PDSCH | Panasonic |
| R1-1713933 | Resource sharing between PDCCH and PDSCH | NTT DOCOMO, INC. |
| R1-1714112 | Dynamic resource reuse for PDSCH | InterDigital, Inc. |
| R1-1714388 | PDSCH starting position indication for NR | WILUS Inc. |

#### 6.1.3.1.4 Group-common PDCCH

*Prioritize discussion of SFI functionality of a group-common PDCCH*

| | | |
|---|---|---|
| R1-1713846 | Discussion on Signalling and UE behavior for DL and UL transmission assignment | CMCC |
| R1-1715115 | WF on signalling for semi-static DL and UL assignment | CMCC |

Possible agreements:

- NR supports the following options for slot format configuration
  - Semi-static SFI configuration only
  - Semi-static SFI configuration + Dynamic SFI signaling
  - Dynamic SFI signaling only
  - No semi-static SFI configuration and no dynamic SFI signalling
  - where semi-static SFI configuration refers to the configuration via higher layer signalling, dynamic SFI signaling refers to the configuration via group common PDCCH.
- Align the terminology and meaning for slot format configuration regardless of semi-static or dynamic
  - 'DL': Resources are used for DL
  - 'UL': Resources are used for UL
  - 'Reserved': Resources are reserved for other purposes



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        - 'unknown' for group common PDCCH is replaced
    - Resource granularity in semi-static configuration
        - Time: Symbol
        - Frequency: CC for 'DL'/ 'UL', PRB or BWP or CC for 'Reserved'
    - Resource granularity in dynamic configuration
        - Time: Symbol
        - Frequency: CC or BWP
- UE behavior for 'Reserved' resources
    - UE shall not assume the transmission from the serving cell
    - UE shall not assume any measurement
    - UE shall not assume UE is allowed to transmit
        - FFS on the exact definition of UE transmit OFF and receive OFF
- In case of simultaneous use of semi-static configuration and dynamic configuration, UE behavior can be defined as one of the following:
    - Option 1
        - No conflict is assumed by UE between semi-static configuration and dynamic configuration
            - Introduce 'Flexible' resources indication for semi-static configuration
            - Only 'Flexible' resources in semi-static configuration can be indicated by dynamic configuration
    - Option 2
        - Similar to Option 1 but 'Reserved' resources via dynamic configuration overrides semi-static configuration
    - Option 3
        - Dynamic configuration always overrides semi-static configuration

**Friday**

**R1-1715271 WF on Slot Format Configuration Qualcomm**

Working assumption:

- 'Unknown' resource is 'flexible' and can be overridden by at least by DCI indication; 'Unknown' is used to achieve the (FFS: exactly/approximately) the same as 'Reserved' if not overridden.
    - 'Unknown' is signalled at least by SFI in a group-common PDCCH
    - FFS: Possibility of overridden by some types of RRC (e.g., measurement configuration)
- 'Reserved' resource is 'not transmit' and 'not receive' but cannot be overridden by DCI/SFI indication.
    - 'Reserved' is signalled at least by RRC
- FFS: handling of 'gap'
- For semi-static DL/UL transmission direction, 'Unknown' can be informed as part of the semi-static configuration.

#### 6.1.3.1.4.1 Structure of group-common PDCCH

R1-1713422 Group common PDCCH encoding Qualcomm Incorporated
R1-1712186 Structure of group-common PDCCH Huawei, HiSilicon
R1-1712396 Channel structure for group-common PDCCH CATT
R1-1712444 Structure consideration of group-common PDCCH ZTE
R1-1712572 Group-common PDCCH: Physical structure Intel Corporation
R1-1712718 On the Structure of Group common PDCCH AT&T
R1-1712849 Group common PDCCH structure vivo
R1-1712970 On structure of GC-PDCCH Sony
R1-1713170 Discussion on the structure of group common PDCCH LG Electronics
R1-1713330 Group common PDCCH structure for NR Sharp
R1-1713616 Structure for UE-Group Common PDCCH Samsung
R1-1713678 Structure of GC PDCCH MediaTek Inc.
R1-1713877 Discussion on structure of group common PDCCH Panasonic
R1-1713934 Remaining issues on structure of group-common PDCCH NTT DOCOMO, INC.
R1-1714062 On the structure of group-common PDCCH in NR Nokia, Nokia Shanghai Bell
R1-1714149 On Group-Common PDCCH Structure InterDigital, Inc.
R1-1714367 Discussion on the structure of group common PDCCH Xiaomi Technology
R1-1714414 On Group-Common PDCCH Structure and Configuration Ericsson

#### 6.1.3.1.4.2 Contents of group-common PDCCH

R1-1713935 SFI and semi-static configurations NTT DOCOMO, INC.
R1-1712187 Contents of group-common PDCCH Huawei, HiSilicon



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R1-1712397 Contents of the group-common PDCCH CATT
R1-1712445 On contents of group-common PDCCH ZTE
R1-1712573 Group-common PDCCH: Contents Intel Corporation
R1-1712850 Group common PDCCH contents vivo
R1-1713171 Discussion on the contents of group common PDCCH LG Electronics
R1-1713423 Contents of group common PDCCH Qualcomm Incorporated
R1-1713617 Functionalities of UE-Group Common PDCCH Samsung
R1-1713679 Contents of GC PDCCH and GC DCI MediaTek Inc.
R1-1713878 Discussion on contents of group common PDCCH Panasonic
R1-1714063 On the slot format related information on group-common PDCCH in NR Nokia, Nokia Shanghai Bell
R1-1714091 Content for group-common PDCCH Apple Inc.
R1-1714150 On Group-Common PDCCH Contents InterDigital, Inc.
R1-1714219 Group-common PDCCH contents, structure, and UE behavior Motorola Mobility, Lenovo
R1-1714366 Discussion on the content of group common PDCCH Xiaomi Technology
R1-1714415 On the Content of Group-Common PDCCH Ericsson
R1-1715081 WF on SFI LG Electronics, Panasonic

#### 6.1.3.1.4.3 UE behaviour related to group-common PDCCH

R1-1712188 UE behavior related to group-common PDCCH Huawei, HiSilicon
R1-1712398 Configuration and monitoring of the group-common PDCCH CATT
R1-1712446 UE behaviour for group-common PDCCH ZTE
R1-1712574 Group-common PDCCH: UE behavior Intel Corporation
R1-1712851 UE behaviors related to SFI vivo
R1-1712971 On UE behaviour related to GC-PDCCH Sony
R1-1713057 The relation among UE-specific DCI, GC-PDCCH, and semi-static signaling Spreadtrum Communications
R1-1713172 Discussion on UE behavior for the group common PDCCH LG Electronics
R1-1713272 Impact on common channel reception to PDCCH design Guangdong OPPO Mobile Telecom
R1-1713331 Group common PDCCH monitoring for NR Sharp
R1-1713424 UE behaviour related to group common PDCCH Qualcomm Incorporated
R1-1713618 UE Behavior for UE-Group Common PDCCH Detection Samsung
R1-1713680 UE behavior for GC PDCCH MediaTek Inc.
R1-1713936 UE behavior for group-common PDCCH NTT DOCOMO, INC.
R1-1714064 On the UE behaviour related to group-common PDCCH in NRNokia, Nokia Shanghai Bell
R1-1714151 UE behaviour related to CORESET(s) configured by PBCH InterDigital, Inc.
R1-1714356 Discussion on grouping rule for GC PDCCHASUSTEK COMPUTER (SHANGHAI)
R1-1714389 Discussion on UE behavior for group-common PDCCH for NR WILUS Inc.
R1-1714416 On UE Procedures Related to Group-Common PDCCH Ericsson
R1-1715202 WF on UE behavior related to SFI LG Electronics, Panasonic

#### 6.1.3.1.5 Ultra-reliable part of URLLC for DL control

*Identify necessary techniques for physical downlink control channel to meet the URLLC requirements set forth by TR38.913.*

R1-1713714 HARQ design and PDCCH reliability for URLLC MediaTek Inc.
R1-1712209 UE procedure of PDCCH monitoring for URLLC Huawei, HiSilicon
R1-1712212 PDCCH reliability for URLLC Huawei, HiSilicon
R1-1712213 DCI design for URLLC Huawei, HiSilicon
R1-1712399 PDCCH for ultra-reliable communications CATT
R1-1712447 NR-PDCCH for supporting URLLC ZTE
R1-1712852 Discussion on ultra-reliable design for PDCCH vivo
R1-1712972 Reliable PDCCH operation for URLLC Sony
R1-1713173 Discussion on DL control with ultra-reliability requirement LG Electronics
R1-1713260 DL control channel design for URLLC Guangdong OPPO Mobile Telecom
R1-1713425 URLLC DL control channel efficiency and reliability Qualcomm Incorporated
R1-1713619 PDCCH Design for URLLC Samsung
R1-1713937 DL control channel design for URLLC NTT DOCOMO, INC.
R1-1714065 On the URLLC specific aspects for DL control channel Nokia, Nokia Shanghai Bell
R1-1714113 Considerations for ultra-reliable DCI transmission InterDigital, Inc.
R1-1714233 Consideration on physical downlink control channel for URLLC CATR
R1-1714418 On the Performance Evaluation of PDCCH for Ultra-Reliable Transmission Ericsson

#### 6.1.3.1.6 Other

**R1-1713428 CRC for NR DL control channel Qualcomm Incorporated**



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*Proposal: 24 bit CRC is proposed for NR DL control channel.*
**Decision:** The document is noted.

- Alt.1: nFAR = 21 bit CRC
  - Supported by Ericsson, LGE, Panasonic, Intel, MediaTek, Qualcomm, Samsung, Motorola Mobility, INL, Sharp, NTT DOCOMO, Lenovo
- Alt.2: nFAR = 16 bit CRC
  - Supported by Nokia, Nokia Shanghai Bell, Huawei, HiSilicon, ZTE, vivo

Nokia, Huawei cannot agree (CRC size will have channel coding impact) – ok to leave it at WA

**Working assumption:**

- False alarm target equivalent to 21 bit CRC (i.e., $2^{-21}$) is supported for NR DL control channel

R1-1712189 Dynamic and semi-static DL/UL resource partition Huawei, HiSilicon
R1-1712217 HARQ feedback indication design for UL grant-free transmission Huawei, HiSilicon
R1-1712853 DCI contents and design vivo
R1-1712854 DCI format size and blind decoding vivo
R1-1712973 UE power saving in CDRX Sony
R1-1713426 Advanced Grant Indication for UE Power Saving Qualcomm Incorporated
R1-1713427 PDCCH blind decoding capability Qualcomm Incorporated
R1-1713428 CRC for NR DL control channel Qualcomm Incorporated
R1-1713620 Transmit Diversity for PDCCH Samsung
R1-1713621 Bandwidth Part Hopping for CORESETS Samsung
R1-1713622 DL and UL Assignment for NR TDD Samsung
R1-1713623 Slot Reconfiguration for Low Latency in TDD Samsung
R1-1713741 Resource sharing between NR-PDCCH and data Huawei, HiSilicon
R1-1713752 Discussion on remaining frequency resources on symbol carrying CORESET Huawei, HiSilicon
R1-1714066 On the usage of PDCCH DMRS as a complementary synchronization signal in DL Nokia, Nokia Shanghai Bell
R1-1714092 Control information for UE power saving Apple Inc.
R1-1714325 On frequency first CCE-to-REG mapping for NR-PDCCH Huawei, HiSilicon
R1-1714326 NR DL control capacity and blocking probability Huawei, HiSilicon
R1-1714327 UE-specific DCI contents in NR Huawei, HiSilicon
R1-1715110 WF on UE Power Saving in connected mode Qualcomm

#### *6.1.3.2 Physical uplink control channel*

##### 6.1.3.2.1 PUCCH in short-duration

###### 6.1.3.2.1.1 Short-PUCCH for UCI of up to 2 bits

*Focus on short-PUCCH on a OFDM symbol.*

**R1-1712448 On short PUCCH for up to 2 bits UCI ZTE**

Agreements:

- For 1-symbol short-PUCCH for UCI of up to 2 bits,
  - The sequence length of 12 REs with consecutive mapping within a PRB is at least supported.
  - Further study 24 or 48 REs.
  - Further study for multiplexing b/w sequence-based short-PUCCH and other sequences using CDM or FDM (DMRS for PUSCH/PUCCH, SRS, long-PUCCH).
    - Including comb-structure
  - For the sequence length of 12 REs,
    - The supported number of base sequences is 30
    - The number of cyclic shifts available for one base sequence is 12

For further discussion

- For 1-symbol short-PUCCH for UCI of up to 2 bits,
  - Log2(m)-bit ACK/NACK is expressed by CS(n) and CS((n+N/m) mod N), …, where:
    - N is the number of cyclic shifts



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- n is one value from 0~N/m-1

**Friday:** The following WFs are listed
R1-1715111 WF on 1-symbol short-PUCCH for UCI of up to 2 bits LG Electronics, Lenovo, Motorola Mobility, vivo, ETRI
R1-1715204 WF on sequences design for short PUCCH Huawei, HiSilicon, Interdigital, IITH, IITM, CEWiT, Tejas Networks, Reliance Jio

R1-1712190 Short PUCCH for UCI of up to 2 bits Huawei, HiSilicon
R1-1712400 Further details of short PUCCH for up to two UCI bits CATT
R1-1712576 Short PUCCH for UCI of up to 2 bits Intel Corporation
R1-1712855 Discussion on short-PUCCH up to 2-bit vivo
R1-1713002 Design for short-PUCCH for UCI of up to 2 bits NEC Corporation
R1-1713174 Design of short NR-PUCCH for up to 2 UCI bits LG Electronics
R1-1713332 Simultaneous SR and HARQ-ACK transmission on short PUCCH for UCI up to 2 bits Sharp
R1-1713344 Discussion on 1-symbol NR-PUCCH for UCI of up to 2 bits Panasonic Corporation
R1-1713429 Channelization of 1-symbol short PUCCH with 1 or 2 bits payload Qualcomm Incorporated
R1-1713624 Short PUCCH for UCI of 1 or 2 Bits Samsung
R1-1713796 Results on Short-PUCCH for UCI of up to 2 bits IITH
R1-1713938 Short-PUCCH for UCI of up to 2 bits NTT DOCOMO, INC.
R1-1714072 On the remaining details of short PUCCH for UCI up to 2 bits Nokia, Nokia Shanghai Bell
R1-1714153 On sequence design for 1-symbol short-PUCCH of up to 2 bits InterDigital, Inc.
R1-1714220 Short PUCCH for up to 2 bit UCI Motorola Mobility, Lenovo
R1-1714390 Consideration on Short PUCCH for UCI of up to 2 bits WILUS Inc.
R1-1714419 On the Design of 1-Symbol PUCCH for 1-2 bits UCI Ericsson

### 6.1.3.2.1.2 Short-PUCCH for UCI of more than 2 bits

*Focus on short-PUCCH on a OFDM symbol.*

Agreements:

- For 1-symbol short-PUCCH for UCI of more than 2 bits,
  - The number of PRBs that can be used for a PUCCH is configurable.
    - Support contiguous and non-contiguous PRB allocation.
      - If prioritization is necessary, contiguous PRB allocation is prioritized.
  - The number of DM-RS REs per PRB is 4.
    - DM-RS REs are at the fixed positions within a PRB.
  - The sequences used for DM-RS are one of the following:
    - Option 1: PN sequences as for PUSCH
    - Option 2: LTE computer-generated/ZC sequence

**Thursday**
Working assumptions:

- For 1-symbol short-PUCCH for UCI of more than 2 bits,
  - DMRS REs are evenly distributed within a PRB
  - FFS: Shifted mapping

R1-1712856 Discussion on short-PUCCH more than 2-bitvivo
R1-1712191 Short PUCCH for UCI of more than 2 bits Huawei, HiSilicon
R1-1712272 Discussion on 2-symbol short PUCCH with more than 2 bits Beijing Xinwei Telecom Techn.
R1-1712401 Further details of short PUCCH for more than two UCI bits CATT
R1-1712449 On short-PUCCH for more than 2 bits ZTE
R1-1712577 Short PUCCH for UCI of more than 2 bits Intel Corporation
R1-1713175 Design of short NR-PUCCH for more than 2 UCI bitsLG Electronics
R1-1713273 Discussion on short PUCCH for more than 2 UCI bitsGuangdong OPPO Mobile Telecom
R1-1713333 Short PUCCH structure for UCI of more than 2 bits Sharp
R1-1713430 Channelization of 1-symbol short PUCCH with more than 2 bits payload Qualcomm Incorporated
R1-1713431 Channelization of 2-symbol short PUCCH Qualcomm Incorporated
R1-1713625 Short PUCCH for UCI of more than 2 Bits Samsung
R1-1713815 Short PUCCH for 3 or more UCI bits ETRI
R1-1713939 Short-PUCCH for UCI of more than 2 bits NTT DOCOMO, INC.


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R1-1714073 On remaining details of short PUCCH for UCI of more than 2 bits Nokia, Nokia Shanghai Bell
R1-1714420 On the Design of 1-Symnol PUCCH for more than 2 bits UCI Ericsson

#### 6.1.3.2.1.3 Support of short-PUCCH over 2 OFDM symbols

Agreements:

- For 2-symbol short-PUCCH for UCI of more than 2 bits, encoded UCI bits are mapped across two symbols.
  - FFS: 1 symbol short-PUCCH for UCI of more than 2 bits are repeated across 2 symbols with or without freq. hopping

R1-1712402 Design of 2-symbol short PUCCH format CATT
R1-1712252 2-symbol PUCCH Huawei, HiSilicon
R1-1712450 Support of short-PUCCH over 2 OFDM symbols ZTE
R1-1712578 2-symbol NR PUCCH Intel Corporation
R1-1713176 Support of short NR-PUCCH over 2 OFDM symbols LG Electronics
R1-1713274 Discussion on short-PUCCH over 2 symbols Guangdong OPPO Mobile Telecom
R1-1713345 Discussion on 2-symbol short-PUCCH with UCI of more than 2 bits Panasonic Corporation
R1-1713626 Short PUCCH over 2 OFDM symbols Samsung
R1-1713940 Short-PUCCH over 2 symbols NTT DOCOMO, INC.
R1-1714074 On 2-symbol short PUCCH design Nokia, Nokia Shanghai Bell
R1-1714421 On the Design of 2-Symbols PUCCH Ericsson

#### 6.1.3.2.2 PUCCH in long-duration

R1-1713443 Uplink Resource for SR Qualcomm Incorporated

#### 6.1.3.2.2.1 Long-PUCCH for UCI of up to 2 bits

*Focus on long-PUCCH within a slot.*

Agreements:

- For a long-PUCCH for UCI of up to 2 bits,
  - Confirm the WA:
    - DMRS always occurs in every other symbol in the long PUCCH
      - FFS: even or odd symbols
- For a long-PUCCH,
  - Frequency-hopping is enabled/disabled by RRC signaling.
    - FFS: if frequency-hopping is always enabled for a long-PUCCH with larger than a certain duration

Agreements:

- Frequency-hopping for a PUCCH occurs within the active UL BWP for the UE
  - FFS message 4 ACK/NACK
  - FFS multiple active BWP
  - The active BWP refers to BWP associated with the numerology of PUCCH

R1-1712192 Long PUCCH for up to 2 bits UCI Huawei, HiSilicon
R1-1712403 Further details of long PUCCH for up to two UCI bits CATT
R1-1712451 On long-PUCCH for up to 2 bits ZTE
R1-1712579 Long PUCCH for up to 2 UCI bits Intel Corporation
R1-1712677 Long PUCCH design for UCI of up to 2 bits Lenovo, Motorola Mobility
R1-1712857 Discussion on long-PUCCH for UCI of up to 2 bits vivo
R1-1713177 Design of long NR-PUCCH for up to 2 UCI bits LG Electronics
R1-1713275 Discussion on long PUCCH for up to 2 UCI bits Guangdong OPPO Mobile Telecom
R1-1713346 Discussion on channel structure of long-duration NR-PUCCH for UCI of up to 2 bits Panasonic Corporation
R1-1713432 Long PUCCH design with 1 or 2 bits UCI payload Qualcomm Incorporated
R1-1713627 Long PUCCH for UCI of 1 or 2 Bits Samsung
R1-1713801 Results on Long-PUCCH for UCI of up to 2 bits IITH
R1-1713941 Long-PUCCH for UCI of up to 2 bits NTT DOCOMO, INC.
R1-1714075 Long PUCCH with small UCI payload Nokia, Nokia Shanghai Bell
R1-1714422 On the Design of Long PUCCH for 1-2 bits UCI Ericsson

#### 6.1.3.2.2.2 Long-PUCCH for UCI of more than 2 bits



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*Focus on long-PUCCH within a slot.*

Agreement: Long-PUCCH for moderate UCI payload with multiplexing capacity is supported

Possible agreements:

- Operation of a long PUCCH with more than 2 bits UCI can support multiplexing of multiple users on a single PRB.
- For the format of long PUCCH supporting multiplexing of users on a single PRB, select from:
  - Alt.1: User multiplexing is realized by time-domain OCC.
  - Alt.2: User multiplexing is realized by pre-DFT-OCC.
  - Alt.3: User multiplexing is realized by FDM within the PRB.
  - Alt.4: User multiplexing is realized by pure TDM in the slot.

**Thursday**

Agreements:

- For a PUCCH format for UCI with large payload with no multiplexing capacity within a slot:
  - If frequency-hopping is enabled,
    - For each frequency-hop with less than X symbols, there is one DMRS symbol.
      - X is not smaller than 4.
    - For each frequency-hop with equal to or more than X symbols, there are two DMRS symbols.
    - For each frequency-hop, at least one DMRS symbol is included.
  - FFS: number of DMRS symbols if frequency-hopping is disabled.
  - Targeting one value for X.
  - FFS: The value of X
  - FFS: DMRS structures
- Note: Continue discussion on simulation assumptions within Thursday – Zhisong (ZTE)

Possible agreements:

- Simulation assumption for long PUCCH of more than 2 bits are as follows
  - Long PUCCH format without multiplexing capability:
  - Payload sizes: 11bits, 22bits, 60bits
  - 1 PRB
  - TDL-A, 30ns,
  - TDL-C, 1000ns,
  - 3km/h, 60km/h, 120km/h
  - 1 or 2 DMRS per hop, Companies are free to choose DMRS position.

**Friday**

**R1-1715239 Offline discussions on simulation assumption for long PUCCH of more than 2 bits ZTE**

Agreements:

- Simulation assumptions for purpose of identifying the number of DMRS symbols for long PUCCH format without multiplexing capability for more than 2 bits UCI payload
  - System bandwidth = 20Mhz
  - Subcarrier spacing = {15kHz, 30 kHz}
  - TDL-C channel with delay spread = {300nS, 1000nS}
  - # UE Tx =1, # gNB Rx =2 ( Optional: # gNB Rx = 4 and 32)
  - Payload sizes without CRC: 20bits, 60bits, 100 bits (only for 14 symbols long PUCCH)
  - Number of RB = {1 RB}
  - Carrier frequency = 4Ghz
  - Number of UEs = {1}
  - UE speed: 3km/h, 120km/h, 500km/h at least for 20 bits
  - Polar code with 8+3 CRC and/or TBCC with 8 CRC bits
  - Practical channel estimation and ideal noise estimation

Agreements:

- For the format of long PUCCH supporting multiplexing of users, target to select one from:
  - Alt.1: User multiplexing is realized by time-domain OCC.
  - Alt.2: User multiplexing is realized by pre-DFT-OCC.
  - Alt.3: User multiplexing is realized by FDM within the PRB.
  - Alt.4: User multiplexing is realized by pure TDM in the slot.
  - Note: Other alternatives are not precluded.



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- Note: The following Simulation assumptions are recommended:
  - System bandwidth = 20Mhz
  - Subcarrier spacing = {15kHz, 30 kHz}
  - TDL-C channel with delay spread = {300nS, 1000nS}
  - # UE Tx =1, # gNB Rx =2 ( Optional: # gNB Rx = 4 and 32)
  - Payload sizes without CRC: 4bits, 10bits, 20bits, 40bits
  - Number of RB = {1}
  - Carrier frequency = 4Ghz
  - Number of UEs = {at least 2}
  - UE speed: 3km/h, 120km/h, 500 km/h
  - Reed-Muller for 4 and 10 bits
  - Polar code with 8+3 CRC and/or TBCC with 8 CRC bits
  - Practical channel estimation and ideal noise estimation
  - Note: Study of the effect of impairments such as power imbalance, time/frequency errors are not precluded.

R1-1712193 Long PUCCH structure for moderate payload with some multiplexing capacity Huawei, HiSilicon
R1-1712404 Further details of long PUCCH for more than two UCI bits CATT
R1-1712452 On long-PUCCH for more than 2 bits ZTE
R1-1712580 Long PUCCH for more than 2 UCI bits Intel Corporation
R1-1712678 Long PUCCH design for UCI of more than 2 bits Lenovo, Motorola Mobility
R1-1712858 Discussion on long-PUCCH for UCI more than 2-bit vivo
R1-1713178 Design of long NR-PUCCH for more than 2 UCI bits LG Electronics
R1-1713334 Slot structure of NR long PUCCH for more than 2 bits Sharp
R1-1713347 Discussion on channel design of long-duration NR-PUCCH for UCI of more than 2 bits Panasonic Corporation
R1-1713628 Long PUCCH for UCI of more than 2 Bits Samsung
R1-1713802 Results on Long-PUCCH for UCI of more than 2 bits IITH
R1-1713847 PUCCH design with long duration CMCC
R1-1713942 Long-PUCCH for UCI of more than 2 bits NTT DOCOMO, INC.
R1-1714076 On the remaining details of long PUCCH for UCI more than 2 bits Nokia, Nokia Shanghai Bell
R1-1714423 On the Design of Long PUCCH for more than 2 bits UCI Ericsson
R1-1714542 Long-PUCCH for UCI of more than 2 bits Cohere Technologies
R1-1714604 Long PUCCH design with more than 2 bits UCI payload Qualcomm Incorporated
R1-1715227 WF on user multiplexing for long PUCCH InterDigital

#### 6.1.3.2.2.3 Support of long-PUCCH over multiple slots

R1-1713058 Support of long-PUCCH transmission over multiple slots Spreadtrum Communications
R1-1712194 Support of long-PUCCH over multiple slots Huawei, HiSilicon
R1-1712405 Design of multi-slot PUCCH transmission CATT
R1-1712453 Consideration on long-PUCCH over slots ZTE
R1-1712581 Long PUCCH over multiple slots Intel Corporation
R1-1712679 Long PUCCH over multiple slots Lenovo, Motorola Mobility
R1-1713179 Support of long NR-PUCCH over multiple slots LG Electronics
R1-1713335 Structure of NR long PUCCH over multiple slots Sharp
R1-1713348 Discussion on support of long-duration NR-PUCCH over multiple slots Panasonic Corporation
R1-1713434 Long PUCCH over multiple slots Qualcomm Incorporated
R1-1713629 Multi-Slot Long PUCCH Transmission Samsung
R1-1713816 Long-PUCCH over multiple slots ETRI
R1-1713943 Long-PUCCH over multiple slots NTT DOCOMO, INC.
R1-1714077 Long PUCCH over multiple slots Nokia, Nokia Shanghai Bell
R1-1714424 On support of Long PUCCH over multiple slots Ericsson
R1-1715137 WF on long-PUCCH over multiple slots LG Electronics

#### 6.1.3.2.3 Transmit diversity for PUCCH

R1-1713630 Transmit Diversity for PUCCH Samsung
R1-1712196 Transmit diversity for PUCCH Huawei, HiSilicon
R1-1712270 Transmit diversity for DFTsOFDM-based PUCCH in long duration Mitsubishi Electric RCE
R1-1712582 Transmit diversity for PUCCH Intel Corporation
R1-1712719 On NR PUCCH Diversity Schemes AT&T



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R1-1713180 Consideration on transmit diversity for NR-PUCCH LG Electronics
R1-1713435 Transmit diversity for PUCCH Qualcomm Incorporated
R1-1714078 Transmit Diversity for PUCCH Nokia, Nokia Shanghai Bell
R1-1714155 On transmit diversity for Long PUCCH InterDigital, Inc.
R1-1714425 On Transmit Diversity Schemes for PUCCH Ericsson

#### 6.1.3.2.4 Resource allocation for PUCCH

Agreements:

- In order to identify PUCCH resource, **at least** following are known by the UE:
  - PUCCH format
  - Starting symbol in a slot
  - Which slot(s) the PUCCH is transmitted
  - PRB allocation within the UL BWP
  - For 1-symbol short-PUCCH for UCI of up to 2 bits,
    - Code/sequence index(es)
  - For 1-symbol short-PUCCH for UCI of more than 2 bits,
    - No additional parameters are identified
  - For 2-symbol short-PUCCH for UCI of up to 2 bits,
    - Code/sequence index(es)
    - Frequency-hopping pattern
  - For 2-symbol short-PUCCH for UCI of more than 2 bits,
    - Frequency-hopping pattern
  - For long-PUCCH for UCI of up to 2 bits,
    - Duration of the long-PUCCH within a slot
      - Note: take the case of multi-slot into account.
    - Sequence/code index
      - OCC and, e.g., cyclic-shift
    - Frequency-hopping pattern
  - For long-PUCCH for UCI of more than 2 bits with no multiplexing capacity,
    - Frequency-hopping pattern
    - Duration of the long-PUCCH within a slot
      - Note: take the case of multi-slot into account.
  - For long-PUCCH for UCI of more than 2 bits with multiplexing capacity,
    - FFS: details
- FFS: for transmit diversity
- FFS: signaling aspects, e.g., implicit, explicit, table, etc.

R1-1713848 Subband-based resource allocation for NR PUCCH CMCC
R1-1712406 Further discussion on PUCCH resource allocation CATT
R1-1712454 NR PUCCH resource allocation ZTE
R1-1712583 Resource allocation for PUCCH during initial access Intel Corporation
R1-1712740 PUCCH resource allocation Fujitsu
R1-1713181 Consideration on resource allocation for NR-PUCCH LG Electronics
R1-1713261 Resource indication for UL control channel Guangdong OPPO Mobile Telecom
R1-1713349 Discussion on resource allocation for uplink control channel Panasonic Corporation
R1-1713436 Resource allocation for PUCCH Qualcomm Incorporated
R1-1713631 Resource Allocation for PUCCH with HARQ-ACK Samsung
R1-1713743 PUCCH resource allocation for HARQ-ACK and SR Huawei, HiSilicon
R1-1713817 Resource allocation for PUCCH ETRI
R1-1713944 Resource allocation for PUCCH NTT DOCOMO, INC.
R1-1714079 PUCCH resource allocation Nokia, Nokia Shanghai Bell
R1-1714157 On resource allocation for 1-symbol short-PUCCH of up to 2 bits InterDigital, Inc.
R1-1714221 PUCCH resource allocation for HARQ-ACK feedback to Msg4 Motorola Mobility, Lenovo
R1-1714426 On PUCCH Resource Allocation and Control Ericsson
R1-1715168 WF on PUCCH time-domain resource indication methods LG Electronics

#### 6.1.3.2.5 UCI multiplexing

##### 6.1.3.2.5.1 UCI piggyback on PUSCH

*For both PUSCH with CP-OFDM waveform and PUSCH with DFT-s-OFDM waveform*

Agreements:

- For frequency first mapping, UCI resource mapping principles (e.g., around RS) are common for PUSCH with DFT-s-OFDM waveform and CP-OFDM waveform
- At least for periodic CSI report configured by RRC and aperiodic CSI report triggered by UL grant, the UL data is rate-matched around the UCI

**Friday**

Working assumptions:

- For slot-based scheduling, for HARQ-ACK with more than 2 bits, PUSCH is rate-matched.
- For slot-based scheduling, for HARQ-ACK with up to 2 bits, PUSCH is punctured.
- Note: NR ensures sufficiently reliable common understanding on HARQ-ACK bits between gNB and UE.

| | | |
|---|---|---|
| R1-1713632 | On UCI Multiplexing in PUSCH | Samsung |
| R1-1712195 | UCI piggyback on PUSCH | Huawei, HiSilicon |
| R1-1712407 | Multiplexing of UCI and UL data on PUSCH | CATT |
| R1-1712455 | UCI multiplexing on PUSCH | ZTE |
| R1-1712584 | UCI multiplexing onto PUSCH | Intel Corporation |
| R1-1712859 | Discussion on UCI piggyback to PUSCH | vivo |
| R1-1713182 | Support of UCI piggyback on PUSCH for NR | LG Electronics |
| R1-1713350 | Discussion on UCI on PUSCH | Panasonic Corporation |
| R1-1713437 | UCI piggyback on PUSCH | Qualcomm Incorporated |
| R1-1713702 | Discussion on UCI on PUSCH | MediaTek Inc. |
| R1-1713945 | UCI on PUSCH | NTT DOCOMO, INC. |
| R1-1714080 | UCI multiplexing on PUSCH | Nokia, Nokia Shanghai Bell |
| R1-1714158 | Considerations on UCI transmission on PUSCH | InterDigital, Inc. |
| R1-1714391 | Discussion on UCI piggyback on PUSCH | WILUS Inc. |
| R1-1714427 | On UCI Transmission on PUSCH | Ericsson |

#### 6.1.3.2.5.2 PUCCH-PUSCH multiplexing

| | | |
|---|---|---|
| R1-1713703 | Discussion on PUCCH and PUSCH multiplexing | MediaTek Inc. |
| R1-1712408 | Simultaneous PUCCH-PUSCH transmission in NR | CATT |
| R1-1712456 | Multiplexing of PUSCH and short PUCCH | ZTE |
| R1-1712585 | PUCCH-PUSCH multiplexing | Intel Corporation |
| R1-1712860 | Discussion on PUCCH-PUSCH multiplexing | vivo |
| R1-1713183 | Support of UL signal/channel multiplexing for NR | LG Electronics |
| R1-1713276 | Multiplexing of short-duration UCI and UL data | Guangdong OPPO Mobile Telecom |
| R1-1713336 | PUCCH and PUSCH simultaneous transmission and multiplexing | Sharp |
| R1-1713351 | Discussion on UCI and data multiplexing | Panasonic Corporation |
| R1-1713438 | Multiplexing of PUCCH and PUSCH | Qualcomm Incorporated |
| R1-1713633 | On Simultaneous PUSCH and PUCCH Transmissions | Samsung |
| R1-1713745 | Multiplexing of PUCCH and PUSCH | Huawei, HiSilicon |
| R1-1713946 | PUCCH-PUSCH multiplexing | NTT DOCOMO, INC. |
| R1-1714081 | On the multiplexing between PUCCHs and PUSCH | Nokia, Nokia Shanghai Bell |
| R1-1714392 | Simultaneous transmission for long-PUCCH and PUSCH | WILUS Inc. |
| R1-1714428 | On Simultaneous Transmission of PUCCH and PUSCH | Ericsson |
| R1-1715138 | WF on Multiplexing of Short PUCCH and PUSCH | LG Electronics |

#### 6.1.3.2.6 Ultra-reliable part of URLLC for UL control

*Identify necessary techniques for physical uplink control channel to meet the URLLC requirements set forth by TR38.913.*

| | | |
|---|---|---|
| R1-1712457 | Analysis of URLLC reliability for uplink control channel | ZTE |
| R1-1712211 | Discussion on UCI feedback for URLLC | Huawei, HiSilicon |
| R1-1712409 | PUCCH aspects for ultra-reliable communications | CATT |
| R1-1712586 | On UL control channel design aspects for URLLC | Intel Corporation |
| R1-1713184 | Discussion on UL control with ultra-reliability | LG Electronics |
| R1-1713301 | Resource allocation for PUCCH to support URLLC | Sequans Communications |
| R1-1713439 | SR design for GF/GB UL URLLC transmission | Qualcomm Incorporated |
| R1-1713634 | PUCCH Design for URLLC | Samsung |



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R1-1713715 ACK/NACK feedback design and reliability for URLLC MediaTek Inc.
R1-1713947 UL control channel design for URLLC NTT DOCOMO, INC.
R1-1714082 On URLLC UCI transmission Nokia, Nokia Shanghai Bell
R1-1714114 Considerations for ultra-reliable UCI transmission InterDigital, Inc.
R1-1714429 On PUCCH for Ultra-Reliable Transmission Ericsson
R1-1714430 On the Performance Evaluation of PUCCH for Ultra-Reliable Transmission Ericsson

#### 6.1.3.2.7 Other

R1-1712587 Configurations of various long PUCCH lengths Intel Corporation
R1-1712588 Short UL control channel early in a slot Intel Corporation
R1-1713352 Discussion on UCI multiplexing with different use cases Panasonic Corporation
R1-1713818 UCI multiplexing of different usage scenario ETRI
R1-1714328 Long PUCCH structure for large payload with no multiplexing capacity Huawei, HiSilicon
R1-1714329 On CSI feedback in NR Huawei, HiSilicon
R1-1714330 Transmit diversity for short duration PUCCH Huawei, HiSilicon
R1-1714331 Multiplexing between PUCCHs Huawei, HiSilicon
R1-1714332 Multiplexing of UL control channel and SRS in NR Huawei, HiSilicon
R1-1714475 Considerations on frequency hopping for PUCCH KT Corp.
R1-1714535 Performance Results for Long PUCCH Samsung
R1-1714536 Performance Results for UCI and Data Multiplexing Samsung
R1-1714537 BSI Reporting on PUCCH Samsung
R1-1714538 Multiplexing PUSCH with Short PUCCH or SRS Samsung
R1-1714539 PUCCH resource configuration for bandwidth restricted UE Samsung

### *6.1.3.3 DL/UL data scheduling and HARQ procedure*

#### 6.1.3.3.1 DL/UL resource allocation

R1-1713870 Slot/non-slot scheduling and related functionality grouping Panasonic

##### 6.1.3.3.1.1 Frequency-domain resource allocation

*Including resource allocation for PDSCH/PUSCH with CP-OFDM waveform and PUSCH with DFT-s-OFDM waveform*

**R1-1715099 WF on Type 0 RA NEC**

**Friday:**
Proposals:
- For a resource allocation scheme based on LTE DL RA type 0, for slot-based scheduling,
  - The RBG size ($P$) is at least a function of the number of PRBs within the BWP.
  - Dynamic switching between the RBG size ($P$) and RBG size = 1 is supported while keeping the RA overhead the same.
    - RBG size = 1 covers only a portion of the bandwidth part.
  - The number of bits for the RA field in the DCI in the BWP is given by

$$N_{\mathrm{RBG}}^{\mathrm{XL}} = header + \left\lceil N_{\mathrm{RB}}^{\mathrm{XL}} / P \right\rceil$$

where X stands for D and U (downlink and uplink respectively)
    - FFS: details of the header.

**R1-1715296 RA field and RBG size OPPO**
Proposals:
- A DCI format containing a X-bit Type 0 RA bitfield is supported.
  - RBG size is at least a function of the number of PRBs within the BWP.
  - Padding bits in case number of RBGs is smaller than X.
  - FFS: Other DCI format containing Type 0 RA bitfield in other size
  - FFS: the value(s) of X

R1-1712861 Discussion on frequency-domain resource allocation vivo
R1-1712156 Scheduling and resource allocation for bandwidth parts Huawei, HiSilicon
R1-1712410 NR DL/UL frequency domain resource allocation CATT
R1-1712458 Resource allocation in frequency domain ZTE



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| | | |
|---|---|---|
| R1-1712589 | DL/UL data frequency-domain resource allocation | Intel Corporation |
| R1-1712741 | Discussion on frequency domain resource allocation | Fujitsu |
| R1-1713185 | Discussion on frequency-domain resource allocation | LG Electronics |
| R1-1713262 | RBG size determinations and frequency resource allocation | Guangdong OPPO Mobile Telecom |
| R1-1713353 | Discussion on PRB grid and RBG determination | Panasonic Corporation |
| R1-1713440 | MPR issue with distributed RB allocation in UL | Qualcomm Incorporated |
| R1-1713635 | DL/UL Frequency Resource Allocation | Samsung |
| R1-1713948 | Frequency-domain resource allocation | NTT DOCOMO, INC. |
| R1-1714007 | On resource allocation in frequency domain for PDSCH and PUSCH in NR | Nokia, Nokia Shanghai Bell |
| R1-1714050 | More details of Frequency-domain RA schemes for NR | NEC |
| R1-1714154 | Two-step resource allocation for data channel in NR | ASUSTEK COMPUTER (SHANGHAI) |
| R1-1714159 | On frequency-domain resource allocation for NR | InterDigital, Inc. |
| R1-1714431 | On Resource Allocation in the Frequency Domain | Ericsson |

#### 6.1.3.3.1.2 Time-domain resource allocation

*Timing/duration determination for symbol-level/slot-level/multi-slot-level scheduling*

Agreements:

- NR supports some combinations of following:
  - For the purpose of designing time-domain resource allocation scheme from UE perspective, assuming no prior information of DL/UL assignment, scheduling DCI informs the UE of the time-domain information of the scheduled PDSCH or PUSCH
    - Following is informed to the UE:
      - One-slot case:
        - Starting symbol and ending symbol in the slot.
        - Which slot it applies to
      - Multi-slot case:
        - Opt.1: Starting symbol and ending symbol of each slot of the aggregated slots, and the starting slot and ending slot where it is applied to
        - Opt.2: Starting symbol and ending symbol of a slot, and the starting slot and ending slot where it is applied to
          - The starting symbol and ending symbol are applied to all the aggregated slots
        - Opt.3: Starting symbol, starting slot, and the ending symbol and ending slot
      - Non-slot (i.e., mini-slot) case:
        - Starting symbol and ending symbol
          - FFS: starting symbol is:
            - Opt.1: Starting symbol of a slot
              - UE is also informed of which slot it applies to
            - Opt.2: Symbol number from the start of the PDCCH where scheduling PDCCH is included
          - FFS: ending symbol is:
            - Opt.1: Ending symbol of a slot
              - UE is also informed of which slot it applies to
            - Opt.2: Symbol number from the starting symbol
  - Scheduling DCI with and without time domain field is supported
  - Note: the starting symbol is the earliest symbol of the PDSCH or PUSCH including DMRS symbol in the case of PUSCH in a slot, FFS: PDSCH
  - Note: the ending symbol is the latest symbol of the PDSCH or PUSCH in a slot
  - FFS: signaling aspects, e.g., implicit, explicit, table, etc.
  - FFS: which are valid combinations
  - FFS: handling of semi-static UL/DL and SFI assignment

| | | |
|---|---|---|
| R1-1713263 | Time-domain resource allocation for NR | Guangdong OPPO Mobile Telecom |
| R1-1712208 | Discussion on data transmission duration | Huawei, HiSilicon |
| R1-1712411 | NR DL/UL time domain resource allocation | CATT |
| R1-1712590 | Time-domain resource allocation for DL and UL data | Intel Corporation |
| R1-1712720 | Transmission duration indication for symbol-level/slot-level/multi-slot-level scheduling | AT&T |
| R1-1712742 | Discussion on time domain resource allocation | Fujitsu |
| R1-1712862 | Discussion on time domain resource allocation | vivo |
| R1-1713186 | Discussion on time-domain resource allocation | LG Electronics |



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R1-1713441 Short PUSCH transmission in UL short duration Qualcomm Incorporated
R1-1713636 DL/UL Time Resource Allocation Samsung
R1-1713949 Time-domain resource allocation NTT DOCOMO, INC.
R1-1714008 Time-domain resource allocation for NR Nokia, Nokia Shanghai Bell
R1-1714051 Time-domain RA schemes for NR NEC
R1-1714229 Discussion on the scheduling of time domain resource CATR
R1-1714432 On Resource Allocation in the Time Domain Ericsson
R1-1714472 Indication of transmission duration KT Corp.
R1-1715056 WF on Resource allocation for multi-slot aggregation LG Electronics

#### 6.1.3.3.1.3 Transport block size determination

*Including TBS related aspects*

Agreements:

- Single maximum TB size is defined for the reference case, and is not exceeded.
  - Reference case is a slot with 14 symbols.

**Friday**

Agreements:

- RAN1 strives for finding TBS determination by using a formula
  - The formula has following as parameters:
    - The number of layers the codeword is mapped onto
    - Time/frequency resource the PDSCH/PUSCH is scheduled
      - Opt.1: The total number of REs available for the PDSCH/PUSCH
      - Opt.2: Reference number of REs per slot/mini-slot per PRB and the number of PRB(s) for carrying the PDSCH/PUSCH
        - FFS: Details of reference number
        - FFS: for the case of more than one slot
    - Modulation order
    - Coding rate
  - RAN1 should also consider at least the following:
    - Whether the system can work without ensuring to enable giving the knowledge for decoding the re-transmission without the knowledge of initial transmission
      - Ensuring to enable the same TBS between initial transmission and re-transmission with the same/different number of PRBs or the same/different number of symbols in some cases
    - Code-block segmentation
    - TBS determination for specific packet sizes (e.g., VoIP, etc)
    - TBS determination for specific services (e.g., URLLC, etc)
    - Possibility of decoupling the coding rate and modulation order for some cases
  - Note: Byte alignment is required
  - Note: in addition to the formula, table(s) may be needed to determine the TBS value

R1-1714433 On Transport Block Size Determination Ericsson
R1-1712157 TB mapping and TBS/MCS determination Huawei, HiSilicon
R1-1712412 NR TB Size determination CATT
R1-1712996 TB mapping across aggregated slots NEC Corporation
R1-1713187 Discussion on TBS determination LG Electronics
R1-1713442 Discussion TB size determination Qualcomm Incorporated
R1-1713637 Transport Block Size Determination Samsung
R1-1713950 TBS determination NTT DOCOMO, INC.
R1-1714009 Transport block size determination and the support of slot aggregation in NR Nokia, Nokia Shanghai Bell
R1-1714087 TBS determination Intel Corporation

#### 6.1.3.3.2 UL data transmission procedure with grant

*Including details for single/multiple SR configurations*

**R1-1715101 Way forward on scheduling request support in NR Ericsson, NTT DOCOMO, Nokia, Nokia Shanghai Bell**

Possible agreements:

- The UE can be configured with more than 2 separate SR configurations.
- Each SR configuration maps to one or more logical channels



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    - Details of mapping (including whether transmission profiles are used as part of mapping) are up to RAN2
- If multiple SRs are triggered to be transmitted overlapping in time, the UE will only transmit the SR corresponding highest priority.
    - Details on how to do the prioritization is up to RAN2 to decide
- An SR can be configured with a periodicity of one OFDM symbol up to the largest periodicity supported in LTE (i.e. XX ms)
- An SR can be configured with both short and long PUCCH (of different lengths)

**R1-1714680 WF on Scheduling Request for NR Idaho National Laboratory, Qualcomm, Lenovo, Motorola Mobility, IITH, CEWIT, IITM, Tejas Networks**

**Friday**
**R1-1715218 Way forward on scheduling request support in NR Ericsson, NTT DOCOMO, Nokia, Nokia Shanghai Bell, Samsung, Panasonic**

Agreements:
- It is up to RAN2 how many SR configurations the UE can be configured with.
- In case of SR only, the physical layer can only transmit one SR at any given time
    - If multiple SR are triggered prioritization of which SR should be transmitted is decided by RAN2
- Multiplexing of SR and HARQ feedback is supported on short-PUCCH
- Multiplexing of SR and HARQ feedback is supported on long-PUCCH
- An SR can be configured with a periodicity of at least equal to X OFDM symbol(s) (at least for short-PUCCH), and with up to the largest periodicity supported in LTE (i.e. 80 ms)
    - Working assumptions:
        - X=1, which implies short-PUCCH could be located at any OFDM symbol of a slot
    - FFS: Supported periodicity values
    - FFS: Possible limitations due to other factors
- One configured SR can be associated with either short or long PUCCH

**R1-1715151 WF on Scheduling Request for NR Idaho National Laboratory, Qualcomm, Lenovo, Motorola Mobility, IITH, CEWIT, IITM, Tejas Networks**

| | | |
|---|---|---|
| R1-1713638 | Procedures for Grant-Based UL Transmissions | Samsung |
| R1-1712055 | Advantages of Underlay Scheduling Request method over PUCCH-based SR | Idaho National Laboratory |
| R1-1712158 | On uplink data scheduling | Huawei, HiSilicon |
| R1-1712413 | Further details of grant-based UL transmission | CATT |
| R1-1712459 | On scheduling request for NR | ZTE |
| R1-1712591 | SR configuration and UL data scheduling | Intel Corporation |
| R1-1712676 | Discussion on SR related procedures | Lenovo, Motorola Mobility |
| R1-1713188 | Discussion on scheduling request design | LG Electronics |
| R1-1713295 | Discussion on the UL waveform indication | Guangdong OPPO Mobile Telecom |
| R1-1713716 | On support of Grant-free and Grant-based transmission for UL URLLC | MediaTek Inc. |
| R1-1713951 | Scheduling request design in NR system | NTT DOCOMO, INC. |
| R1-1714010 | Discussion on multiple SR configuration | Nokia, Nokia Shanghai Bell |
| R1-1714053 | Frequency hopping for NR UL PUSCH | NEC |
| R1-1714434 | On UL Data Scheduling Grant in NR | Ericsson |

#### 6.1.3.3.3 UL data transmission procedure without grant

*Including HARQ/re-transmission, UE identification, relation b/w UL grant-free and UL SPS, etc.*

**R1-1715193 Offline discussions on some topics for AI6.1.3.3.3 NTT DOCOMO**

Agreements:
- Confirm the Working assumption: Both DFT-S-OFDM and CP-OFDM are supported for UL transmission without grant.
- It is not necessary to support Type 3 UL transmission without UL grant

Possible agreements:
- The maximum number of HARQ processes for UL transmission without grant is configured by higher-layer
- HARQ process number (HPN) derivation is based at least on time/frequency resource of the UL transmission without UL grant.



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- FFS: frequency resource base
- Support using MAC CE as an acknowledgement for L1 signalling used for Type 2 UL transmission without grant activation/deactivation (same as in LTE SPS)

**R1-1715197 WF on configuration for UL grant free Huawei, HiSilicon**

Possible agreements:

- For at least type 1 of UL transmission without UL grant, multiple sets of parameters per RRC configuration is supported
  - Each set of parameters is associated with up to X HARQ processes
    - FFS the value of X and X is configurable
  - Each set of parameters includes at least
    - A periodicity and offset of a resource with respect to SFN=0
      - Periodicity is defined as an interval of transmission occasions including repetitions for the same TB
      - The UE only transmits one TB at any given time using the same set of parameters
    - Time domain resource allocation
    - Frequency domain resource allocation
    - UE-specific DMRS configuration
      - The configuration is further TB-specific
    - An MCS/TBS value
    - Number of repetitions K
    - Power control related parameters

**R1-1715198 WF on HARQ feedback for UL grant free Huawei, HiSilicon**

Possible agreements:

- For UL transmission without UL grant, a group-common RNTI can be used for the DCI indicating ACK of a TB
- The DCI can be received during the repetitions of the same TB or within a predefined period
- The DCI can also include
  - ACKs for other UEs/TBs;
  - ACK mapping to the corresponding UE/TB.

**Friday**

**R1-1714813 Summary of offline discussions on UL transmission without UL grant NTT DOCOMO, INC.**
**R1-1715294 Outcome of offline discussions on UL transmission without UL grant NTT DOCOMO, INC.**

Agreements:

- Support using MAC CE as an acknowledgement for L1 signalling for activation/deactivation of Type 2 UL transmission without grant (similar/same behaviour as in LTE SPS).
- Regarding the RV determination for K repetitions including the initial transmission, further study following options including possible down-selection:
- For Type 1:
  - Option 1: Fixed to
    - 1-1: a single value
    - 1-2: a RV pattern
  - Option 2: RRC configured
    - 2-1: a single value
    - 2-2: a RV pattern
- For Type 2:
  - Option 1: Same as Type 1
  - Option 2: Based on the L1 signalling
- Repetition number K for Type 2 UL transmission without grant is down-selected from the following:
  - Option 1: Only RRC signalling
  - Option 2: Combination of RRC + L1 activation signalling
- At least when an UL grant is used for retransmissions of Type 1 UL transmission without UL grant, different RNTI from the RNTI for UL transmission with grant is needed.
  - FFS how to determine the RNTI.
- For Type 2 UL transmission without UL grant, different RNTI from the RNTI for UL transmission with grant is needed for activation/deactivation and at least for re-transmission.
  - FFS how to determine the RNTI.
- Send a LS to RAN2 to inform all the agreements (Lihui)

LS for email discussion/approval until August 31st – Lihui (DOCOMO)

Agreements:



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- If HARQ feedback is supported, to indicate HARQ feedback of UL transmission without grant, following options and related UE behavior should be further studied.
  - Option 1: Based on UL grant to indicate "ACK"
  - Option 2: Group-common DCI
    - 2-1: Only ACK
    - 2-2: ACK and NACK
  - Option 3: Define a Timer, UE assumes following, when the Timer expires
    - 3-1: ACK if an NACK is not received after the K repetitions
    - 3-2: NACK if an ACK is not received
- FFS: Option 1, Option 2 and Option 3-2 can be used during and after the K repetition
- Note: UL grant for the same TB initially transmitted without grant can indicate "NACK"

R1-1713952 UL data transmission without UL grant NTT DOCOMO, INC.
R1-1712215 On the determination of UE ID and HARQ process for UL grant-free transmission Huawei, HiSilicon
R1-1712414 Grant-free UL transmission procedure CATT
R1-1712592 UL data transmission without grant Intel Corporation
R1-1712689 HARQ design for uplink grant-free transmission Lenovo, Motorola Mobility
R1-1712743 Discussions on HARQ for grant-free transmission Fujitsu
R1-1712753 HARQ related procedure for UL transmission without grant ZTE
R1-1712821 DMRS design considerations in UL data transmission without grant NICT
R1-1712863 Discussion on UL grant-free transmission vivo
R1-1712884 Configuration and Resource Assignments for Grant Free UL TCL Communication Ltd.
R1-1712974 Discussion on the pre-emption and retransmission of UL transmission without grant Sony
R1-1712994 On UL grant-free NEC
R1-1713189 Discussion on UL transmission without grant LG Electronics
R1-1713302 UL Transmission without Grant Sequans Communications
R1-1713337 K Repetitions of UL Transmission: Not just by RRC signaling! Sharp
R1-1713444 L1 signaling for GF UL transmission Qualcomm Incorporated
R1-1713639 Procedures for Grant-Free UL Transmissions Samsung
R1-1713717 Grant-free repetition schemes for UL URLLC MediaTek Inc.
R1-1713819 Considerations on URLLC grant-free transmission Types ETRI
R1-1713849 Discussion on scheduling for SPS CMCC
R1-1714011 UL transmission procedure without grant Nokia, Nokia Shanghai Bell
R1-1714128 Discussion on UL transmission without grant China Telecommunications
R1-1714160 On remaining aspects of UL data transmission without grant InterDigital, Inc.
R1-1714393 Discussion on HARQ Combining for UL transmssion without grant WILUS Inc.
R1-1714435 On UL Data Transmisison without UL GrantEricsson
R1-1714463 On Grant-Free UL transmission ITL

#### 6.1.3.3.4 CBG-based (re)transmission

**R1-1713640 Summary of Email discussion on [NRAH2-08] Down-selection of CBG-based (re)transmission**
**Samsung**

Possible agreements:

- At least support that the number of CBGs per TB is indicated by RRC signaling
  - FFS whether also support to indicate the number of CBGs per TB by L1 signaling

Possible agreements:

- For semi-static HARQ-ACK codebook determination, support TB-level NACK by setting all CBG-level HARQ-ACK bits to NACK.
  - FFS whether to also support other approach(es) to inform TB-level NACK

Possible agreement:

- For HARQ-ACK codebook for CBG-based transmissions, continue discussions on semi-static and dynamic codebook determinations

Possible agreement (for CBG construction)

- When $M$ is configured for the number of CBGs per TB and a TB consists of $C$ CBs, the first $K$ CBGs out of total $M$ CBGs include $ceil(C/M)$ CBs per CBG and the remaining $M-K$ CBGs include $floor(C/M)$ CBs per CBG. $K$ is determined by $K = C - floor(C/M) \times M$.

**Wednesday**



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Agreements:

- At least for single CW case, at least support that the number of CBGs per TB is indicated by RRC signaling
  - FFS whether also support to indicate the number of CBGs per TB by L1 signaling

**R1-1715043 WF on CBG retransmission Samsung**

Agreements:

- For DL CBG-based (re)transmission,
  - Following information can be separately configured to be included in the same DCI:
    - Which CBG(s) is/are (re)transmitted.
    - Which CBG(s) is/are handled differently for soft-buffer/HARQ combining.
      - FFS: whether/how UE behavior is specified, e.g., part/whole of soft-buffer of indicated CBG(s) is flushed

**R1-1715098 WF on CBG construction Huawei, HiSilicon, OPPO, AT&T, Samsung,**
Also supported by LG Electronics

Agreements:

- At least for single CW case
  - The maximum number ***N*** of CBG(s) per TB is configured by RRC signaling
    - The number ***M*** of CBG(s) in the TB equals to ***min(C, N)***, where ***C*** is the number of CB(s) within the TB.
  - For CBG construction
    - The first ***Mod(C,M)*** CBG(s) out of total ***M*** CBG(s) include ***ceil(C/M)*** CB(s) per CBG
    - The remaining ***M-Mod(C,M)*** CBG(s) include ***floor(C/M)*** CB(s) per CBG.

**Thursday**

Possible agreements:

- At least support that the number of CBGs per TB is indicated by RRC signaling
  - FFS whether also support to indicate the number of CBGs per TB by L1 signaling

Possible agreements:

- For semi-static HARQ-ACK codebook determination, support TB-level NACK by setting all CBG-level HARQ-ACK bits to NACK.
  - FFS whether to also support other approach(es) to inform TB-level NACK

Possible agreements:

- For HARQ-ACK codebook for CBG-based transmissions, continue discussions on semi-static and dynamic codebook determinations

Possible agreements (for CBG construction)

- When *M* is configured for the number of CBGs per TB and a TB consists of *C* CBs, the first *K* CBGs out of total *M* CBGs include *ceil(C/M)* CBs per CBG and the remaining *M-K* CBGs include *floor(C/M)* CBs per CBG. *K* is determined by $K = C - floor(C/M) \times M$.

### 6.1.3.3.4.1 CBG construction

**R1-1714808 WF on CBG construction Samsung, ZTE, Panasonic, Intel, Huawei, HiSilicon, Lenovo, Motorola Mobility, LG Electronics**

Agreement:

- Confirm the working assumption that, for initial transmission and retransmission, each CBG of a TB has the same set of CB(s).

**R1-1714809 WF on CBG configuration Samsung, Huawei, HiSilicon**

Possible agreement:

- For multiple CW cases, the gNB configures the same maximum number of CBGs for each TB

**Friday**

**R1-1714812 WF on CBG configuration Samsung**



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Agreements:

- For multiple CW cases, the following can be considered.
  - Option 1. The gNB configures the maximum number of CBGs per TB.
    - Each TB has the same maximum number of CBGs.
  - Option 2. The gNB configures the maximum number of CBGs per TB.
    - Each TB can be configured with different/same maximum number of CBGs.
    - Note: the gNB configures two parameters on the maximum number of CBGs per TB to the UE.
  - Option 3. The gNB configures the maximum number of CBGs to be shared by both CWs.
    - FFS: How to divide the total number of CBGs to two CWs

**R1-1715223 Offline discussions on CBG-based retransmission for AI 6.1.3.3.4 Samsung**

Agreements:

- For the purpose of further discussion, we conclude following:
  - For the following discussion on CBG-based retransmission, define the terms CBGTI and CBGFI as below.
    - CBGTI (CBG transmission information) means information on which CBG(s) is/are (re)transmitted and,
    - CBGFI (CBG flushing out information) means information on which CBG(s) is/are handled differently for soft-buffer/HARQ combining
- At least following is supported for DL CBG-based (re)transmission.
  - A DCI includes both CBGTI and CBGFI.
    - For single CW case, when N is the maximum number of CBGs configured by RRC
      - N bits for CBGTI, and the other 1 bit for CBGFI
        - FFS: whether re-interpret NDI as CBGFI
        - FFS: whether CBGTI is re-interpreted as NDI
        - FFS: whether jointly using other field as CBGTI or CBGFI
    - FFS on multiple CW case.
- At least following is supported for DL and UL CBG-based (re)transmission.
- A DCI includes CBGTI.
  - For single CW case, N bits for CBGTI as configured by RRC
    - FFS: whether CBGTI is re-interpreted as NDI
    - FFS: whether NDI is re-interpreted as CBGTI
    - FFS: whether jointly using other field as CBGTI
  - FFS on multiple CW case

R1-1713445 Region-based CBG Construction Qualcomm Incorporated
R1-1712201 Discussion on CBG construction Huawei, HiSilicon
R1-1712415 Details of CBG construction CATT
R1-1712593 CBG-based (re)transmissions: CBG construction Intel Corporation
R1-1712665 CBG construction ZTE
R1-1712690 Discussion on CBG grouping Lenovo, Motorola Mobility
R1-1712721 Deatails of CBG construction AT&T
R1-1712864 Discussion on CBG-based (re)transmission vivo
R1-1713190 CBG construction for CBG based retransmission in NR LG Electronics
R1-1713277 Discussion on CBG grouping Guangdong OPPO Mobile Telecom
R1-1713641 CBG Construction Samsung
R1-1713720 On CBG construction for NR HARQ MediaTek Inc.
R1-1713953 CBG construction NTT DOCOMO, INC.
R1-1714012 Mapping code blocks to code block groups Nokia, Nokia Shanghai Bell
R1-1714115 CBG construction for NR InterDigital, Inc.
R1-1714436 Code Block Group Formation Ericsson

### 6.1.3.3.4.2 DL control signalling for CBG-based (re)transmission

*Including CBG information by the DCI*

R1-1712200 Scheduling mechanisms for CBG-based re-transmission Huawei, HiSilicon
R1-1712416 DL control signaling design for CBG-based operationCATT
R1-1712594 CBG-based (re)transmissions: DL control signaling Intel Corporation
R1-1712666 DL control for CBG ZTE
R1-1712691 DL control signalling for retransmitted CBG indication Lenovo, Motorola Mobility
R1-1712722 Downlink Control Channel Design for CBG based Transmission Schemes AT&T



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R1-1712744 Discussion on DL control signaling related to CBG based (re-)transmission Fujitsu
R1-1712975 DL control signalling for UL CBG-based (re)transmission Sony
R1-1713191 DCI signaling for CBG based retransmission in NR LG Electronics
R1-1713278 Discussion on CBG indication in DCI Guangdong OPPO Mobile Telecom
R1-1713300 CBG based retransmission Sequans Communications
R1-1713338 Discussion on CBG-based (re)transmission Sharp
R1-1713446 DCI considerations for CBG-based (re)-Transmissions Qualcomm Incorporated
R1-1713642 DL control for CBG Retransmissions Samsung
R1-1713862 Discussion on DL control signalling for CBG-based retransmission HTC Corporation
R1-1713871 DL control signalling for CBG-based (re)transmission Panasonic
R1-1713954 DL control signalling for CBG-based (re)transmission NTT DOCOMO, INC.
R1-1713981 DCI for CBG-based (re)transmission Shenzhen Coolpad Technologies
R1-1714013 DL control signalling for CBG-based transmissions Nokia, Nokia Shanghai Bell
R1-1714093 CBG-based (re)transmission for multiplexing eMBB and URLLC Apple Inc.
R1-1714116 CBG based transmission for NR InterDigital, Inc.
R1-1714130 Discussion on CBG-based (re)transmission China Telecommunications
R1-1714394 On DCI Design for CBG-based (re)transmission WILUS Inc.
R1-1714437 Downlink Control Signaling for Code Block Group Operations Ericsson

### 6.1.3.3.4.3 UL control signalling for CBG-based (re)transmission

*Including CBG-level HARQ-ACK feedback*

**R1-1715276 WF on HARQ-ACK for CBG based retransmission LG Electronics, Qualcomm, Intel, vivo, Lenovo, Motorola Mobility, Samsung, CATT, Ericsson, Nokia, Nokia Shanghai Bell**

Agreements:

- For single CW case with CBG based retransmission for the semi-static codebook with HARQ-ACK multiplexing, at least following is supported for the HARQ-ACK composition and mapping per TB
  - HARQ-ACK codebook includes HARQ-ACK corresponding to all the CBGs (including the non-scheduled CBG(s))
  - At least followings are supported
    - HARQ-ACK payload size is the same with the configured number of CBGs
    - Each HARQ-ACK bit corresponds to each CBG
    - FFS payload size reduction
  - ACK is reported for a CBG if the same CBG has been successfully decoded
  - FFS how to handle the case if TB CRC check is not passed while CB CRC check is passed for all the CBs

R1-1712202 Discussion on CBG-based feedback Huawei, HiSilicon
R1-1712417 UL control signaling design for CBG-based operation CATT
R1-1712595 CBG-based (re)transmissions: HARQ-ACK feedback Intel Corporation
R1-1712667 UL control for CBG ZTE
R1-1712692 HARQ-ACK feedback for CBG-based retransmission Lenovo, Motorola Mobility
R1-1712723 On the deatails of uplink Control Channel Design for CBG based Transmission Schemes AT&T
R1-1712745 Compressed HARQ-ACK feedback for CBG based (re-)transmission Fujitsu
R1-1713192 UCI signaling for CBG based retransmission in NR LG Electronics
R1-1713279 Discussion on HARQ-ACK feedback for CBG-based transmission Guangdong OPPO Mobile Telecom
R1-1713299 CBG based HARQ-Ack/Nack Sequans Communications
R1-1713447 UCI considerations for CBG-based (re)-Transmissions Qualcomm Incorporated
R1-1713643 HARQ-ACK Feedback for CBG-Based Retransmissions Samsung
R1-1713863 Discussion on UL control signalling for CBG-based retransmission HTC Corporation
R1-1713955 UL control signalling for CBG-based (re)transmission NTT DOCOMO, INC.
R1-1714014 HARQ-ACK feedback for CBG-based (re-)transmission in NR Nokia, Nokia Shanghai Bell
R1-1714161 HARQ feedback design aspects for CBG based transmission InterDigital, Inc.
R1-1714395 Discussion on UL HARQ-ACK feedback for CBG-based retransmission WILUS Inc.
R1-1714438 On Design of CBG HARQ-ACK Feedback Schemes Ericsson
R1-1714473 HARQ procedure for CBG-based transmission KT Corp.
R1-1715240 WF on HARQ-ACK feedback for CBG LG Electronics



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#### 6.1.3.3.5 HARQ-ACK feedback

##### 6.1.3.3.5.1 HARQ-ACK feedback timing

| | | |
|---|---|---|
| R1-1713850 | Discussion on timing design with semi-static DL/UL assignment | CMCC |
| R1-1712724 | HARQ-ACK feedback timing for FDD, semi-static TDD and mini-slot based transmissions | AT&T |
| R1-1712203 | HARQ feedback timing for NR | Huawei, HiSilicon |
| R1-1712418 | On NR HARQ-ACK feedback timing | CATT |
| R1-1712865 | Discussion on HARQ timing design | vivo |
| R1-1713193 | Consideration on HARQ-ACK feedback timing for NR | LG Electronics |
| R1-1713448 | HARQ feedback timing in FDD | Qualcomm Incorporated |
| R1-1713644 | HARQ-ACK Feedback Timing | Samsung |
| R1-1713956 | HARQ-ACK timing | NTT DOCOMO, INC. |
| R1-1714015 | Timing aspects for HARQ-ACK feedback | Nokia, Nokia Shanghai Bell |
| R1-1714202 | HARQ-ACK feedback timing for NR | Potevio |
| R1-1714439 | On HARQ Feedback Timing | Ericsson |

##### 6.1.3.3.5.2 HARQ-ACK multiplexing/bundling

*Including solutions to address single/multiple TBs/CBGs over single/multiple carriers/TTIs*

| | | |
|---|---|---|
| R1-1714016 | On HARQ feedback determination | Nokia, Nokia Shanghai Bell |
| R1-1712419 | NR HARQ-ACK multiplexing | CATT |
| R1-1712460 | HARQ-ACK multiplexing/bundling | ZTE |
| R1-1712597 | HARQ-ACK bundling and multiplexing in NR | Intel Corporation |
| R1-1712693 | On HARQ-ACK multiplexing and bundling | Lenovo, Motorola Mobility |
| R1-1712725 | HARQ multiplexing of Multi codeword MIMO Schemes | AT&T |
| R1-1712746 | Discussion on HARQ-ACK codebook | Fujitsu |
| R1-1713194 | Support of HARQ-ACK multiplexing/bundling for NR | LG Electronics |
| R1-1713280 | Discussion on HARQ-ACK feedback | Guangdong OPPO Mobile Telecom |
| R1-1713645 | HARQ-ACK Codeword Determination | Samsung |
| R1-1713744 | On HARQ-ACK multiplexing and/or bundling | Huawei, HiSilicon |
| R1-1713864 | Discussion on CBG-based HARQ feedback multiplexing | HTC Corporation |
| R1-1713876 | HARQ-ACK codebook for CBG-based transmission | Panasonic |
| R1-1713957 | HARQ-ACK multiplexing | NTT DOCOMO, INC. |
| R1-1714070 | UE-based HARQ-ACK bundling for NR | Sequans Communications |
| R1-1714184 | CBG multiplexing for MCW CA and dynamic K1 timing | Qualcomm Austria RFFE GmbH |
| R1-1714396 | HARQ-ACK multiplexing for CBG-based (re)transmission | WILUS Inc. |
| R1-1714440 | On HARQ Codebook | Ericsson |
| R1-1715047 | WF on HARQ-ACK bundling for NR | LG Electronics |

#### 6.1.3.3.6 Scheduling/HARQ process

##### 6.1.3.3.6.1 gNB/UE processing time and necessary HARQ RTT/number

Agreements:

The candidate factors for (N1,N2) processing time characterization (Step 3) are given in following table

- Nominal assumptions are provided for this characterization in the table, for which the (N1,N2) values are evaluated
- Additional candidate factors indicated in [] can be optionally considered for (N1,N2).
- It is understood that if nominal assumptions change, the (N1,N2) characterization can be modified accordingly.

**Candidate factors for UE processing time (N1,N2)**

| | N1 | N2 |
|---|---|---|



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| | | |
|---|---|---|
| **Nominal assumptions** | Single carrier / Single BWP / Single TRP<br>○ Full range of MCS and multi-layer support up to the 4-layer MIMO and 256-QAM<br>○ Up to 3300 active subcarriers[2]<br>PDCCH<br>○ Same numerology / BWP as PDSCH<br>○ Single grant monitored for PDSCH<br>○ 44 blind decodes, single symbol CORESET<br>PDSCH<br>○ PDSCH does not precede PDCCH<br>○ 14-symbol slot-based scheduling<br>○ Frequency-first RE-mapping, no time-interleaving of CBs across TB<br>PUCCH<br>○ Short formats for HARQ-ACK | Single carrier / Single BWP / Single TRP<br>○ Full range of MCS and multi-layer support up to the 2-layer MIMO and 64-QAM<br>○ Up to 3300 active subcarriers<br>PDCCH<br>○ Same numerology / BWP as PUSCH<br>○ Single grant monitored for PUSCH<br>○ 44 blind decoding, single symbol CORESET<br>PUSCH<br>○ 14-symbol slot-based scheduling<br>○ No time-interleaving of CBs across TB<br>○ DFTsOFDM or OFDM<br>○ Front loaded DMRS for low latency[4]<br>○ No UCI multiplexing |
| **Candidate factors** | ○ SCS<br>○ DMRS configuration[3]<br>○ [Percentage of peak rate]<br>○ [RE-mapping[1]] | ○ SCS<br>○ RE-mapping (depending on specification)[1]<br>○ [Percentage of peak rate] |

[1]Preferred RE-mappings may be specified in cases where decisions are pending.
[2]Some consideration can also be given to N1 when the 3300 active subcarriers are achieved with carrier aggregation.
[3]Front loaded and distributed patterns are assumed. For front loaded, the 3rd and 4th symbols have DMRS.
[4]N2 is measured from the start of DMRS (since front-loaded assumption is made). One DMRS is TDM with PUSCH.

R1-1713449 UE processing time email discussion Qualcomm Incorporated
R1-1713977 UE processing time evaluation MediaTek Inc.
R1-1712197 Processing time for DL HARQ and UL grant Huawei, HiSilicon
R1-1712420 Discussion on HARQ processes and RTT CATT
R1-1712598 Processing times and HARQ processes in NR Intel Corporation
R1-1712726 On HARQ Process number for Multi Codeword MIMO and other remaining details AT&T
R1-1712866 Discussion on UE processing time vivo
R1-1712995 Number of HARQ processes for co-existence with TD-LTE NEC Corporation
R1-1713062 Discussion on UE processing time Spreadtrum Communications
R1-1713195 Consideration on HARQ process number for NR LG Electronics
R1-1713646 On Number of HARQ Processes and HARQ RTT Samsung
R1-1713958 Processing time and HARQ process number for NR NTT DOCOMO, INC.
R1-1714017 On the number of HARQ processes Nokia, Nokia Shanghai Bell
R1-1714185 UE processing time Qualcomm Austria RFFE GmbH
R1-1714441 On Minimum Processing Time and Number of HARQ Processes in NR Ericsson

### 6.1.3.3.6.2 Soft-buffer management for NR

*Including soft-buffer management for a HARQ processes over one/multiple carriers*

Agreements:

- NR specification should decouple the transmit (or RV) buffer from soft buffer size of the UE receiver.
  - Note: transmit (or RV) buffer refers to the PDSCH rate-matching buffer

R1-1713450 Considerations for soft buffer management Qualcomm Incorporated
R1-1713872 UE category modelling and soft buffer Panasonic
R1-1712199 Soft buffer handling Huawei, HiSilicon
R1-1712421 Soft buffer management for NR CATT
R1-1712599 Soft-buffer requirements in NR Intel Corporation
R1-1713196 Consideration on soft buffer and UE category for NR LG Electronics
R1-1713647 Soft Buffer Partitioning Samsung
R1-1713959 Soft-buffer aspects for NR NTT DOCOMO, INC.
R1-1714018 On the HARQ soft buffer handling Nokia, Nokia Shanghai Bell
R1-1714442 On HARQ and Soft Buffer Handling Ericsson

### 6.1.3.3.6.3 Soft-buffer management for LTE-NR dual connectivity

*Soft-buffer management for LTE-NR dual connectivity*



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R1-1712162 Soft buffer handling on LTE-NR DC Huawei, HiSilicon
R1-1713197 Discussion on soft buffer handling for LTE-NR DC LG Electronics
R1-1713482 Soft buffer partitioning in NSA Qualcomm Austria RFFE GmbH
R1-1713648 Soft Buffer Partitioning for LTE-NR Dual Connectivity Samsung
R1-1714019 On the HARQ soft buffer handling for LTE-NR dual connectivity Nokia, Nokia Shanghai Bell
R1-1714123 Soft-buffer management for LTE-NR dual connectivity Intel Corporation
R1-1714443 On HARQ and Soft Buffer Handling for LTE-NR Dual Connectivity Ericsson

#### 6.1.3.3.7 Multiplexing data with different transmission durations

**R1-1713298 On NR slots Ericsson**

Agreements:

- Remove the support for 7-symbol slots from NR
  - It is allowed to have more than one DL/UL switching points within a 14-symbol slot by using non-slot-based scheduling
  - Note: at least 14-symbol, 7-symbol, and 2-symbol CORESET monitoring periodicities are supported for non-slot-based scheduling
  - Removing 7-symbol slot does not imply to remove the agreed design of 4- to 7-symbol long PUCCH
  - Allow additional DMRS position with non-slot based scheduling
- RAN1 recommends to define test cases for following cases:
  - Slot-based scheduling for downlink
    - The first DMRS position of the PDSCH is fixed on the 3rd or 4th symbol of the slot
  - Non-slot-based scheduling for downlink
    - The first DMRS position of the PDSCH is the 1st symbol of the scheduled data
    - At least PDSCH durations of 2, 4, and 7 OFDM symbols including DMRS are recommended to be specified
      - Note: the LS includes the motivations of selected values
  - Note: Final decision is up to RAN4

Prepare draft LS to RAN4 until Thursday – Ralf (AT&T)
**Thursday**
**R1-1715164 [DRAFT] LS on RAN1 recommendation to define test cases AT&T**
**Decision:** Final LS is approved in R1-1715188 with following updates
The PDSCH durations of 2, 4, and 7 OFDM symbols (including DMRS) are motivated by

- Support of PDSCH durations that align with SS block transmissions with the same or different numerology in order to allow FDM of SS block transmissions and PDSCH transmissions , especially if TxRP uses beam-sweeping (e.g., above 6GHz)
  - This use case includes unicast and broadcast PDSCH ~~(e.g., for RMSI)~~
  - This use case includes FDM across CC in case of intra-band CA where the same RF hardware is used for more than one CC
- Support of finer TDM granularity of scheduling for the same/different UEs within a slot, especially if TxRP uses beam-sweeping (e.g., above 6GHz)
  - This use case includes unicast and broadcast PDSCH (e.g., for RMSI)
- Support of very low latency ~~including MBB and URLLC~~
- Support of NR transmissions scheduled in LTE ~~MBSFN and~~ non-MBSFN subframes
  - PDSCH can be scheduled on OFDM symbols not carrying CRS
- Support of forward compatibility, e.g., multiplexing of Rel. 15 waveforms with future services, e.g., integrated access and backhaul

R1-1713451 On slot durations in NR Qualcomm Incorporated

#### 6.1.3.3.7.1 Pre-emption indication for downlink

*Including signalling details and UE behaviour when it is indicated*

**R1-1715162 WF on preemption indication Huawei, HiSilicon, Sony, Panasonic, MediaTek, Intel, Interdigital, LGE**
Also supported by III, Sequans, Convida wireless

Possible agreements:



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- Preempted resource(s) within a certain time/frequency region (i.e. reference downlink resource) within the periodicity to receive group common DCI for PI, is indicated by the group common DCI carrying the preemption indication
  - The frequency region of the reference downlink resource is configured semi-statically implicitly or explicityly
  - The time region of the reference downlink resource is configured semi-statically implicitly or explicitly
- The frequency granularity of PI is configured to be y RBs within the reference downlink resource for a given numerology
  - Note: The y RBs can correspond to the whole frequency range of the downlink reference resource.
- The time granularity of PI is configured to be x symbols within the reference downlink resource for a given numerology

**Friday**

Agreements:

- Preempted resource(s) within a certain time/frequency region (i.e. reference downlink resource) within the periodicity to monitor group common DCI for pre-emption indication, is indicated by the group common DCI carrying the preemption indication
  - The frequency region of the reference downlink resource is configured semi-statically
    - FFS: explicit signaling or implicitly derived by other RRC signalling
  - The time region of the reference downlink resource is configured semi-statically
    - FFS: explicit signaling or implicitly derived by other RRC signalling
- The frequency granularity of pre-emption indication is configured to be y RBs within the reference downlink resource for the given numerology
  - FFS: explicit signaling or implicitly derived by other RRC signalling
  - Note: The y RBs can correspond to the whole frequency region of the downlink reference resource.
- The time granularity of pre-emption indication is configured to be x symbols within the reference downlink resource for the given numerology
  - FFS: explicit signaling or implicitly derived by other RRC signalling
- Note: Time/frequency granularities of pre-emption indication should take into account the payload size of the group common DCI carrying the pre-emption indication

R1-1712867 Discussion on pre-emption indication for downlink vivo
R1-1712204 On pre-emption indication for DL multiplexing of URLLC and eMBB Huawei, HiSilicon
R1-1712422 Further design considerations for DL pre-emption indication CATT
R1-1712600 DL pre-emption indication support in NR Intel Corporation
R1-1712668 DL pre-emption indicationZTE
R1-1712976 On transmission of pre-emption indicator using Group Common DCI Sony
R1-1713198 Discussion on pre-emption indication for downlink LG Electronics
R1-1713264 Symbol-level time-domain resource allocation and pre-emption indication Guangdong OPPO Mobile Telecom
R1-1713452 URLLC DL pre-emption and UL suspension indication channel design Qualcomm Incorporated
R1-1713649 Indication of Preempted Resources in DL Samsung
R1-1713960 Pre-emption indication for downlink NTT DOCOMO, INC.
R1-1714085 Considerations on preemption indication for DL Sequans Communications
R1-1714162 Remaining details of preemption indication for DL InterDigital, Inc.
R1-1714228 Discussion on the design of DL preemption indication CATR
R1-1714397 Discussion on UE behavior by pre-emption indication WILUS Inc.
R1-1714444 On Pre-emption Indication for Downlink Ericsson
R1-1714474 Remaining issues on preemption indication for DL KT Corp.

### 6.1.3.3.7.2 Possible enhancements for uplink

R1-1714445 On Pre-emption Indication for Uplink Ericsson
R1-1712218 Discussion on UL multiplexing of grant-based eMBB and grant-free URLLC Huawei, HiSilicon
R1-1712423 On pre-emption indication for UL transmission CATT
R1-1712601 Multiplexing of UL transmissions with different data durations and latency requirements Intel Corporation
R1-1712747 On eMBB and URLLC multiplexing for Uplink Fujitsu
R1-1712868 Discussion on UL multiplexing of eMBB and URLLC vivo
R1-1712977 Multiplexing data with different transmission durations for Uplink Sony
R1-1713199 Discussion on eMBB and URLLC multiplexing for uplink LG Electronics
R1-1713453 Timing advance for different numerology Qualcomm Incorporated
R1-1713650 On Indication of Preempted Resources in UL Samsung
R1-1713718 On use of scrambling for UL Grant-free URLLC transmission MediaTek Inc.
R1-1713961 Possible enhancements for uplink NTT DOCOMO, INC.
R1-1714020 Pause-Resume Scheduling for Low Latency Uplink Transmissions Nokia, Nokia Shanghai Bell
R1-1714156 Multiplexing of UL eMBB and URLLC in NR ASUSTEK COMPUTER (SHANGHAI)



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R1-1714165 Multiplexing of low-latency traffic and non-latency sensitive traffic in UL InterDigital, Inc.
R1-1715108 WF on dynamic resource sharing in UL LG Electronics, III, Samsung, Nokia, NSB

#### 6.1.3.3.8 Ultra-reliable part of URLLC for scheduling/HARQ procedure

*Identify necessary techniques for scheduling/HARQ procedure to meet the URLLC requirements set forth by TR38.913.*

R1-1713455 Ultra reliable HARQ design with async CSI feedback Qualcomm Incorporated
R1-1712056 Underlay Scheduling Request Lower Latency Advantage for URLLC Idaho National Laboratory
R1-1712210 Link adaption for URLLC transmission Huawei, HiSilicon
R1-1712214 PDSCH reliability for URLLC Huawei, HiSilicon
R1-1712219 Discussion on Multi-TRP cooperation for URLLC Huawei, HiSilicon
R1-1712424 HARQ and scheduling aspects of ultra-reliable communications CATT
R1-1712461 Ultra-reliable part of URLLC for scheduling and HARQ procedure ZTE
R1-1712602 On link adaptation enhancements to support URLLC Intel Corporation
R1-1712869 Discussion on scheduling and HARQ for URLLC reliability vivo
R1-1712978 Feedback for improving URLLC reliability Sony
R1-1713200 Discussion on scheduling and HARQ procedure for URLLC LG Electronics
R1-1713454 UL URLLC capacity based on URLLC and eMBB dynamic multiplexing Qualcomm Incorporated
R1-1713651 Scheduling/HARQ Procedures for URLLC Samsung
R1-1713719 HARQ procedure for DL URLLC MediaTek Inc.
R1-1713747 Discussion on URLLC numerology Huawei, HiSilicon
R1-1713748 Support of URLLC for TDD Huawei, HiSilicon
R1-1713749 CSI reporting for high reliability in URLLC Huawei, HiSilicon
R1-1713751 On supporting ultra reliability in a resource efficient way Huawei, HiSilicon
R1-1713753 Discussion on over-the-air time synchronization for URLLC Huawei, HiSilicon, SIA
R1-1713962 Scheduling and HARQ procedures for URLLC NTT DOCOMO, INC.
R1-1714021 CSI measuring and reporting procedure for URLLC Nokia, Nokia Shanghai Bell
R1-1714022 Discussion on scheduling based URLLC transmission Nokia, Nokia Shanghai Bell
R1-1714023 On reliability enhancement for scheduling information transmission Nokia, Nokia Shanghai Bell
R1-1714175 URLLC for heterogeneous industrial networks with time synchronization requirement SIA
R1-1714349 Discussion on URLLC transmitted in same or different numerology resources ASUSTEK COMPUTER (SHANGHAI)
R1-1714364 On reliability of URLLC transmission in uplink III
R1-1714446 On Supporting High Reliability for Data Transmissions Ericsson

#### 6.1.3.3.9 Other

*Including data scrambling aspects.*

R1-1712155 Bandwidth part activation and adaptation Huawei, HiSilicon
R1-1712159 On data channel scrambling Huawei, HiSilicon
R1-1712198 Number of HARQ processes and HARQ RTT Huawei, HiSilicon
R1-1712205 CBG-based transmission/retransmission for DL multiplexing of eMBB and URLLC Huawei, HiSilicon
R1-1712206 Consideration on subsequent transmission after pre-emption Huawei, HiSilicon
R1-1712207 Discussion on UL multiplexing of grant-based eMBB and URLLC Huawei, HiSilicon
R1-1712216 On multiple resource configuration for UL grant-free transmission Huawei, HiSilicon
R1-1712220 Superposed transmission of pre-emption indication with eMBB data Huawei, HiSilicon
R1-1713201 Discussion on data scrambling in NR LG Electronics
R1-1713732 Remaining issues on ECP Huawei, HiSilicon
R1-1713733 Coexistence of different UE types on a wideband carrier Huawei, HiSilicon
R1-1713734 On cross-BWPs and cross-numerology retransmission Huawei, HiSilicon
R1-1713736 DMRS location for PDSCH and PUSCH Huawei, HiSilicon
R1-1713746 Resource allocation for data channels Huawei, HiSilicon
R1-1713750 Discussion on TB size determination Huawei, HiSilicon
R1-1713754 Discussion on configuration and design of group common pre-emption Indication Huawei, HiSilicon
R1-1713755 Unified design for slot and mini-slot Huawei, HiSilicon
R1-1714083 On data scrambling in NR Intel Corporation
R1-1714086 Preemption-aware HARQ-ACK feedback Sequans Communications
R1-1714333 PDCCH monitoring for slot-aggregation and cross-slot scheduling Huawei, HiSilicon
R1-1714449 On Transmission Profile Ericsson
R1-1714450 On UL Waveform Type Signaling Ericsson
R1-1714451 On DMRS-based UE identification for UL transmission without UL grant Ericsson
R1-1714452 On timing advance Ericsson



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R1-1714498 Remaining Aspects for Short Scheduling Durations Samsung
R1-1714499 Considerations on signaling design for indicating Preemted Resources Samsung
R1-1714500 Downlink Pre-emption Indication Prior to HARQ-ACK Feedback Samsung
R1-1714501 Average user plane latency for pre-emption based multiplexing Samsung
R1-1714502 Triggered UCI Transmissions Samsung
R1-1714503 HARQ Process Management in NR Samsung
R1-1714571 On UL Transmission Timing Aspects Samsung
R1-1714572 Indication of Preempted Resources for TB-based re-transmission Samsung
R1-1714586 On SS block/PDSCH/DMRS multiplexing Samsung

#### 6.1.3.4 Scheduling/HARQ aspects for carrier aggregation

*Including dual connectivity (if any)*

**R1-1715305 Way Forward on NR Carrier Aggregation Huawei, HiSilicon, Nokia, Nokia Shanghai Bell**

Agreements:

- Confirm the WA at RAN1 NR AH#2
  - HARQ-ACK transmission related to multiple DL component carriers is supported for DL component carriers operating with the same and different numerology
    - The time granularity of a HARQ-ACK transmission on PUCCH, indicated in the DCI scheduling the PDSCH, is based on the numerology of PUCCH transmission
- FFS: For cross-carrier scheduling, support the following functionalities
  - Multi-slot scheduling (i.e., one DCI schedules N slots with N TBs)
- For NR CA, for the scenario that all the carriers are 15Khz, around [32.47us] maximum uplink timing difference between two TAGs should be assumed in NR
  - Granularity of TA for SCS = 15kHz is same as LTE
  - Maximum number of TAGs is 4
  - Note: final decision of the maximum timing difference is up to RAN4
  - FFS: for other scenarios
- For NR CA, both semi-static and dynamic HARQ-ACK codebook are supported
- NR supports 2 cell groups for PUCCH for NR CA
  - NR supports at least the configuration of one carrier transmitting the PUCCH within the cell group
  - FFS The carrier transmitting the PUCCH is always PCC and/or carrier(s) transmitting the PUCCH can be SCC in a cell group containing PCC

R1-1712160 On NR carrier aggregation Huawei, HiSilicon
R1-1712425 Scheduling and HARQ support for NR CA CATT
R1-1712426 Scheduling and HARQ support for NR DC CATT
R1-1712603 Scheduling and UCI feedback for carrier aggregation Intel Corporation
R1-1712604 On Dual Connectivity for NR Intel Corporation
R1-1712694 HARQ-ACK codebook size determination for CA with different numerologies Lenovo, Motorola Mobility
R1-1712727 Scheduling/HARQ aspects for carrier aggregation AT&T
R1-1712748 Considerations on UCI feedback for carrier aggregation Fujitsu
R1-1713202 Discussion on dual connectivity with single active UL at a given time LG Electronics
R1-1713203 Support of DL/UL control/signal transmission for NR CA LG Electronics
R1-1713265 Bandwidth part based resource scheduling for carrier aggregation Guangdong OPPO Mobile Telecom
R1-1713456 CA with mixed numerology Qualcomm Incorporated
R1-1713652 Cross-Carrier Scheduling and HARQ-ACK Feedback Samsung
R1-1713653 Fast Carrier Switcing for SRS Transmissions Samsung
R1-1713963 Scheduling/HARQ aspects for carrier aggregation NTT DOCOMO, INC.
R1-1714095 On NR CA/DC configuration and cross-numerology scheduling Nokia, Nokia Shanghai Bell
R1-1714096 On joint UCI for CA Nokia, Nokia Shanghai Bell
R1-1714453 On scheduling aspects for CA Ericsson
R1-1714454 On UCI aspects for CA Ericsson
R1-1715233 WF on the scheduling and HARQ-ACK timing for NR CA LG Electronics, WILUS

#### 6.1.3.5 Remaining details of bandwidth parts

*Note that PRB indexing should be discussed in A.I. 6.1.3.3.1.1 Frequency-domain resource allocation*

**R1-1715010 WF on common PRB indexing Huawei, HiSilicon, MediaTek, OPPO, Nokia, NEC, Samsung**



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Agreements:

- Common PRB indexing is used at least for DL BWP configuration in RRC connected state
  - The reference point is PRB 0, which is common to all the UEs sharing a wideband CC from network perspective, regardless of whether they are NB, CA, or WB UEs.
  - An offset from PRB 0 to the lowest PRB of the SS block accessed by the UE is configured by high layer signaling
    - FFS the configuration is by RMSI and/or UE-specific signaling
  - The common PRB indexing is for maximum number of PRBs for a given numerology defined in Table 4.3.2-1 in 38.211
  - FFS: common PRB indexing for RS generation for UE-specific PDSCH
  - FFS: common PRB indexing for UL

**Friday**

**R1-1715307 Way Forward on Bandwidth Part Operation MediaTek, Intel, Panasonic, LGE, Nokia, Ericsson, InterDigital**

Agreements:

- There is an initial active DL/UL bandwidth part pair to be valid for a UE until the UE is explicitly (re)configured with bandwidth part(s) during or after RRC connection is established
  - The initial active DL/UL bandwidth part is confined within the UE minimum bandwidth for the given frequency band
  - FFS: details of initial active DL/UL bandwidth part are discussed in initial access agenda
- Support activation/deactivation of DL and UL bandwidth part by explicit indication at least in (FFS: scheduling) DCI
  - FFS: In addition, MAC CE based approach is supported
- Support activation/deactivation of DL bandwidth part by means of timer for a UE to switch its active DL bandwidth part to a default DL bandwidth part
  - The default DL bandwidth part can be the initial active DL bandwidth part defined above
  - FFS: The default DL bandwidth part can be reconfigured by the network
  - FFS: detailed mechanism of timer-based solution (e.g. introducing a new timer or reusing DRX timer)
  - FFS: other conditions to switch to default DL bandwidth part

**R1-1715277 WF on measurement for a UE on bandwidth part operation LG Electronics, Huawei, HiSilicon, MediaTeK**

Agreements:

- When a UE performs measurement or transmit SRS outside of its active BWP, it is considered as a measurement gap
  - FFS: details of measurement gap configuration
  - During the measurement gap, UE is not expected to monitor CORESET

Email approval of LS to RAN2 about bandwidth part until August 31st – Yunjung (LGE)

| | | |
|---|---|---|
| R1-1713457 | Further considerations for bandwidth parts | Qualcomm Incorporated |
| R1-1713654 | Wider Bandwidth Operations | Samsung |
| R1-1712728 | Remaining details of bandwidth parts | AT&T |
| R1-1712153 | Overview of bandwidth part | Huawei, HiSilicon |
| R1-1712427 | Remaining details of wider bandwidth operation | CATT |
| R1-1712669 | Resource allocation for wideband operation | ZTE |
| R1-1712870 | Discussion on activation/deactivation of the bandwidth part | vivo |
| R1-1712953 | On bandwidth parts | Nanjing Ericsson Panda Com Ltd |
| R1-1713204 | Further remaining details on wider bandwidth operation | LG Electronics |
| R1-1713266 | Remaining issues on bandwidth part configuration and activation | Guangdong OPPO Mobile Telecom |
| R1-1713481 | UE Power Saving during Active State | Qualcomm Incorporated |
| R1-1713820 | Views on bandwidth part in idle mode operation | ETRI |
| R1-1713964 | Remaing issues on bandwidth parts for NR | NTT DOCOMO, INC. |
| R1-1713976 | Combining DRX with BWP adaptation | PANASONIC |
| R1-1713978 | Further details on bandwidth part operation | MediaTek Inc. |
| R1-1714052 | Remaining details of the Bandwidth parts | NEC |
| R1-1714088 | Remaining details of bandwidth parts | Intel Corporation |
| R1-1714094 | On the remaining wider-band aspects of NR | Nokia, Nokia Shanghai Bell |
| R1-1714117 | Remaining details of BWP | InterDigital, Inc. |
| R1-1715107 | WF on a UE with multiple configured bandwith parts | LG Electronics, Ericsson, MediaTeK |



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#### 6.1.3.6 Resource reservation

*Including resource reservation for forward compatibility*

R1-1713205 Discussion on Resource reservation LG Electronics
R1-1712428 On resource reservation for forward compatibility CATT
R1-1712729 Further details on forward compatible resources in NR AT&T
R1-1712979 Reserved resources for supporting NR coexistence with eMTC and NB-IoT Sony
R1-1713267 On resource reservation Guangdong OPPO Mobile Telecom
R1-1713655 Indication of Reserved Resources Samsung
R1-1713735 Overview of reserved resources Huawei, HiSilicon
R1-1713873 Discussion on the resource reservation Panasonic
R1-1713965 Resource reservation NTT DOCOMO, INC.
R1-1714024 On forward compatibility resource reservation Nokia, Nokia Shanghai Bell
R1-1714084 On resource reservation for forward compatibility Intel Corporation
R1-1714264 Discussion on resource reservation for URLLC ETRI
R1-1714455 On Resource Reservation Ericsson

### 6.1.4 Channel coding

**Friday**

**R1-1715121 Chairman's notes of AI 6.1.4 Channel coding Ad-Hoc chair (Nokia)**

The document was presented Matthew Baker of Nokia.

**Decision:** The document is endorsed, and content is incorporated as below.

**R1-1715297 [Draft] LS on Channel Coding Nokia**

Decision: Final LS is approved in R1-1715317.

#### 6.1.4.1 LDPC code

##### 6.1.4.1.1 CRC attachment

**R1-1712429 CRC attachment for eMBB data CATT**
**R1-1714630 CRC attachment for Smaller TBS and CB Nokia, Nokia Shanghai Bell** (Revision of R1-1714372)
**R1-1712637 Study of CRC Length for Code Blocks Ericsson**
**R1-1713229 CRC Attachment for NR data channel ZTE**

Background:
3824 vs 1008 bits:

- Tradeoff of reduced overhead and UE complexity vs improved undetected error probability.

Agreement:

- $L_{TB\text{-}CRC}$ = 16 for TBs smaller than or equal to 3824 bits
- $L_{CB\text{-}CRC}$ = 24 bits
- CRC polynomials:
  - 24 bits: Reuse both A and B from 36.212 for corresponding CB and TB CRCs
  - 16 bits: Reuse from 36.212

Not treated.

R1-1712605 CRC attachment for LDPC Intel Corporation
R1-1712638 Study of CRC Length for Small Transport Blocks Ericsson
R1-1713206 CRC polynomial for TB-level and CB-level CRCs LG Electronics
R1-1713458 CRC attachment Qualcomm Incorporated
R1-1713708 On CRC attachment for LDPC codes MediaTek Inc.
R1-1713739 CRC attachment Huawei, HiSilicon
R1-1714587 CRC for transport block Samsung
R1-1714588 CRC for code block Samsung
R1-1714685 WF on CRC Attachment for CBs Ericsson
R1-1714688 WF on CRC Attachment for TBs Ericsson



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#### 6.1.4.1.2 Segmentation

*Supported code block sizes and granularity*

**R1-1714167** **Code block segmentation for data channel** **InterDigital, Inc.**
**R1-1712253** **Code block segmentation** **Huawei, HiSilicon**
**R1-1714547** **Code Block Segmentation for LDPC Codes** **Ericsson Inc.**

Agreement:
- Equal code block size after segmentation
- Working Assumption: TBS determination procedure ensures that TBS plus TB-CRC can be factored into the number of CBs multiplied by the CBS (before addition of LDPC encoding filler bits).
  - (If a special case emerges where the TBS determination procedure cannot achieve the above criterion, equal CBS would be achieved by zero-padding.)

R1-1713207 On code block segmentation for NR LDPC LG Electronics
R1-1713459 LDPC segmentation Qualcomm Incorporated
R1-1713658 LDPC segmentation for eMBB Samsung
R1-1714373 Code block segmentation Nokia, Nokia Shanghai Bell
**R1-1712430** **Consideration on CB segmentation for eMBB data channel** **CATT**
**R1-1714830** **WF on Code Block Segmentation for BG #2** **CATT, MediaTek, InterDigital, Ericsson**

Proposal:
- For code rate R < Rthresh, the maximum code block size is: $K_{cb}$ = 3840 and BG#2 is used
  - For TBS larger than $K_{cb}$, the number of code blocks is determined by segmenting the TB into code blocks no larger than $K_{cb}$ = 3840

**R1-1715172** **Observations on code block segmentation for BG2 Ericsson**

**Working Assumption**, to be checked after finalisation of the TBS table and confirmed if TBSs exist for which the following is meaningfully beneficial and does not cause meaningful degradation:
- For initial transmissions with code rate $R_{init}$ > 1/4*, BG2 is not used when TBS>3824
  - If the FFS on UE capabilities w.r.t. support of both BGs is resolved such that it is possible that a UE does not support BG1, then the above bullet only applies if the UE supports BG1.
- BG2 is used for initial transmissions with code rate $R_{init}$ <= ¼* for all TBS supported at that code rate
  - For BG2 with TBSs larger than 3824, the TB is segmented into CBs no larger than 3840
- * ¼ is TBC at NR AH#3

Email agreement on the definition of $R_{init}$ until Wednesday 30th August (Yufei, Ericsson):
Alt 1:
- Denote the code rate of the initial transmission after applying LBRM (if applied) as Rinit

Alt 2:
- $R_{init}$ is the effective code rate at initial transmission of the transport block. An effective code rate is the code rate used in running the LDPC encoder and decoder, after taking into account both:
  - (a) the nominal code rate, as signalled in a control information to schedule the transmission of the transport block; and
  - (b) LBRM (if applied)

Modifications to the above alternatives can also be considered.
This definition should also applies to previous agreements on BG selection.

#### 6.1.4.1.3 Padding details

**R1-1713460** **Padding for LDPC** **Qualcomm Incorporated**
R1-1712254 Padding for LDPC codes Huawei, HiSilicon
R1-1713659 Padding details for data channel Samsung
R1-1713208 Padding for LDPC LG Electronics

#### 6.1.4.1.4 Bit-level interleaving

**R1-1712177** **Interleaving for eMBB data** **Huawei, HiSilicon**
**R1-1712431** **Bit-level interleaving for NR LDPC** **CATT**
**R1-1714628** **On Interleaving for LDPC code** **ZTE** (Revision of R1-1713230)
**R1-1713660** **Bit-level Interleaver of LDPC Codes on high order modulation** **Samsung**
Further revised in R1-1714589
**R1-1713710** **On design of bit-level interleaver** **MediaTek Inc.**

Agreement:



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- A bit-level interleaver within a code block is included at the output of the rate matcher

**Next steps for interleaver design:**
Evaluate the following based on initial transmissions, until NR AH#3, and select one at NR AH#3:
- Block interleaver (e.g. as in LTE)
- Systematic bits priority order interleaver (e.g. as in HSPA)

Evaluation assumptions:
- Fading channel model – TDL-C
- All modulation orders
- Interference modelled

FFS until NR AH#3 whether to additionally include reversal of bit mapping order in retransmissions.

Not treated.

R1-1713209 On bit-level interleaver LG Electronics
R1-1713461 Bit-level interleaving Qualcomm Incorporated
R1-1714374 Interleaving for LDPC Nokia, Nokia Shanghai Bell
R1-1714789 WF on Bit-level Channel Interleaver for LDPC Codes Ericsson, Samsung, LG, AT&T
R1-1714728 WF on Bit-Level Interleaver MediaTek, CATT, InterDigital, ITRI, Samsung, ZTE

#### 6.1.4.1.5 Rate matching

*Remaining details, including circular buffer mapping*

**R1-1712642 Built-in Puncturing of Systematic Bits for NR LDPC Codes Ericsson**

Agreements:
- Confirm the Working Assumption that the punctured systematic bits are not entered into the circular buffer
- Filler bits are entered into the circular buffer.
- The starting position of each RV is an integer multiple of Z.
- The starting positions of RVs for limited buffer should be approximately scaled from the full buffer positions, while remaining integer multiples of Z.

**Next steps:**
- Investigate until NR AH#3 whether non-uniform fixed starting positions for the RVs within the circular buffer can be found giving improved performance
- FFS until NR AH#3 whether a single reordering function (e.g. as shown in Fig 5 in R1-1713462) should be supported for RVs greater than zero before the bit collection step, considering both performance and complexity.
- FFS: RV order for special cases where RV index is not explicitly signalled.

**R1-1713231 On rate matching for LDPC code ZTE**
**R1-1713462 LDPC rate matching Qualcomm Incorporated**
**R1-1714375 Rate matching for LDPC Nokia, Nokia Shanghai Bell**
**R1-1712176 Rate matching for LDPC codes Huawei, HiSilicon**
R1-1714590 Rate matching for data channel coding Samsung
Revision of R1-1713661
R1-1712432 IR-HARQ scheme for NR LDPC codes CATT
R1-1713662 Rate matching method for HARQ Samsung
R1-1712607 Details of LDPC rate-matching Intel Corporation
R1-1713210 Redundancy version addressing for circular buffer LG Electronics
R1-1714168 LDPC rate matching design InterDigital, Inc.
R1-1712639 Extended Code Rate Coverage for Base Graph #1 Ericsson
R1-1712640 Extended Block Length Coverage for Base Graph #2 Ericsson
R1-1712641 Extended Code Rate Coverage for Base Graph #2 Ericsson

#### 6.1.4.1.6 LDPC code design

*Remaining details of base graph selection.*

**R1-1714555 Remaining issues for LDPC code design ZTE** (Revision of R1-1713232)
**R1-1713709 On design and performance of LDPC codes MediaTek Inc.**
**R1-1714169 On LDPC base graph selection InterDigital, Inc.**
**R1-1714324 Remaining details of the base graph design Huawei, HiSilicon**
**R1-1713463 Base graph selection Qualcomm Incorporated**



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Can X be extended to 3840?
Y: Qualcomm, ZTE, Ericsson, CATT, Mediatek, Intel, ITRI
N: Samsung, LG, Nokia, Xilinx, NSB, Huawei, HiSilicon

Can Y be extended to 0.75?
Y: ZTE, Mediatek, CATT
N: Nokia, NSB, Huawei, HiSilicon, LG, Intel, Ericsson, InterDigital, Samsung, Xilinx, Qualcomm

Agreement:
- X=3840
- Y=0.67

Not treated.

| | | |
|---|---|---|
| R1-1712433 | Base graphs selection for NR LDPC | CATT |
| R1-1713211 | Base graph selection for LDPC | LG Electronics |
| R1-1713663 | Base graph for high-rate and short-length LDPC codes | Samsung |
| R1-1713740 | Performance evaluation of LDPC codes for NR eMBB data | Huawei, HiSilicon |
| R1-1714125 | Conversion of LDPC Shift Matrices for a Unified Format | ETRI |
| R1-1714376 | Use of two LDPC base graphs | Nokia, Nokia Shanghai Bell |
| R1-1714683 | WF on Base Graph Selection for Small K and high R | Ericsson |
| R1-1714687 | WF on Extension of Block Length for Base Graph #2 | Ericsson |
| R1-1714689 | Selection of Base Graph for Small Block Length and High Code Rate | Ericsson |
| R1-1715292 | Remaining issues for LDPC code design | ZTE |

#### 6.1.4.1.7 Other

| | | |
|---|---|---|
| R1-1712643 | LDPC Performance for Low BLER Target | Ericsson |
| R1-1713664 | Channel coding for URLLC | Samsung |

### *6.1.4.2 Polar code*

#### 6.1.4.2.1 Code construction

*Including CRC and interleaver*

**R1-1712175** **Summary of email discussion [NRAH2-12] Polar code design on polynomial and interleaver** **Huawei, HiSilicon**
Tsofun expressed concern that its code construction proposal is not included in the list.

**R1-1714629** **Performance evaluation of Polar codes with distributed CRC bits** **ZTE** (Revision of R1-1713233)
**R1-1713704** **False-Alarm Rate Check for Polar code with CRC** **MediaTek Inc.**
**R1-1714877** **Evaluations of distributed CRC for Polar code construction** **Huawei, HiSilicon** (Revision of R1-1713738)
**R1-1714861** **Performance evaluation of polar code constructions** **Nokia, Nokia Shanghai Bell** (Revision of R1-1714378)

Proposal based on former assumption of 19 CRC bits:

- Denote the input to the CRC computation by $u_0, u_1, u_2, \ldots, u_{L-1}$, and the parity bits by $p_0, p_1, p_2, \ldots, p_{18}$. The parity bits are generated by the following cyclic generator polynomial (0x9ED45):
  - gCRC19(D) = [D19 + D16 + D15 + D14 + D13 + D11 + D10 + D8 + D6 + D2 + 1].
- After CRC calculation, the bits which will be fed into an interleaver are denoted by $v_0, v_1, v_2, \ldots, v_{Kmax+18}$, which fulfils:
  - $v_k = u_{L-1-k}$ for $k = 0, 1, 2, \ldots, L-1$.
  - $v_k = <NULL>$ for $k = L, L+1, L+2, \ldots, K_{max}-1$.
  - $v_k = p_{k-Kmax}$ for $k = K_{max}, K_{max}+1, \ldots, K_{max}+18$.
  - where $K_{max}$ + CRC length is the size of the interleaver.
  - Then $v_0, v_1, v_2, \ldots, v_{Kmax+18}$ is fed to the interleaver. Denote the output of the interleaver is $w_0, w_1, w_2, \ldots, w_{Kmax+18}$. The relationship between the input and output of the interleaver is as follows:
  - $w_k = v_{\Pi(k)}$ for $k = 0, 1, 2, \ldots, K_{max}+18$,
  - where the pattern is defined in the working assumption below.



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- The interleaver pattern is one of the pattern in R1-1712167 and Patterns 3 and 2 from R1-1714377, in decreasing priority order.
- Note that a longer CRC and associated interleaver pattern will be considered if required to meet the FAR target

Working Assumption:

- Denote the input to the CRC computation by $u_0, u_1, u_2, \ldots, u_{L-1}$, and the parity bits by $p_0, p_1, p_2, \ldots, p_{23}$. The parity bits are generated by the following cyclic generator polynomial:
  - gCRC24(D) = [D24+D23+D21+D20+D17+D15+D13+D12+D8+D4+D2+D+1]
- After CRC calculation, the bits which will be fed into an interleaver are denoted by $v_0, v_1, v_2, \ldots, v_{Kmax+23}$, which fulfils:
  - $v_k = u_{L-1-k}$ for $k = 0, 1, 2, \ldots, L-1$.
  - $v_k = <NULL>$ for $k = L, L+1, L+2, \ldots, K_{max}-1$.
  - $v_k = p_{k-Kmax}$ for $k = K_{max}, K_{max}+1, \ldots, K_{max}+23$.
  - where $K_{max}$ = max(140, max DCI payload size in Rel-15 + 20), and $K_{max}$ + CRC length is the size of the interleaver.
  - Then $v_0, v_1, v_2, \ldots, v_{Kmax+23}$ is fed to the interleaver. Denote the output of the interleaver is $w_0, w_1, w_2, \ldots, w_{Kmax+23}$. The relationship between the input and output of the interleaver is as follows:
  - $w_k = v_{\Pi(k)}$ for $k = 0, 1, 2, \ldots, K_{max}+23$,
  - where the pattern is the pattern for nFAR=21 in R1-1712167.
- If problems are identified with this pattern, companies can propose modifications to the polynomial and/or interleaver pattern at NR AH#3, keeping the modifications as minimal as possible.

**Agreement on next steps:**

- By the Sept NR adhoc, companies are requested to evaluate exhaustively the FAR of the above working assumption to identify any potential FAR problems (i.e. below 1.5 x 2^-21 with 100 events):
  - For evaluation purposes, assume max DCI payload size = 140
  - Check for all values of K with granularity of 4 from 16 to 100, and granularity of 20 up to 140.
  - Check for M values 96, 192, 384, 768 (with repetition for 768)
  - Not including combinations of K and M that would give R < 1/8 or greater than 5/6
  - Priority will be given to R<=2/3

Ericsson, LG and NEC expressed concern that the above working assumption only approximately meets the 2^-21 FAR target, whereas when considering the 19-bit CRC the exact FAR target was used for comparing the distributed CRC proposals.

**Friday**
Further concern expressed by NEC/LGE
NEC: NEC proposals of CRC polynomial and interleaver were evaluated with incorrect assumptions (different rate matching and sequence asssumptions) than what was assumed in their proposals. It was agreed in the discussion on RAN1 reflector that proposals which do not meet FAR requirements would be allowed to update their design which did not happen.
Ad-hoc chair: the above was agreed as a working assumption, as such can be revisited at the next meeting if any issue – amazed to see delegates (not present in the channel coding sessions) commenting a working assumption agreed by their colleagues who were present in the sessions.

**R1-1713303 On the hardware implementation of CRC interleaving AccelerComm Ltd**

**R1-1714377 Distributed CRC Polar code construction Nokia, Nokia Shanghai Bell**

**R1-1714938 WF on Code Construction for Polar Code on UL Ericsson, Qualcomm, Samsung, Tsofun, Intel, MediaTek, LG, AT&T, CATT, Fujitsu, DOCOMO, Heron, IAESI**

Agreement:
For UL code construction:

- ($n_{FAR}$ + 3) CRC bits are generated by a single CRC polynomial
  - CRC polynomial is FFS
    - Companies are to provide CRC proposals by 6th September
- Working Assumption: The CRC bits are attached as a block to the end of info bits
  - Can be revisited at NR AH#3 if FAR is shown to exceed 1.5 x 2^-$n_{FAR}$.
  - ~~FFS until Friday:~~
    - ~~K + $n_{FAR}$ > 100: $n_{FAR}$ = 16~~
    - ~~22 <= K + $n_{FAR}$ <= 100: $n_{FAR}$ = 8~~
    - ~~12 <= K + $n_{FAR}$ <= 22: $n_{FAR}$ = FFS till Fri~~

Proposal for email agreement by Wed 30th August – Yufei (Ericsson):



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- 12 <= K + $n_{FAR}$ <= 22:
  - For 8<=K<=18, $n_{FAR}$ = 4
  - This gives: 12<= K + $n_{FAR}$ <= 22
- 22 <= K + $n_{FAR}$ <= 256:
  - For 19<= K <=248, $n_{FAR}$ = 8
  - This gives: 27 <= K + $n_{FAR}$ <= 256
- K + $n_{FAR}$ > 256:
  - For K>248, $n_{FAR}$ = 16
  - This gives: K + $n_{FAR}$ > 256

**R1-1712256 Enhancement of Early Termination by placing UE-ID on Frozen Bits Tsofun Algorithm**

**R1-1714067 UE_ID Frozen Bit Insertion for DCI Early Block Discrimination Coherent Logix**

**R1-1714929 WF on UEID Frozen bit insertion for DCI Early Termination Coherent Logix Inc., AT&T, NTT DOCOMO, Tsofun Algorithm, McGill University, Huawei, Nokia, LG Electronics, InterDigital, Tejas Network, CeWiT, IITM, IITH, Reliance**

Proposed Working Assumption:
- Frozen bit values are set to 0
- Adopt UE-specific linear scrambling on UE-specific DCI messages
  - Detailed mechanism FFS until NR AH#3

**Conclusion:** study further until NR AH#3

Not treated.

R1-1712167 Distributed CRC for Polar code construction Huawei, HiSilicon
R1-1712257 FAR-Preserving Polar Code Construction and Decoding Algorithm for Early Termination Tsofun Algorithm
R1-1712258 Latency and Complexity Modeling of Polar Decoder Tsofun Algorithm
R1-1712334 Polar code construction with single CRC polynomial and interleaver NEC Corporation
R1-1712434 Polar codes construction for NR control channel CATT
R1-1712608 Polar code construction Intel Corporation
R1-1712645 Polar Code Construction for UL Ericsson
R1-1713212 Interleaver design for polar code construction LG Electronics
R1-1713316 Blind Detection with Polar Codes McGill University
R1-1713317 Early stopping of blind detection with distributed CRC McGill University
R1-1713464 Early termination design for Polar codes using single CRC with interleaver Qualcomm Incorporated
R1-1713465 Evaluation of early termination for Polar codes Qualcomm Incorporated
R1-1713466 Consideration of early termination for UCI Qualcomm Incorporated
R1-1713467 Decoding and encoding latency for polar codes Qualcomm Incorporated
R1-1713665 Polar Code Construction Samsung
R1-1713966 Scrambling design for Polar codes NTT DOCOMO, INC.
R1-1714223 CRC Polynomial and Interleaver for Polar Code Construction InterDigital, Inc.
R1-1714791 Investigation of Distributed CRC and Interleaver for Polar Codes Ericsson
R1-1715175 Evaluation of Polar code uplink FAR Nokia, Nokia Shanghai Bell

#### 6.1.4.2.2 Sequence design

**R1-1712174 Summary of email discussion [NRAH2-11] Polar code sequence Huawei, HiSilicon**

Conclusions:
- Huawei, Ericsson and Samsung sequences are selected according to the procedure from the last meeting.

Support for each of the two selected sequences:
- Huawei sequence:
  - Coherent Logix, Accelercomm, Sanechip, Nubia, Vivo, McGill, Oppo, CATT, ZTE, ZTE Trunking, LG, Nokia, NSB, Mediatek, InterDigital, Huawei, HiSilicon, CATR, Dish, Xiaomi, Coolpad, Meizu, China Telecom, China Unicom, ITRI, Broadcom, Spreadtrum
- Ericsson sequence:
  - NEC, Intel, Ericsson, Docomo, Mitsubishi, KDDI, Prisma, Fujitsu, Qualcomm, ETRI, Samsung, Sharp

Agreement: Huawei sequence from R1-1712174 is selected.



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**R1-1714893** **Further analysis of polar code sequence performance** **Fujitsu**

**R1-1714790** **WF on Observation of Polar Code Sequences** **Ericsson, DOCOMO, Intel, Qualcomm, Samsung**

Not treated.
R1-1712168 Sequence for Polar code Huawei, HiSilicon
R1-1712609 Sequence design and evaluations Intel Corporation
R1-1713234 Performance evaluation of sequence design for Polar codes ZTE
R1-1713468 Sequence construction of Polar codes for control channel Qualcomm Incorporated
R1-1713469 Evaluation of the sequence for Polar codes Qualcomm Incorporated
R1-1713666 Design of polar code sequence Samsung
R1-1714360 Performance evaluation of Polar sequence Spreadtrum Communications
R1-1714793 Information Sequence Design for Polar Codes Ericsson

#### 6.1.4.2.3 Rate matching

**Rate-matching parameters**
**R1-1714878** **Rate matching for Polar code** **Huawei, HiSilicon** (Revision of R1-1712169)
**R1-1712648** **Thresholds for Rate Matching of Polar Codes** **Ericsson**

Note that the thresholds and beta are included in the Working Assumption below on Slide 15 in R1-1715000.

**R1-1714903** **WF on repeated bits selection for Polar codes** **Qualcomm, Ericsson**
Covered by Working Assumption on R1-1715000, slide 14:
- Puncturing is realized by selecting bits from position (N-M) to position (N-1) from the circular buffer
- Shortening is realized by selecting bits from position 0 to position M-1 from the circular buffer
- Repetition is realized by selecting all bits from the circular buffer, and additionally repeat (M-N) consecutive bits with the smallest index bit from the circular buffer

**Rate-matching pattern**
**R1-1713705** **Polar rate-matching design and performance** **MediaTek Inc.**
**R1-1714792** **Performance of Rate matching Schemes for Polar Codes** **Ericsson** (Revision of R1-1712647)

**Next Steps:**
- Companies to work together this evening on a single (i.e. single scheme for UL, DL and all rates / sizes) merged rate matching proposal
- Evaluate BLER performance (with further iterations of the design if necessary) until Friday morning.
- On Friday morning, take a Working Assumption on a single rate matching design (the merged proposal if possible, otherwise one or more alternatives from the other known schemes; if more than one scheme ends up in the working assumption, note that this will multiply the needed FAR evaluations).
- The Working Assumption Rate Matcher will be used in the FAR evaluations for the code construction.

**R1-1715000** **Way Forward on Rate Matching for Polar Coding MediaTek, Qualcomm, Samsung, ZTE**
**R1-1715270** **Observations on Polar rate-matching merged proposal in R1-1715000** **Huawei**
**R1-1715267** **Rate-matching scheme for control channel** **Qualcomm**

**Observations:**
- Performance is very close between the two options in R1-1715000
- Main comments focus on complexity differences and feasibility of overcoming complexities

Working Assumption:
- Polar rate matcher: Option 2 from R1-1715000 with corrections of typos:
  - Slide 13: in top part of figure, second “25” -> 26
  - Slide 15: 0.7/16 -> 7/16
- Channel interleaver:
  - Uplink: Triangular interleaver (e.g. as in R1-1713474)
  - Downlink: Parallel rectangular interleaver (e.g. as in R1-1714691)
    - To be confirmed at NR AH#3 unless it is shown that there are no meaningful benefits of including the downlink channel interleaver, using evaluation assumptions in R1-1714983

Agreement:
- **R1-1714983** Proposed Evaluation assumptions for Polar Channel Interleaver for DL Intel, Fujitsu



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- Results with other channel models are not precluded in addition.
- Interference modelling can also be included.
- Use the distributed CRC and interleaver from the Working Assumption.

R1-1712335 Rate-matching in polar codes NEC Corporation
R1-1713214 Interleaver design for polar code LG Electronics
R1-1713471 Further determination of the values for the parameters in rate-matching for control channel Qualcomm Incorporated
R1-1713472 Determination of the pattern for repetition of Polar codes Qualcomm Incorporated
R1-1713967 Rate matching interleaving design of Polar codes NTT DOCOMO, INC.
R1-1714224 Parameter selection for polar codes puncturing and shortening InterDigital, Inc.
R1-1714225 Parameter selection for polar codes repetition InterDigital, Inc.
R1-1714226 Interleaver design for polar codes with high order modulation InterDigital, Inc.
R1-1714939 Rate matching scheme for Polar codes ZTE
R1-1715065 Rate Matching Scheme for Polar Codes Samsung Electronics Co., Ltd

#### 6.1.4.2.4 Other

**Channel interleaver**

**R1-1712170 Polar code interleaver Huawei, HiSilicon**
**R1-1713236 Consideration on high order modulation and interleaver for Polar Codes ZTE**
**R1-1713474 Design and evaluation of Interleaver for Polar codes Qualcomm Incorporated**
**R1-1713706 Polar channel bit interleaving design and performance MediaTek Inc.**
**R1-1714691 Channel Interleaver for Polar Codes Ericsson** (Revision of R1-1712649)

Agreement:
- For UL, the channel bit interleaver is a separate stage after rate matching.
- For DL, see working assumption above in 6.1.4.2.3.

**Conclusion:** See above for Working Assumption.

R1-1712172 Channel coding for URLLC Huawei, HiSilicon
R1-1713968 Channel interleaving design of Polar codes NTT DOCOMO, INC.
R1-1714570 Interleaver design for NR polar codes CATT
R1-1715248 Design and evaluation of interleaver for Polar codes Qualcomm Incorporated

**Segmentation**

R1-1713237 Segmentation of Polar codes for large UCI ZTE
R1-1713473 Design of Polar code for large UCI with segmentation Qualcomm Incorporated

### *6.1.4.3 PBCH*

R1-1712173 Polar code for PBCH and soft combining Huawei, HiSilicon
R1-1712650 Polar Code Design for NR-PBCH Ericsson
R1-1713707 PBCH coding design for reduced measurement complexity MediaTek Inc.
R1-1714381 Implicit timing indication for PBCH Nokia, Nokia Shanghai Bell
R1-1713215 Coding aspects for PBCH transmission LG Electronics
R1-1713238 Considerations on Channel Coding for NR-PBCH ZTE
R1-1712436 Discussion on Polar codes for PBCH CATT

### *6.1.4.4 Other*

R1-1712259 Channel Coding for URLLC Tsofun Algorithm
R1-1714004 Essential enhancement to rate matching of Reed Muller code Sequans Communications
R1-1714591 Irregular Modulation for LDPC Codes Samsung
R1-1714592 Bit-Interleaved Coded Modulation and Multi-Level Coding for LDPC Codes Samsung
R1-1714593 Symbol Mapping Diversity for Retransmission Samsung

## 6.1.5 Duplexing

**R1-1715123 Chairman's notes of AI 6.1.5 Duplex and interference management Ad-Hoc chair (Qualcomm)**
The document was presented by RAN1 chair on behalf of Wanshi Chen.
**Decision:** The document is endorsed, and content is incorporated as below.



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R1-1712280 Viewpoint on NR CLI Management for Duplexing Work Plan ZTE

#### 6.1.5.1 Cross-link interference management

**R1-1712178 UE-to-UE measurement for cross-link interference mitigation Huawei, HiSilicon**
**R1-1712281 UE-to-UE measurement as an enabler for CLI mitigation schemes ZTE**
**R1-1712871 UE to UE CLI measurements vivo**
**R1-1713216 Discussion on details of backhaul signaling for duplexing flexibility LG Electronics**
**R1-1713851 Discussion on UE-to-UE cross-link interference management CMCC**
**R1-1713857 Discussion on UE-to-UE interference measurement and report Panasonic**
**R1-1713969 Discussion on cross-link interference mitigation for duplexing flexibility NTT DOCOMO, INC.**

Agreement:
- TRP-to-TRP measurement is not specified in NR Rel-15 (i.e., left to NW implementation)

**R1-1714191 Impact of UE-to-UE interference to DL Control Signalling ITRI**
**R1-1714456 On UE-to-UE Measurements for Cross-link Interference Mitigation Ericsson**
**R1-1714510 CLI measurement for UE-to-UE and TRP-to-TRP links CEWiT**

Agreements:
- UE-to-UE interference measurement and reporting can be configured to be ON or OFF semi-statically and UE-specifically
  - Note: there may or may not be an explicit ON/OFF indicator; in the latter case, it can be implicitly derived by other parameters (if any)

**R1-1714743 WF on UE-UE CLI measurement Huawei, HiSilicon**
**R1-1714799 WF on UE-UE CLI measurement Huawei, HiSilicon, ZTE, Vivo, CMCC, Samsung**

Agreements:
- Definitions of metrics for CLI:
  - SRS-RSRP:
    - Linear average of the power contributions of the SRS to be measured over the configured resource elements within the considered measurement frequency bandwidth in the time resources in the configured measurement occasions
  - RSSI:
    - The linear average of the total received power observed only in certain OFDM symbols of measurement time resource(s), in the measurement bandwidth, over the configured resource elements for measurement by the UE
- For SRS-RSRP based UE-UE CLI measurement
  - At least SRS can be used for UE-UE CLI measurement
  - The specification should provide a mechanism for the network to configure at least a same SRS sequence for one or more UEs transmitting SRS
    - Note: This intends to support cell-level, UE-group-level, and UE-level interference differentiation
  - UE can be configured with one or more SRS resource(s) (including time-frequency resource(s), sequence(s), cyclic shift(s), periodicity, etc) to measure UE-UE CLI interference.
    - FFS details, e.g. configuration signaling, measurement triggering mechanism
    - Every SRS resource has to be explicitly configured, i.e. there is no SRS blind acquisition by the UE required.
    - FFS the maximum of SRS resources – aim to limit the number of resources to reduce complexity while considering performance aspect
  - Mechanism to limit the UE complexity for UE-UE CLI measurement is supported
    - FFS details, [e.g. by limiting the number of root sequence of SRS for UE-UE CLI measurement that a UE needs to detect within a certain amount of time, longer periodicity.]
    - FFS whether there is spec impact.
  - FFS: The specification should provide a mechanism to avoid potential DL transmission interfering the SRS for UE-UE CLI measurement
    - FFS exact details, [e.g. by rate matching the DL transmission around the SRS]
  - FFS: Transmission timing advance of SRS for CLI measurement can be different from the transmission timing advance of its PUSCH, e.g D2D channel transmission timing
  - The UE is not required to perform time tracking or time adjustment relative to DL operation in order to perform RSRP measurement
    - FFS whether or not to have measurement accuracy relaxation



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- For RSSI based UE-UE CLI measurement
  - UE can be configured with a set of resource elements to measure UE-UE CLI interference.
    - FFS details, e.g. the set of resource elements can be SRS or DM-RS resource, configuration signaling, measurement triggering mechanism
  - FFS whether additional mechanism for SRS transmission is needed for RSSI based UE-UE CLI measurement
  - FFS: The specification should provide a mechanism to avoid potential DL transmission in the RSSI measurement resource elements for UE-UE CLI measurement
    - FFS exact details, e.g. by rate matching the DL transmission around the resource elements for RSSI UE-UE CLI measurement
- To conclude whether or not to down-select the above two approaches in the next meeting

**R1-1714733** **WF on inter-gNB signaling for UE-to-UE CLI measurement** **LG Electronics, NTT DoCoMo, Intel**

R1-1712437 Support of interference management schemes in duplexing flexibility CATT
R1-1712610 on CLI measurement for NR duplexing Intel Corporation
R1-1712749 Discussion on cross-link interference management Fujitsu
R1-1713217 Discussion on CLI measurement and reporting for duplexing flexibility LG Electronics
R1-1713476 Dynamic TDD UE to UE measurement considerations Qualcomm Incorporated
R1-1713699 Cross link interference management MediaTek Inc.
R1-1713667 Discussion on joint CLI Mitigation and beam management Samsung
R1-1714265 Cross-link interference management for dynamic TDD Nokia, Nokia Shanghai Bell
R1-1714811 WF on details of backhaul signaling for duplexing flexibility LG Electronics, ZTE

#### *6.1.5.2 Other*

**R1-1714504** **Cross-link Interference Management Based on UE Measurements** **Samsung**

R1-1712179 TRP-to-TRP measurement for cross-link interference mitigation Huawei, HiSilicon
R1-1712180 UL power control for cross-link interference mitigation Huawei, HiSilicon
R1-1712282 Channel sensing based schemes for cross-link interference mitigation in NR ZTE
R1-1712283 TRP-to-TRP measurement as an enabler for CLI mitigation schemes ZTE
R1-1713821 Discussion on dynamic TDD for high-speed train scenario ETRI
R1-1713858 Discussions on intended DL/UL direction configuration via Xn signalling Panasonic
R1-1713859 Discussion on symbol alignment in NR duplex Panasonic
R1-1713970 Discussion on prioritized scenarios for duplexing flexibility NTT DOCOMO, INC.
R1-1714266 Performance evaluation of various dynamic TDD schemes with and without interference cancellation Nokia, Nokia Shanghai Bell
R1-1714457 On Hybrid TDD and Measurements for Cross-link Interference Mitigation Ericsson
R1-1714458 On Dynamic TDD Scenarios Ericsson
R1-1714459 On Duplexing in Paired Spectrum Ericsson
R1-1714505 Cross-link Interference Management based on Coordinated Beamforming Samsung
R1-1714506 Performance Evaluation of Cross-Link Interference Management Samsung
R1-1714507 Timing Alignment on Cross-Link for Dynamic TDD Samsung
R1-1714508 Cross-Link Interference Management based on Power Control Samsung
R1-1714509 Discussion on CLI Mitigation with Network Coordination Samsung

### 6.1.6 NR-LTE co-existence

*Target to complete remaining issues*
*Also, refer to R1-1709844 for work plan*

**R1-1715124** **Chairman's notes of AI 6.1.6 NR-LTE co-existence** **Ad-Hoc chair (Qualcomm)**
The document was presented by RAN1 chair on behalf of Wanshi Chen.
**Decision:** The document is endorsed, and content is updated and incorporated as below.

**R1-1712336** **On UL coverage extension of TDD @3.5GHz** **ORANGE**
Further revised in R1-1714262
**R1-1714823** **WF on scenario 1** **Orange, China Unicom, Nokia, Nokia Shanghai Bell, Ericsson, ZTE, Apple**
Also supported by Vodafone

Agreements:



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- Define the necessary mechanisms to ensure that NR-PUSCH which carries only control information can reach a similar coverage as NR DL control in scenario 1
  - Example mechanisms
    - Support for a small TB size design to carry RLC-feedback and CSI-feedback
      - FFS for piggybacking HARQ-ACK
    - Support for TTI bundling / repetition, TBS scaling for improved coverage for NR-PUSCH
- Note that these mechanisms may be useful for other scenarios, e.g., scenario 2

**R1-1712730 RAN3 signaling support for LTE-NR coexistence feature AT&T**
**R1-1714752 WF on RAN3 signaling support for LTE-NR coexistence feature AT&T, Deutsche Telekom, Ericsson, Huawei, HiSilicon, Intel, Nokia, NSB, Orange, Samsung, T-Mobile USA, Vodafone**
**R1-1714892 WF on RAN3 signaling support for LTE-NR coexistence feature AT&T, CATT, Deutsche Telekom, Ericsson, Huawei, HiSilicon, Intel, Orange, Nokia, NSB, Samsung, T-Mobile USA, VIVO, Vodafone**

Agreements:
- For LTE-NR coexistence in overlapping spectrum,
  - Send an LS to RAN3 to specify the Xn interface and enhanced X2 interface messages that enable coordination between LTE and NR, including
    - LTE cell on/off configuration with details up to RAN3
    - LTE MBSFN subframe configuration
    - DL and/or UL carrier center frequency (ARFCN)
    - Carrier bandwidth
    - Signaling related to timing synchronization and SFN
      - Note: this does not require the network to be synchronized and/or SFN aligned and/or radio-frame-boundary aligned
      - Note: It is up to RAN3 if this requires new procedures in addition to signaling support
    - Indication of semi-statically used resources (to avoid collisions with, e.g., CSI-RS, SRS, PRACH, PUCCH, DRS, PSS/SSS, PBCH, …)
    - Indication of slots/PRBs not intended for transmissions by the eNB and gNB, respectively
- For LTE-NR coexistence in adjacent spectrum,
  - Send an LS to RAN3 to specify the Xn interface and enhanced X2 interface messages that enable coordination between LTE and NR, including
    - Signaling related to timing synchronization and SFN
      - Note: this does not require the network to be synchronized and/or SFN aligned and/or radio-frame-boundary aligned
      - Note: It is up to RAN3 if this requires new procedures in addition to signaling support
    - TDD UL/DL configuration in case of LTE and NR and special subframe configuration in case of LTE

Draft LS in R1-1714978, which was endorsed and approved in R1-1715041 (with the red color text updated to black color)

**R1-1713221 Remaining details on supplementary UL in NR LTE coexistence LG Electronics**
**R1-1714816 WF on the opportunistic uplink transmission in TDM for single TX LG Electronics, Ericsson**
**R1-1715170 WF on the opportunistic uplink transmission in TDM for single TX LG Electronics, Ericsson, Nokia, NSB**
**R1-1713294 Discussion on the NR-LTE self-interference issue Guangdong OPPO Mobile Telecom**
**R1-1714382 On NR-LTE coexistence considering RF issues China Unicom**
**R1-1713318 Harmonics issue within band combinations ZTE**

**R1-1714837 WF on UE self-interference handling China Unicom, Orange, vivo, OPPO**
Also supported by China Telecom
**R1-1715021 WF on UE self-interference handling China Unicom, Orange, vivo, OPPO, China Telecom, Huawei, HiSilicon**

Agreements:
- RAN1 should investigate resource management approaches (e.g., time-domain, frequency-domain, etc.) for handling harmonic-related interference between a pair of UL (F1) and DL (F2) carriers
- The investigation should include performance, complexity, necessary potential specification impacts (e.g., network signaling, etc.), etc.

**R1-1713971 Remaing issues on NR-LTE co-existence NTT DOCOMO, INC.**



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R1-1714089 **On UE TDM uplink transmission in NR NSA mode** **Apple Inc.**
R1-1714461 **On NR-LTE co-existence** **Ericsson**
R1-1714482 **Discussion on Supplementary Uplink Frequency** **China Telecommunications**

R1-1714827 **Way forward on remaining issues of single UL transmission** **NTT DOCOMO, Apple, LGE**

~~Working assumption:~~
**Friday:** Agreements

- When the UE is configured with multiple UL carriers on different frequencies (where there is at least one LTE carrier and at least one NR carrier of a different carrier frequency), but the UE operates on only one of the carriers at a given time among a pair of LTE and NR carriers
  - UE can be configured with
    - Case 1: DL-reference UL/DL configuration defined for LTE-FDD-SCell in LTE-TDD-FDD CA with LTE-TDD-PCell
      - For scheduling/HARQ timing of LTE FDD carrier, DL-reference UL/DL configuration defined for LTE-FDD-SCell in LTE-TDD-FDD CA with LTE-TDD-PCell is applied
      - UE is allowed to transmit NR UL signals at least in the subframe(s) where LTE UL transmission is not allowed according to the DL-reference UL/DL configuration
      - FFS whether or not a UE-specific subframe offset for the DL-reference UL/DL configuration can be configured considering system resource utilization and potential spec impact
    - Case 2: Release 15 LTE-FDD HARQ timing
      - No impact on LTE RAN1 specifications
    - Note: it doesn't necessarily imply that UE has to support both cases
- To be confirmed this week

R1-1714950 **WF on initial access with SUL** **Huawei, HiSilicon, MediaTek, Deutsche Telekom, CATR, CMCC**
Revision of R1-1714833
R1-1715152 **WF on initial access with SUL** **Huawei, HiSilicon, MediaTek, Deutsche Telekom, CATR, CMCC, Ericsson**
Also supported by ZTE

Agreements:

- For NR UE initial access based on RACH configuration for an SUL carrier
  - RACH configuration for the SUL carrier is broadcasted in RMSI
  - The configuration information for the SUL carrier is sufficient for UEs to complete RACH procedure via only that SUL carrier
    - In particular the configuration information includes all necessary power control parameters
  - The configuration information for the SUL carrier includes a threshold. The UE selects that SUL carrier for initial access if and only if the RSRP measured by the UE on the DL carrier where the UE receives RMSI is lower than the threshold
  - If the UE starts its RACH procedure on the SUL carrier, then the RACH procedure is completed with all uplink transmission taking place on that carrier
- It is expected that the network would be able to request a connected-mode UE to initiate a RACH procedure towards any uplink carrier for path-loss and timing-advance acquisition
- Sent an LS accommodating above agreement to RAN2

Draft LS to be prepared R1-1715203
**Friday**
R1-1715203 **[Draft] LS on initial access with SUL** **Huawei**
**Decision:** Final LS is approved in R1-1715260

R1-1714951 **WF on uplink operation with SUL for LTE-NR UL Coexistence** **Huawei, HiSilicon, MediaTek, China Telecom, Deutsche Telekom**
Revision of R1-1714834
R1-1715189 **WF on uplink operation with SUL for LTE-NR UL Coexistence** **Huawei, HiSilicon, MediaTek, China Telecom, Deutsche Telekom**

R1-1714952 **WF on pathloss offset of SUL** **Huawei, HiSilicon, MediaTek, China Telecom, Deutsche Telekom, CMCC**
Revision of R1-1714835



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**R1-1715154 WF on pathloss offset of SUL Huawei, HiSilicon, MediaTek, China Telecom, Deutsche Telekom, CMCC, Ericsson**

Agreements:

- Each UL carrier (including SUL) available for initial access has its own separate power control configuration.
- Power adjustment for SUL should be taken into account in the uplink power control
  - The power adjustment for SUL can be used to compensate the difference between a pathloss estimate for the SUL frequency and the path loss estimated on the DL carrier where the UE receives the RMSI.
  - Note: it may be possible to include the power adjustment in P0.

**R1-1714953 WF on LTE-NR DC with UL coexistence Huawei, HiSilicon, Deutsche Telekom, China Unicom, China Telecom**
Revision of R1-1714854
**R1-1715155 WF on LTE-NR DC with UL coexistence Huawei, HiSilicon, Deutsche Telekom, China Unicom, China Telecom**
Further revised in R1-1715247.

R1-1712163 TDM of LTE and NR uplinks for LTE-NR dual connectivity Huawei, HiSilicon
R1-1712164 UL power control for SUL and LTE-NR uplink coexistence with UL sharing Huawei, HiSilicon
R1-1712165 Initial access and uplink operations with SUL Huawei, HiSilicon
R1-1712166 Discussion on scenario 2 for LTE-NR DC with UL sharing from UE perspective Huawei, HiSilicon
R1-1712438 Remaining issues on LTE/NR coexistence CATT
R1-1712611 Remaining issues on NR-LTE co-existence Intel Corporation
R1-1712872 Solutions for UE self-interference vivo
R1-1712873 Quantitative analysis on UE self-interference vivo
R1-1713218 Discussion on the Xn and enhanced X2 interface messages in NR-LTE coexistence LG Electronics
R1-1713219 Remaining details on DL sharing between LTE and NR LG Electronics
R1-1713220 Simultaneous transmission and reception between LTE and NR LG Electronics
R1-1713477 NR LTE Coexistence Considerations Qualcomm Incorporated
R1-1713668 LTE-NR coexistence for DL Samsung
R1-1713669 LTE-NR coexistence for UL Samsung
R1-1713670 UL Sharing between LTE and NR Samsung
R1-1713737 Contents of messages for Xn and X2 interface to support LTE-NR coexistence Huawei, HiSilicon
R1-1714054 Views on UL sharing of NR and LTE NEC
R1-1714172 Study on uplink coverage with band combination ZTE
R1-1714262 On UL coverage extension of TDD @3.5GHz Orange
R1-1714359 Support for single Tx UE in LTE-NR UL Dual Connectivity Nokia, Nokia Shanghai Bell
R1-1714447 On NR coex with LTE MTC and NB-IoT Ericsson
R1-1714481 Discussion on SRS Switching in LTE-NR Uplink Sharing Scenario China Telecommunications
R1-1714485 Some Consideration on UL Power Control for uplink sharing China Telecommunications
R1-1714740 WF on UE-to-UE crosslink measurement CMCC
R1-1715247 WF on LTE-NR DC with UL coexistence Huawei, HiSilicon, Deutsche Telekom, China Unicom, China Telecom

### 6.1.7 UL power control

**R1-1715122 Chairman's notes of AI 6.1.7 UL Power control Ad-Hoc chair (Qualcomm)**
The document was presented by RAN1 chair on behalf of Wanshi Chen.
**Decision:** The document is endorsed, and content is updated and incorporated as below.

#### *6.1.7.1 Power sharing mechanism*

*Including power sharing mechanism for LTE-NR dual connectivity, NR carrier aggregation and dual connectivity*

**R1-1713289 Discussion on UL Power Sharing for LTE-NR Dual Connectivity Guangdong OPPO Mobile Telecom**
**R1-1713478 Power sharing for LTE-NR dual connectivity Qualcomm Incorporated**
**R1-1714118 Power Sharing Mechanisms with LTE-NR DC and NR DC InterDigital, Inc.**
**R1-1714460 Power Sharing for LTE-NR Dual connectivity Ericsson**

**R1-1715083 WF on power sharing on MR-DC AT&T, Bouygues Telecom, China Telecom, China Unicom, Deutsche Telekom, KT Cop. , NTT-Docomo, Orange, Telecom Italia, T-Mobile USA, Vodafone, Sprint**



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**R1-1715090** **Way forward on power sharing for LTE-NR NSA operation** **Ericsson, CATT, Nokia, NSB, Samsung, Huawei**
**R1-1715185** **Way forward on power sharing for LTE-NR NSA operation** **Ericsson, CATT, Samsung, Mediatek, Nokia, NSB**

Agreements:

- At least for LTE-NR NSA operation
  - Maximum allowed power values for LTE (P_LTE) and NR (P_NR) are set separately
    - i.e., when UE is configured for NR, P_LTE can be configured up to P_cmax and P_NR can be configured up to P_cmax.
    - e.g. P_LTE + P_NR > P_cmax or P_LTE + P_NR = P_cmax
  - Signaling details for P_LTE, P_NR are left to RAN2, RAN4.
  - Note: 'P_cmax' is a limit that is similar to 'The configured maximum UE output power' that was specified for LTE.
  - Note: The network will still have flexibility to prioritize or reserve certain NR transmission power depending on network implementation
  - All UEs are mandated to handle P_LTE + P_NR = P_cmax while handling of P_LTE + P_NR > P_cmax depends on UE capability
  - At least, when DL/UL LTE sTTI/reduced UE processing time based operation is not configured for the UE, if total transmit power exceeds P_cmax when there is simultaneous NR and LTE UL tx,
    - For NR, UE scales down/drops NR transmission and NR power scaling details are left to UE implementation (note: it is not intended to have RAN4 test from RAN1 perspective)
      - If there are two or more UL carriers, the power scaling or tx dropping can be performed for each of the UL carriers separately or jointly up to UE implementation
    - For LTE, no change in power control procedure
  - FFS the case when DL/UL LTE sTTI/reduced UE processing time based operation is configured for the UE
  - The following is FFS
    - The case when P_NR is configured such that P_NR < P_cmax, and UE can use power up to P_cmax in NR when it knows that there will be no UL transmission in LTE by semi-static configuration (e.g., measurement gap, DL/UL configuration)

Send an LS to RAN2 and RAN4 to be drafted in R1-1715237
**Friday:**
**R1-1715237** **Draft LS on power sharing for LTE-NR Dual Connectivity** **Ericsson**
**Decision:** Final LS is approved in R1-1715313

R1-1712235 Power control for CA and DC Huawei, HiSilicon
R1-1712271 Discussion on uplink power sharing for LTE-NR FiberHome
R1-1712439 Power Sharing Mechanism CATT
R1-1712612 Power sharing mechanism for NR dual connectivity Intel Corporation
R1-1713222 Discussion on power sharing for LTE-NR DC LG Electronics
R1-1713671 On UL Power Sharing for Multi-Cell Transmissions Samsung
R1-1713972 LTE-NR power sharing mechanism NTT DOCOMO, INC.
R1-1714097 On power sharing between LTE and NR in DC Nokia, Nokia Shanghai Bell
R1-1714880 WF on UL power sharing between LTE and NR Nokia, Nokia Shanghai Bell
R1-1714888 WF on power sharing NTT DOCOMO INC., Huawei

#### *6.1.7.2 NR power control framework*

*Including power control for PUSCH/PUCCH/SRS/DMRS, PHR calculation*

**R1-1712312** **On NR power control** **ZTE**
**R1-1712874** **NR UL power control framework** **vivo**
**R1-1713223** **Consideration on UL power control process for NR** **LG Electronics**
**R1-1713770** **General considerations on power headroom calculation and reporting** **Huawei, HiSilicon**
**R1-1713852** **Discussion on NR power control and sharing** **CMCC**
**R1-1713974** **Power headroom report** **NTT DOCOMO, INC.**

**R1-1714889** **WF on NR power control framework** **NTT DOCOMO, LG, InterDigital, Nokia**

Agreements:

- For open-loop power control parameters for PUSCH for a UE,



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    - gNB configures one or multiple P0 values
        - e.g., for specific combination(s) of one or more beam(s), waveform (if agreed) and service type (if agreed)
    - gNB can configure one or multiple alpha values
- FFS the case of closed-loop power control
- FFS how to handle reconfiguration of open-loop power control parameters for PUSCH for a UE, e.g., reset or not reset closed-loop power control

**R1-1714930 Offline summary for Al 6.1.7 NR UL power control ZTE**

Agreements:
- PL calculation can be based on periodic CSI-RS if configured at least for the following cases:
    - PUSCH
    - SRS
    - PUCCH

**R1-1715190 Offline summary for Al 6.1.7 NR UL power control ZTE**

Agreements:
- It is up to RAN4 to discuss how to support any power back-off needed for CP-OFDM transmission compared with DFT-S-OFDM transmission
    - E.g., specification of fixed power back-off, specification of power back-off as MPR

| | | |
|---|---|---|
| R1-1712234 | General considerations on UL power control design | Huawei, HiSilicon |
| R1-1712279 | UL transmission power control | Mitsubishi Electric Co. |
| R1-1712313 | On NR PHR calculation | ZTE |
| R1-1712440 | NR Power Control Framework | CATT |
| R1-1712613 | Discussion On UL Power Control Framework | Intel Corporation |
| R1-1713224 | Consideration on UL power headroom report for NR | LG Electronics |
| R1-1713246 | Uplink power control for NR | Guangdong OPPO Mobile Telecom |
| R1-1713479 | Power control and PHR for NR | Qualcomm Incorporated |
| R1-1713672 | Power Control Framework | Samsung |
| R1-1713673 | On PHR Requirements and Calculation | Samsung |
| R1-1713973 | Power control framework for PUSCH | NTT DOCOMO, INC. |
| R1-1714170 | Common and Beam Specific Power Control Parameters | InterDigital, Inc. |
| R1-1714320 | On NR power control framework | Ericsson |
| R1-1714321 | On the power headroom reporting | Ericsson |
| R1-1714362 | Discussion on NR power control framework | Nokia, Nokia Shanghai Bell |
| R1-1714384 | Power control on different SRS groups | ASUSTEK COMPUTER (SHANGHAI) |
| R1-1714890 | WF on power back-off | NTT DOCOMO INC., Ericsson |
| R1-1714895 | WF on power control process in NR | LG Electronics |

## 6.2 Other

*Including channel model*

**R1-1714984 Chairman's notes of AI 6.2 Ad-Hoc chair (Nokia)**
The document was presented Matthew Baker of Nokia.
**Decision:** The document is endorsed, and content is incorporated as below.

**Channel Modelling**
**R1-1712260 Correction on 3D-RMa channel model in TR 36.873 Huawei, HiSilicon**
**R1-1712261 Correction on large scale parameters for 3D-InH in TR 36.873 Huawei, HiSilicon**

**R1-1714722 Correction on cross polarization power ratios in TR 36.873 Huawei, HiSilicon**
Revision of R1-1702262
**Decision:** Agreed in R1-1714981 36873CR0033r2 with changes-on-changes removed.

**R1-1714723 Correction on cross polarization power ratios in TR 38.901 Huawei, HiSilicon**
Revision of R1-1702263



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**Decision:** Agreed in R1-1714982 38901CR0018r2 with changes-on-changes removed.

**R1-1714631** **TR38.901_CR_Spatially-consistent_UT_modelling** **Fraunhofer HHI**
Revision of R1-1714545.
**Decision:** 38.901CR0017 is withdrawn; it supersedes the decision from last June ad-hoc meeting.

**R1-1714666** **TR38.901_CR_Calibration_Results** **Fraunhofer HHI**
Revision of R1-174546

**Modulation (Friday)**
**R1-1714807** **WF on pi/2 BPSK with Spectrum Shaping** **IITH, ATT, Ericsson, Nokia, Qualcomm, IITM, CEWiT, Tejas Networks, Reliance Jio**
Also supported by Huawei, HiSilicon

**R1-1715311** **[draft] LS on further considerations on pi/2 BPSK with spectrum shaping**
**Decision:** Final LS is approved in R1-1715312 with following updates
RAN1 would like to ask RAN4 to take into account the above RAN1 views on defining the performance requirements for PUSCH pi/2 BPSK modulation.

**Other**
**Friday:** Email discussion until the next meeting about eV2X evaluation methodology – Hanbyul (LGE)

Not treated.
R1-1712875 Measurement results and analysis on UE power consumption vivo
R1-1712876 NR UE power saving vivo
R1-1712877 Feasibility study on subband constellation rotation for uplink PAPR reduction for CP-OFDM waveform vivo
R1-1712878 PAE consideration on supporting CP-OFDM and DFT-S-OFDM vivo
R1-1712879 Forward compatibility consideration for ECP design and NR-MBMS vivo
R1-1713781 On remaining issues about pi/2 BPSK FDSS Huawei, HiSilicon
R1-1713782 High level consideration on NR unlicensed band operation Huawei, HiSilicon
R1-1713783 NR Numerology on unlicensed bands Huawei, HiSilicon
R1-1713784 NR Frame structure on unlicensed bands Huawei, HiSilicon
R1-1713785 Coexistence and Channel access for NR unlicensed band operations Huawei, HiSilicon
R1-1713786 NR standalone operation on unlicensed bands Huawei, HiSilicon
R1-1713787 Discussion on NoMA study for Rel-15 SI Huawei, HiSilicon
R1-1713788 Discussion on LLS evaluation for NoMA Huawei, HiSilicon
R1-1713984 Discussion of Multi-Antenna and Highly Directional Beam-Forming for Operation in Unlicensed Spectrum Ericsson Japan K.K.
R1-1713985 On Autonomous UL Transmissions for NR in Unlicensed Spectrum Ericsson Japan K.K.
R1-1713986 On Channel Access Mechanisms for NR in Unlicensed Spectrum Ericsson Japan K.K.
R1-1713987 On NR Operation in the 60 GHz Unlicensed Band Ericsson Japan K.K.
R1-1713988 On Physical Layer Design Policies for Unlicensed Operation of NR Ericsson Japan K.K.
R1-1713989 Technology Components for Unlicensed Operation Ericsson Japan K.K.
R1-1714177 LBT Considering Beamforming in Unlicensed Spectrum ASUSTEK COMPUTER (SHANGHAI)
R1-1714186 Low PAPR Modulation Qualcomm Austria RFFE GmbH
R1-1714192 Calibration results for NR MIMO system level calibration ITRI
R1-1714398 On spectrum shaping for uplink Pi/2 BPSK with DFT-S-OFDM Nokia, Nokia Shanghai Bell
R1-1714476 Considerations on satellite channel model THALES
R1-1714477 Considerations on NR impacts THALES
R1-1714484 Interference Measurement Table and Beam Coordination Samsung Electronics Co., Ltd
R1-1714486 ECP Aspects for 60kHz SCS Samsung Electronics Co., Ltd
R1-1714487 Modulation Scheme for URLLC with Preemption Multiplexing Samsung Electronics Co., Ltd
R1-1714488 On Transparency of Spectrum Shaping for p/2-BPSK DFT-s-OFDM Samsung Electronics Co., Ltd
R1-1714489 On Spectrum Shaping Methods for p/2-BPSK DFT-s-OFDM Samsung Electronics Co., Ltd
R1-1714490 On PAPR of DMRS for p/2-BPSK DFT-s-OFDM with Spectrum Shaping Samsung Electronics Co., Ltd
R1-1714491 RACH Aspects for CA and DC Samsung Electronics Co., Ltd
R1-1714492 On Modulation Schemes for High Spectral Efficiency Samsung Electronics Co., Ltd
R1-1714493 Discussion on NTN Use Cases, KPIs and Key Impact Areas Samsung Electronics Co., Ltd
R1-1714494 Transmission and Reception for High-Order Modulation with MIMO Samsung Electronics Co., Ltd
R1-1714495 Deployment scenarios for Integrated Access and Backhaul Samsung Electronics Co., Ltd
R1-1714496 Evaluation assumptions for Integrated Access and Backhaul Samsung Electronics Co., Ltd


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| | | |
|---|---|---|
| R1-1714497 | Dynamic resource allocation for Integrated Access and Backhaul | Samsung Electronics Co., Ltd |
| R1-1714540 | Remaining issues on pi/2 BPSK | IITH |
| R1-1714568 | Impact of channel estimation error on the performance of high spectral efficiency MIMO schemes | Samsung |
| R1-1714573 | Remaining Issues on RB Grid | Samsung |
| R1-1715092 | Summary of email discussion [89-28] eV2X evaluation methodology | LG Electronics |

# 7 Elections

## 7.1 Chairman election

The candidatures received for the Chairmanship prior to meeting start are indicated below:

| Name | Company / Partner |
|---|---|
| Dr. Wanshi Chen | Qualcomm Incorporated / ATIS |
| Mr. Brian Classon | HuaWei Technologies Co., Ltd / CCSA |

**Monday 21st**
The position of Chairman had two candidates, as listed above.

Observers: Sharat Chandler (AT&T), Enrico Buracchini (Telecom Italia), Jean-Aicard Fabien (USDoC)

The result of the first ballot for the position of WG RAN1 Chairman was as follows:

| candidate | votes for | percent |
|---|---|---|
| Dr Wanshi Chen | 150 | 50,336% |
| Mr Brian Classon | 148 | 49,664% |
| ABSTAIN or spoiled | **0** | 0% |
| total votes cast: | 298 | 100,000% |
| total returned papers | 298 | |
| number of proxy votes cast: | 126 | |

Mr Ke Wang (DATANG SEMICONDUCTOR, CCSA) was nominated as a fourth observer for the chair election.
The result of the second ballot for the position of WG RAN1 Chairman was as follows:

| candidate | votes for | percent |
|---|---|---|
| Dr Wanshi Chen | 158 | 53,199% |
| Mr Brian Classon | 139 | 46,801% |
| ABSTAIN or spoiled | **3** | 1,010% |
| total votes cast: | 297 | 100,000% |
| total returned papers | 300 | |
| number of proxy votes cast: | 132 | |

**Dr Wanshi Chen** (Qualcomm Inc., ATIS) was therefore appointed to the position of WG RAN1 Chairman.

## 7.2 Vice Chairman election

The candidatures received for the Vice Chairmanship prior to meeting start are indicated below:

| Name | Company / Partner |
|---|---|
| Dr. Kazuaki Takeda | NTT DOCOMO INC. / ARIB |
| Dr. Younsun Kim | Samsung Electronics Co., Ltd / TTA |
| Dr. Havish Koorapaty | Ericsson Inc. / ATIS |



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| | |
|---|---|
| Dr. Hanbyul Seo | LG Electronics Inc. / TTA |

**Tuesday 22nd**
The position of Vice Chairman had four candidates, as listed above.

Observers: Sharat Chandler (AT&T), Enrico Buracchini (Telecom Italia), Jean-Aicard Fabien (USDoC), Woo-Jin Choi (KT Corp.).

The result of the first ballot for the VC position was as follows:

| candidate | votes for | percent |
|---|---|---|
| Dr Kazuaki Takeda | 81 | 27,645% |
| Dr. Younsun Kim | 136 | 46,416% |
| Dr. Havish Koorapaty | 65 | 22,184% |
| Dr. Hanbyul Seo | 11 | 3,754% |
| ABSTAIN or spoiled | 2 | 0,683% |
| total votes cast: | 293 | 100,000% |
| total returned papers | 295 | |
| number of proxy votes cast: | 131 | |

Dr. Hanbyul Seo (LG Electronics, TTA) then decided to step down. The remaining 3 candidates declared that they will all go to a second round.
Two hours before the start of the second round, Dr. Havish Koorapaty (Ericsson, ATIS) announced Ericsson's decision to step down as well.
Due to some misunderstanding within the group, MCC made a clarification by refering to Article 28 of the 3GPP working procedures:
"In the second ballot, in cases where there are only two candidates, the candidate obtaining the higher number of votes is elected."

The result of the second ballot for the VC position was as follows:

| candidate | votes for | percent |
|---|---|---|
| Dr Kazuaki Takeda | 122 | 41,781% |
| Dr. Younsun Kim | 170 | 58,219% |
| ABSTAIN or spoiled | 0 | 0,000% |
| total votes cast: | 292 | 100,000% |
| total returned papers | 292 | |
| number of proxy votes cast: | 132 | |

**Dr. Younsun Kim** (Samsung, TTA) was therefore appointed to the position of WG RAN1 Vice Chairman.

# 8 Closing of the meeting

RAN1#90 was the last meeting chaired by Satoshi-san.
Farewell to Satoshi took place during the last quarter of an hour and was the proper time to thank Satoshi for his great efforts and contributions to RAN1.

MCC post-meeting: The purpose of the ad-hoc meeting in September 2017 is clearly meant to address NR-related topics only associated with the WI RP-171485. It is common understanding that RAN1 mandates this Ad hoc meeting with full decision power for NR WI RP-171485.

Meeting was closed at 18:00.
See you all in Prague again, and in Nagoya for NR interested.


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**Annex A: List of Tdocs at RAN1 #90**

Please see excel file attached to this report



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**Annex B: List of CRs agreed at RAN1 #90**

| TS/TR | CR | Rev | Rel | Title | Cat | Vsn | @ Mtg | TD# | Source to WG | Work Item |
|---|---|---|---|---|---|---|---|---|---|---|
| 36.211 | 384 | - | Rel-14 | Correction of RRC parameter name for non-anchor carriers | F | 14.3.0 | R1#90 | R1-1712139 | Huawei, HiSilicon | NB_IOTenh-Core |
| 36.211 | 386 | 1 | Rel-14 | Corrections on CDM8 sequence for 24 and 32 CSI-RS ports and CDM4 sequence | F | 14.3.0 | R1#90 | R1-1714711 | Huawei, HiSilicon | LTE_eFDMIMO-Core |
| 36.211 | 387 | - | Rel-14 | PRS and PDSCH/MPDCCH collision | F | 14.3.0 | R1#90 | R1-1714637 | Qualcomm Incorporated | LTE_feMTC-Core |
| 36.211 | 388 | - | Rel-13 | NPUSCH transmission during NPRACH gaps | F | 13.6.0 | R1#90 | R1-1714707 | Qualcomm Incorporated | NB_IOT-Core |
| 36.211 | 389 | - | Rel-14 | NPUSCH transmission during NPRACH gaps | A | 14.3.0 | R1#90 | R1-1714708 | Qualcomm Incorporated | NB_IOT-Core |
| 36.211 | 390 | - | Rel-13 | MPDCCH Frequency hopping for RRC connected contention-based RACH | F | 13.6.0 | R1#90 | R1-1715326 | Nokia | LTE_MTCe2_L1-Core |
| 36.211 | 391 | - | Rel-14 | MPDCCH Frequency hopping for RRC connected contention-based RACH | A | 14.3.0 | R1#90 | R1-1715327 | Nokia | LTE_MTCe2_L1-Core |
| 36.211 | 392 | 1 | Rel-14 | Interference randomization for NPDCCH and NPDSCH | F | 14.3.0 | R1#90 | R1-1715334 | Qualcomm Incorporated, Huawei, HiSilicon | NB_IOTenh-Core |
| 36.212 | 264 | 3 | Rel-14 | Correction on NB-IoT DCI format N1 in 36.212 | F | 14.3.0 | R1#90 | R1-1714717 | Ericsson, Huawei, HiSilicon | NB_IOTenh-Core |
| 36.212 | 265 | | Rel-14 | CR on UE assumption on co-scheduled DMRS ports for MUST in 36.212 | F | 14.3.0 | R1#90 | R1-1714814 | CMCC | LTE_MUST-Core |
| 36.213 | 945 | 1 | Rel-14 | Clarification of Type1A-CSS candidates | F | 14.3.0 | R1#90 | R1-1714643 | Huawei, HiSilicon | NB_IOTenh-Core |
| 36.213 | 948 | 1 | Rel-13 | Correction for FD-MIMO PMI definition | F | 13.6.0 | R1#90 | R1-1714648 | Ericsson | LTE_EBF_FDMIMO-Core |
| 36.213 | 950 | 1 | Rel-14 | Correction for UCI transmission on LAA sCell | F | 14.3.0 | R1#90 | R1-1714699 | Ericsson | LTE_eLAA-Core |
| 36.213 | 952 | - | Rel-13 | Correction on MPDCCH search space with CRC scrambled by the C-RNTI outside the random access procedure | F | 13.6.0 | R1#90 | R1-1714633 | Intel Corporation | LTE_MTCe2_L1-Core |
| 36.213 | 953 | - | Rel-14 | Correction on MPDCCH search space with CRC scrambled by the C-RNTI outside the random access procedure | A | 14.3.0 | R1#90 | R1-1714634 | Intel Corporation | LTE_MTCe2_L1-Core |
| 36.213 | 955 | - | Rel-14 | Corrections to Mode-3 scheduling | F | 14.3.0 | R1#90 | R1-1714702 | Ericsson | LTE_V2X-Core |
| 36.213 | 956 | - | Rel-14 | CSI periodicity relationship between eMIMO-Types in hybrid CSI | F | 14.3.0 | R1#90 | R1-1714651 | ZTE, InterDigital | LTE_eFDMIMO-Core |
| 36.213 | 957 | - | Rel-13 | Correction on PUCCH format 3 information for eCA | F | 13.6.0 | R1#90 | R1-1714897 | Rohde & Schwarz, Nokia | LTE_CA_enh_b5C-Core |
| 36.213 | 958 | - | Rel-14 | Correction on PUCCH format 3 information for eCA | A | 14.3.0 | R1#90 | R1-1714704 | Rohde & Schwarz, Nokia | LTE_CA_enh_b5C-Core |
| 36.213 | 959 | - | Rel-14 | Correction on periodic CSI reporting for LAA SCell | F | 14.3.0 | R1#90 | R1-1714698 | Rohde & Schwarz | LTE_eLAA-Core |
| 36.213 | 960 | - | Rel-13 | Corrections on Class A Codebook in 36.213 | F | 13.6.0 | R1#90 | R1-1714646 | Huawei, HiSilicon | LTE_EBF_FDMIMO-Core |



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| TS/TR | CR | Rev | Rel | Title | Cat | Vsn | @ Mtg | TD# | Source to WG | Work Item |
|---|---|---|---|---|---|---|---|---|---|---|
| 36.213 | 961 | - | Rel-14 | Corrections on Class A Codebook in 36.213 | A | 14.3.0 | R1#90 | R1-1714647 | Huawei, HiSilicon | LTE_EBF_FDMIMO-Core |
| 36.213 | 962 | - | Rel-14 | CR on definition of sensing window | F | 14.3.0 | R1#90 | R1-1714700 | Samsung | LTE_V2X-Core |
| 36.213 | 963 | 1 | Rel-14 | CR on subframe index for PSCCH re-transmission in mode 3 | F | 14.3.0 | R1#90 | R1-1714716 | Samsung | LTE_V2X-Core |
| 36.213 | 964 | - | Rel-14 | Correct RRC parameter for UL 256QAM | F | 14.3.0 | R1#90 | R1-1714703 | Qualcomm Incorporated | LTE_UL_CAP_enh-Core |
| 36.213 | 965 | 1 | Rel-13 | Maximum Code Rate applicability for UCI reporting over PUSCH | F | 13.6.0 | R1#90 | R1-1714720 | Qualcomm Incorporated | LTE_CA_enh_b5C-Core |
| 36.213 | 966 | - | Rel-14 | Maximum Code Rate applicability for UCI reporting over PUSCH | A | 14.3.0 | R1#90 | R1-1714695 | Qualcomm Incorporated | LTE_CA_enh_b5C-Core |
| 36.213 | 967 | - | Rel-13 | PUCCH priority for CSI report types 7-8-9-10 | F | 13.6.0 | R1#90 | R1-1714645 | Qualcomm Incorporated | LTE_EBF_FDMIMO-Core |
| 36.213 | 968 | - | Rel-14 | PUCCH priority for CSI report types 7-8-9-10 | A | 14.3.0 | R1#90 | R1-1714649 | Qualcomm Incorporated | LTE_EBF_FDMIMO-Core |
| 36.213 | 969 | - | Rel-14 | Correction on TBS determination for PDSCH in CE mode B | F | 14.3.0 | R1#90 | R1-1715102 | Intel Corporation | LTE_feMTC-Core |
| 36.213 | 970 | - | Rel-11 | SRS dropping for simultaneous SRS and PUSCH in intraband CA | F | 11.12.0 | R1#90 | R1-1714712 | Qualcomm Incorporated | LTE_CA_enh-Core |
| 36.213 | 971 | - | Rel-12 | SRS dropping for simultaneous SRS and PUSCH in intraband CA | A | 12.11.0 | R1#90 | R1-1714713 | Qualcomm Incorporated | LTE_CA_enh-Core |
| 36.213 | 972 | - | Rel-13 | SRS dropping for simultaneous SRS and PUSCH in intraband CA | A | 13.6.0 | R1#90 | R1-1714714 | Qualcomm Incorporated | LTE_CA_enh-Core |
| 36.213 | 973 | - | Rel-14 | SRS dropping for simultaneous SRS and PUSCH in intraband CA | A | 14.3.0 | R1#90 | R1-1714715 | Qualcomm Incorporated | LTE_CA_enh-Core |
| 36.213 | 974 | - | Rel-13 | PUCCH Format 4-5 collision with SRS | F | 13.6.0 | R1#90 | R1-1714653 | Qualcomm Incorporated | LTE_CA_enh_b5C-Core |
| 36.213 | 975 | - | Rel-14 | PUCCH Format 4-5 collision with SRS | A | 14.3.0 | R1#90 | R1-1714654 | Qualcomm Incorporated | LTE_CA_enh_b5C-Core |
| 36.213 | 976 | - | Rel-14 | Search space monitoring | F | 14.3.0 | R1#90 | R1-1714718 | Ericsson | NB_IOTenh-Core |
| 36.213 | 977 | - | Rel-14 | Clarification on NPDCCH monitoring for Rel-14 2-HARQ process UE | F | 14.3.0 | R1#90 | R1-1715310 | ZTE, Huawei, HiSilicon | NB_IOTenh-Core |
| 36.213 | 978 | | Rel-14 | Correction of RAR window timing definition in NB-IoT | F | 14.3.0 | R1#90 | R1-1715328 | Nokia | NB_IOTenh-Core |
| 36.214 | 44 | - | Rel-15 | CR on 36.214 for UE carrier phase measurements | B | 14.2.0 | R1#90 | R1-1715179 | Ericsson, Nokia, Nokia Shanghai Bell | LCS_LTE_acc_enh-Core |
| 36.214 | 45 | 0 | Rel-13 | Clarification CR for LAA RRM measurements within the DRS transmisison window | F | 13.4.0 | R1#90 | R1-1714696 | Qualcomm Incorporated | LTE_LAA-Core |
| 36.214 | 46 | 0 | Rel-14 | Clarification CR for LAA RRM measurements within the DRS transmisison window | A | 14.2.0 | R1#90 | R1-1714697 | Qualcomm Incorporated | LTE_LAA-Core |
| 36.873 | 31 | | Rel-14 | Correction on 3D-RMa channel model in TR 36.873 | F | 12.5.1 | R1#90 | R1-1712260 | Huawei, HiSilicon | FS_LTE_3D_channel |



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| TS/TR | CR | Rev | Rel | Title | Cat | Vsn | @ Mtg | TD# | Source to WG | Work Item |
|---|---|---|---|---|---|---|---|---|---|---|
| 36.873 | 32 | | Rel-14 | Correction on large scale parameters for 3D-InH in TR 36.873 | F | 12.5.1 | R1#90 | R1-1712261 | Huawei, HiSilicon, Fraunhofer HHI | FS_LTE_3D_channel |
| 36.873 | 33 | 2 | Rel-14 | Correction on cross polarization power ratios in TR 36.873 | F | 12.5.1 | R1#90 | R1-1714981 | Huawei, HiSilicon, Fraunhofer HHI | FS_LTE_3D_channel |
| 38.802 | 4 | | Rel-14 | CR for definitions, symbols and abbreviations in TR38.802 | F | 14.1.0 | R1#90 | R1-1714778 | NTT DOCOMO | FS_NR_newRAT |
| 38.802 | 5 | - | Rel-14 | TR38.802_CR_Section_7.1.6_MIMO calibration | F | 14.1.0 | R1#90 | R1-1715256 | ZTE | FS_NR_newRAT |
| 38.901 | 18 | 2 | Rel-14 | Correction on cross polarization power ratios in TR 38.901 | F | 14.1.1 | R1#90 | R1-1714982 | Huawei, HiSilicon, Fraunhofer HHI, ZTE | FS_NR_newRAT |
| 38.901 | 19 | 1 | Rel-14 | TR38.901_CR_Spatially-consistent_UT_modelling | F | 14.1.1 | R1#90 | R1-1714631 | Fraunhofer HHI, ZTE, Nokia, Ericsson | FS_NR_newRAT |
| 38.901 | 20 | 1 | Rel-14 | TR38.901_CR_Calibraiton_Results | F | 14.1.1 | R1#90 | R1-1714666 | Fraunhofer HHI, Ericsson | FS_NR_newRAT |



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**Annex C-1: List of Outgoing LSs from RAN1 #90**

| TDoc # | Title | Source | Release | Related WIs | Reply to | To | Cc | Original LS | Reply in |
|---|---|---|---|---|---|---|---|---|---|
| R1-1714719 | Support of early contention resolution in NB-IoT | RAN1, Nokia | Rel-13 | NB_IOT-Core | | RAN2 | RAN3 | | |
| R1-1714764 | LS on UE capability signaling for sTTI configurations | RAN1, Intel | Rel-15 | LTE_sTTIandPT-Core | | RAN4 | RAN2 | | |
| R1-1714767 | Reply LS on possible RF impact related to sPUSCH design | RAN1, Ericsson | Rel-15 | LTE_sTTIandPT-Core | | RAN4 | | | |
| R1-1714768 | LS on Stage 2 description of short TTI and shortened processing time | RAN1, Ericsson | Rel-15 | LTE_sTTIandPT-Core | | RAN2 | | | |
| R1-1714769 | LS on Pcmax for shortened processing time | RAN1, Huawei | Rel-15 | LTE_sTTIandPT-Core | | RAN4 | | | |
| R1-1714969 | LS on RRC parameters for NR | RAN1, Ericsson | Rel-15 | NR_newRAT-Core | | RAN2 | | | |
| R1-1715041 | LS on RAN3 signaling support for LTE-NR coexistence feature | RAN1, AT&T | Rel-15 | NR_newRAT-Core | | RAN3 | | | |
| R1-1715071 | LS on multiple SSBs within a wideband carrier | RAN1, Ericsson | Rel-15 | NR_newRAT-Core | | RAN2 | | | |
| R1-1715080 | LS on RAN1 agreements on enhancements to LTE operation in unlicenced spectrum | RAN1, Nokia | Rel-15 | LTE_unlic-Core | | RAN2 | | | |
| R1-1715089 | LS on response to EPC QoS aspects for TSG RAN's lower latency features | RAN1, Ericsson, Vodafone | Rel-15 | LTE_sTTIandPT, EDCE5, LTE_HRLLC, NR_newRAT | S2-175276 | SA2, RAN2 | SA1, CT1, RAN, SA, RAN3 | | |
| R1-1715120 | LS to RAN2 on Text Proposals for 3GPP TR 36.746 | RAN1, Intel | Rel-15 | FS_feD2D_IoT_relay_wearable | | RAN2 | RAN4 | | |
| R1-1715149 | New configuration and UE capabilities for NB-IoT | RAN1, Qualcomm | Rel-14 | NB_IOTenh-Core | | RAN2 | | | |
| R1-1715174 | LS on RAN1 agreements on mode 3 sidelink CA | RAN1, HiSilicon | Rel-15 | LTE_eV2X-Core | | RAN2 | | | |
| R1-1715184 | LS response on spectrum utilization | RAN1, Huawei | Rel-15 | NR_newRAT-Core | R4-1706974 | RAN4, RAN2, RAN3 | | | |
| R1-1715188 | LS on RAN1 recommendation to define test cases | RAN1, AT&T | Rel-15 | NR_newRAT-Core | | RAN4 | | | |
| R1-1715260 | LS on initial access with SUL | RAN1, Huawei | Rel-15 | NR_newRAT-Core | | RAN2 | | | |
| R1-1715274 | LS on UL diversity transmission for PUSCH with CP-OFDM | RAN1, Mitsubishi | Rel-15 | NR_newRAT-Core | | RAN4 | | | |
| R1-1715280 | Reply LS on short processing time and sTTI | RAN1, Ericsson | Rel-15 | LTE_sTTIandPT-Core | R2-1706159 | RAN2 | | | |
| R1-1715282 | LS to RAN2 on supported use case for Rel-15 V2X CA on PC5 | RAN1, Huawei | Rel-15 | LTE_eV2X-Core | | RAN2 | | | |
| R1-1715283 | LS on RAN1 agreement on carrier selection for sidelink CA | RAN1, NTT DOCOMO | Rel-15 | LTE_eV2X-Core | | RAN2 | SA2 | | |
| R1-1715284 | LS on PSCCH PSD boosting with 64 QAM PSSCH | RAN1, LG Electronics | Rel-15 | LTE_eV2X-Core | | RAN4 | | | |



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| TDoc # | Title | Source | Release | Related WIs | Reply to | To | Cc | Original LS | Reply in |
|---|---|---|---|---|---|---|---|---|---|
| R1-1715287 | LS to RAN on PC5 operation with short TTI for V2X phase 2 based on LTE | RAN1, Huawei, CATT | Rel-15 | LTE_eV2X-Core | | RAN | RAN2, RAN4 | | |
| R1-1715299 | LS on UL HARQ-ACK feedback for Rel-15 LTE efeMTC | RAN1, ZTE | Rel-15 | LTE_eMTC4-Core | | RAN2 | | | |
| R1-1715300 | LS on narrowband measurement accuracy enhancement | RAN1, Huawei | Rel-15 | NB_IOTenh2-Core | | RAN4 | RAN2 | | |
| R1-1715301 | LS on TDD NB-IoT | RAN1, Huawei | Rel-15 | NB_IOTenh2-Core | | RAN2 | | | |
| R1-1715303 | LS on TP for remaining evaluation assumptions and channel modelling | RAN1, Ericsson | Rel-15 | FS_LTE_Aerial | | RAN2 | | | |
| R1-1715304 | LS on minimum time for DL-to-UL and UL-to-DL switching on one NB-IoT carrier for TDD NB-IoT UEs | RAN1, Ericsson | Rel-15 | NB_IOTenh2-Core | | RAN4 | | | |
| R1-1715306 | LS on RAN1 agreements on UE GNSS carrier phase measurement | RAN1, Nokia | Rel-15 | LCS_LTE_acc_enh-Core | | RAN2 | RAN4, RAN5 | | |
| R1-1715308 | LS on transmit diversity for PC5 | RAN1, Ericsson | Rel-15 | LTE_eV2X-Core | | RAN4 | | | |
| R1-1715312 | LS on further considerations on pi/2 BPSK with spectrum shaping | RAN1, IITH | Rel-15 | NR_newRAT-Core | | RAN4 | | | |
| R1-1715313 | LS on power sharing for LTE-NR Dual Connectivity | RAN1, Ericsson | Rel-15 | NR_newRAT-Core | | RAN4, RAN2 | | | |
| R1-1715315 | LS response on Random Access | RAN1, Samsung | Rel-15 | NR_newRAT-Core | R1-1711950 | RAN2 | | | |
| R1-1715316 | LS on NR initial access and mobility | RAN1, NTT DOCOMO | Rel-15 | NR_newRAT-Core | | RAN4 | RAN2 | | |
| R1-1715317 | LS on Channel Coding | RAN1, Nokia | Rel-15 | NR_newRAT-Core | | RAN4 | | | |
| R1-1714860 | LS on TP for key performance indicator, identified problem, evaluation assumptions, channel modelling, and evaluation results | RAN1, Ericsson | Rel-15 | FS_LTE_Aerial | | RAN2 | | | |
| R1-1714986 | LS on RRC parameters for sTTI and short processing time | RAN1, Ericsson | Rel-15 | LTE_sTTIandPT-Core | | RAN2 | | | |
| R1-1714995 | LS on NR UL transmission without UL grant | RAN1, NTT DOCOMO | Rel-15 | NR_newRAT-Core | | RAN2 | | | |
| R1-1714996 | LS on Further agreements for Bandwidth part operation | RAN1, LG Electronics | Rel-15 | NR_newRAT-Core | | RAN2 | RAN4 | | |
| R1-1715332 | LS on RRC parameters for FeCoMP | RAN1, ZTE | Rel-15 | feCoMP_LTE-Core | | RAN2 | | | |
| R1-1715335 | Corrections on antenna switching | RAN1, Qualcomm | Rel-13 | LTE_CA_TDD_FDD-Core | | RAN2, RAN4 | | | |
| R1-1715338 | LS on RRC parameters for NR | RAN1, Ericsson | | | | | | | |



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**Annex C-2: List of Incoming LSs from RAN1 #90**

| TDoc # | Title | Source | Release | Related WIs | Reply to | To | Cc | Original LS | Reply in |
|---|---|---|---|---|---|---|---|---|---|
| R1-1712034 | Liaison Statement from NGMN Alliance to 3GPP on Test Results of Technology Building Blocks phase of the Trial and Testing Initiative | NGMN Alliance, KT, Telecom Italia | Rel-15 | | | RAN1 | RAN2, RAN3, RAN4 | 170629_Liaison Statement NGMN TTI TTBB to 3GPP | |
| R1-1712035 | Reply LS on SFN indication in handover message | RAN2, Qualcomm | Rel-14 | LTE_feMTC-Core | R1-1704118 | RAN1, RAN4 | | R2-1705920 | |
| R1-1712036 | RAN2 agreement on UAV requirements | RAN2, NTT DOCOMO | Rel-15 | FS_LTE_Aerial | | RAN1 | | R2-1706013 | |
| R1-1712037 | LS on short processing time and short TTI | RAN2, Ericsson | Rel-15 | LTE_sTTIandPT-Core | | RAN1 | | R2-1706159 | |
| R1-1712038 | Reply LS on monitoring of partial NPDCCH search spaces | RAN2, Huawei | Rel-13 | NB_IOT-Core | R1-1709716 | RAN1 | RAN | R2-1706195 | |
| R1-1712039 | LS on shared baseband capabilities for MR-DC | RAN2, Nokia | Rel-15 | NR_newRAT-Core | | RAN4 | RAN1 | R2-1707505 | |
| R1-1712040 | LS on support of CACC and platooning applications by 3GPP systems | SAE DSRC Technical Committee, Chair | Rel-15 | | | SA2, RAN2 | SA1, RAN1 | SAE DSRC TC LS 06132017-rev5 | |
| R1-1712041 | LIAISON STATEMENT TO 3GPP on UNWANTED EMISSIONS OF IMT-2020 | ITU-R Working Party 5D | Rel-15 | | | RAN4 | RAN, RAN1 | Document 5D/666/TEMP/321 Rev.1 | |
| R1-1712042 | CHARACTERISTICS OF IMT-2020 SYSTEM FOR COEXISTENCE STUDY IN THE FREQUENCY BAND 4 800-4 990 MHz | ITU-R Working Party 5D | Rel-15 | | | RAN4, RAN1 | RAN | Document 5D/666/TEMP/345 Rev.1 | |
| R1-1712043 | LS on RAN4 agreements for FeD2D SI | RAN4, Intel | Rel-14 | FS_feD2D_IoT_relay_wearable | | RAN1, RAN2 | | R4-1706074 | |
| R1-1712044 | Reply LS regarding 1024QAM | RAN4, Huawei | Rel-15 | LTE_1024QAM_DL-Core | R1-1706842 | RAN1 | | R4-1706112 | |
| R1-1712045 | LS on Maximum Transmission Timing Difference and Maximum Receive Timing Difference in CA for sTTI | RAN4, Intel | Rel-15 | LTE_sTTIandPT-Core | | RAN1 | | R4-1706271 | |
| R1-1712046 | Reply LS on set of configuration values for SS burst set periodicity | RAN4, Intel | Rel-15 | NR_newRAT-Core | R1-1706708 | RAN1 | | R4-1706906 | |
| R1-1712047 | Reply LS on the feasibility of DC-related mobility enhancements in NR | RAN4, Huawei | Rel-15 | NR_newRAT-Core | R2-1703971 | RAN2 | RAN1 | R4-1706913 | |
| R1-1712048 | LS Reply on transient period for NR | RAN4, Qualcomm | Rel-15 | NR_newRAT-Core | R1-1703782 | RAN1 | | R4-1706940 | |
| R1-1712049 | Reply LS on support of supplementary uplink in NR | RAN4, CMCC | Rel-15 | NR_newRAT-Core | R1-1709843 | RAN1, RAN2 | | R4-1706967 | |
| R1-1712050 | LS on spectrum utilization | RAN4, Vodafone | Rel-15 | NR_newRAT-Core | | RAN1, RAN2 | | R4-1706974 | |



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| TDoc # | Title | Source | Release | Related WIs | Reply to | To | Cc | Original LS | Reply in |
|---|---|---|---|---|---|---|---|---|---|
| R1-1712051 | LS on DL & UL channel bandwidth for NR | RAN4, Intel | Rel-15 | NR_newRAT-Core | | RAN1, RAN2 | | R4-1706978 | |
| R1-1712052 | Response to IEEE LS to 3GPP RAN/RAN1/RAN4 related to PD and ED issues | RAN, Qualcomm | Rel-13 | LTE_LAA-Core | | IEEE 802 LAN/MAN Standards Committee | RAN1, RAN4 | RP-171482 | |
| R1-1712053 | Reply LS on UE capabilities for MBMS | SA2, Qualcomm | Rel-14 | NB_IOTenh-Core, LTE_feMTC-Core | R1-1704074 | RAN1, RAN2, RAN3 | CT3, CT4 | S2-175071 | |
| R1-1712054 | LS on EPC QoS aspects for TSG RAN's lower latency features | SA2, Ericsson | Rel-15 | EDCE5, NR_newRAT-Core, LTE_sTTIandPT-Core | SP-170584, RP-171473 | RAN, SA, RAN1, RAN2, RAN3 | SA1, CT1 | S2-175276 | |
| R1-1714585 | Response to 3GPP Liaison R4-164972 | Wi-Fi Alliance | Rel-13 | LTE_LAA | R4-164972 | RAN4, RAN | RAN1, IEEE 802.11 | | |
| R1-1714826 | Reply LS on spectrum utilization | RAN2, Huawei | Rel-15 | NR_newRAT-Core | R4-1706974 | RAN4, RAN1 | | R2-1709816 | |
| R1-1714921 | Reply LS on Relay UE discovery | RAN2, Nokia | Rel-15 | FS_feD2D_IoT_relay_wearable | R1-1709621 | RAN1 | | R2-1709782 | |
| R1-1715263 | LS on uplink and downlink channel bandwidth for NR | RAN4, Intel | Rel-15 | NR_newRAT-Core | | RAN1, RAN2 | | R4-1709136 | |
| R1-1715264 | LS on effect of SRS switching in TDD + FDD CA | RAN4, Qualcomm | Rel-14 | LTE_SRS_switch-Core | | RAN1 | RAN2 | R4-1708772 | |
| R1-1715268 | LS on RACH agreements | RAN2, Ericsson | Rel-15 | NR_newRAT-Core | | RAN1 | | R2-1709800 | |
| R1-1715269 | Response LS on BWP operation in NR | RAN2, Samsung | Rel-15 | NR_newRAT-Core | R1-1711998 | RAN1 | | R2-1709801 | |
| R1-1715279 | LS on RAR reception for NB-IoT | RAN2, Nokia | Rel-14 | NB_IOTenh-Core | | RAN1 | | R2-1709902 | |



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**Annex D: List of Approved updated WIDs**

None



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**Annex E: List of draft TSs/TRs agreed at RAN1 #90**

| Tdoc Number | Title | Source | Conclusion/Decision |
|---|---|---|---|
| R1-1714655 | TS 38.202 v0.1.0 Services provided by the physical layer | Qualcomm Incorporated | Endorsed as basis for further updates |
| R1-1714656 | TS38.211 v0.2.0 NR; Physical channels and modulation | Ericsson | Endorsed as basis for further updates |
| R1-1714658 | TS38.213 v0.1.0 NR; Physical layer procedures for control | Samsung | Endorsed as basis for further updates |
| R1-1714659 | TS38.212 v0.1.0 NR; Multiplexing and channel coding | Huawei | Endorsed as basis for further updates |
| R1-1714660 | TS38.215 v0.1.0 NR; Physical layer measurements | Intel Corporation (UK) Ltd | Endorsed as basis for further updates |
| R1-1715069 | TS38.201 V.0.1.0 NR; Physical layer; General description | NTT DOCOMO, INC. | Endorsed as basis for further updates |
| R1-1715077 | TS 38.214 v0.1.0 NR; Physical layer procedures for data | Nokia | Endorsed as basis for further updates |
| R1-1714994 | TR 36.783 v1.0.0 E-UTRA; Introduction of 1024QAM in LTE downlink (Release 15) | Qualcomm | Agreed |
| R1-1715319 | TS38.201 V.0.1.1 NR; Physical layer; General description | NTT DOCOMO, INC. | Endorsed as basis for further updates |
| R1-1715320 | TS 38.202 v0.1.1 Services provided by the physical layer | Qualcomm Incorporated | Endorsed as basis for further updates |
| R1-1715322 | TS38.212 v0.1.1 NR; Multiplexing and channel coding | Huawei | Endorsed as basis for further updates |
| R1-1715329 | TS38.211 v0.2.2 NR; Physical channels and modulation | Ericsson | Endorsed as basis for further updates |
| R1-1715330 | TS38.213 v0.1.2 NR; Physical layer procedures for control | Samsung | Endorsed as basis for further updates |
| R1-1715331 | TS 38.214 v0.1.2 NR; Physical layer procedures for data | Nokia | Endorsed as basis for further updates |
| R1-1715333 | TS38.215 v0.1.2 NR; Physical layer measurements | Intel Corporation (UK) Ltd | Endorsed as basis for further updates |



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**Annex F: List of actions**

- **Outgoing LS**

[90-01] Alberto (Qualcomm)
**R1-1715264 LS on effect of SRS switching in TDD + FDD CA RAN4**
**Decision:** Email discussion about Release number and potential LS to RAN2 (cc RAN4) and potential approval of CR until Sept.6th
**Done: According to decision posted on Sept.7th, LS to RAN2/RAN4 is approved in R1-1715335 and provides RAN1 agreements on the antenna selection for the case of carrier aggregation. RAN1 agreed in principle below draft CR (conditionally to the pending details on RAN2 signaling).**
**R1-1715336 Corrections for antenna switching Qualcomm Rel-13 36.213 13.6.0 LTE_CA_TDD_FDD-Core CatF**

[90-15] Mårten (Ericsson)
Email approval on the LS to RAN2 including updated RRC parameters .
**Done: According to the email posted on Sept 19th, the final LS is approved in R1-1714986 and includes the RRC parameters endorsed in R1-1714985.**

[90-16] Alexei (Intel)
5.2.4 Further enhancements to CoMP Operation for LTE
Email approval on the LS to RAN2/4 capturing all the agreements
**Done: According to decision posted on August 28th, there is no need to send an LS to RAN2/RAN4 with the list of agreements. An LS with list of RRC parameters (to be discussed in [90-17]) is already sufficient. Rapporteur has provided the following:**
**R1-1715318 List of agreements for Further enhancements to Coordinated Multi-Point (CoMP) Operation for LTE up to RAN1#90 meetingIntel Corporation, ZTE**

[90-17] Nan (ZTE)
Email approval on the LS to RAN2 including RRC parameters for further enhancements to CoMP operation.
**Done: According to decision posted on Sept. 9th, final LS is approved in:**
**R1-1715332 LS on RRC parameters for FeCoMP RAN1, ZTE**

[90-24] Daniel (Ericsson)
Email approval on the LS to RAN2 including updated RRC parameters list for NR.
**Done: According to the email posted on Sept 12th, the final LS is approved in R1-1715338 and includes the RRC parameters endorsed in R1-1715337.**

[90-26] Lihui (NTT DOCOMO)
Draft LS for UL transmission without UL grant to RAN2 to inform all the agreements, for email approval until August 31st
**Done: According to Mr Chair's decision posted on Sept 1st, final LS is approved in R1-1714995.**

[90-27] Yunjung (LGE)
Email approval of LS to RAN2 about bandwidth part until August 31st



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**Done: According to Mr Chair's decision posted on Sept 1st, final LS is approved in R1-1714996.**

[90-31] Siva (Ericsson)
Email approval till 9/5 of LS to RAN2 based on the agreed TP in [90-22]
**Done: According to Mr Chair's decision posted on Sept 7th, final LS is approved in R1-1714860.**

- **CR approval**

[90-02] Alberto (Qualcomm)
**R1-1714710 Interference randomization for NPDCCH and NPDSCH Qualcomm**
For email approval by Thur 31st Aug
**Done: According to Mr Chair's decision posted on Sept 1st, CR0392 to 36.211 (Rel-14, F) in R1-1714997 is agreed. It was then noticed that RAN2 had used a different IE name (*interferenceRandomisationConfig* versus *interferenceRandomisation*) and further decided to revise it. CR0392rev1 to 36.211 (Rel-14, F) is agreed in R1-175334.**

[90-03] Rapeepat (Nokia)
**R1-1715285 Correction of RAR window timing definition in NB-IoT Nokia**
For email approval until August 31st
**Done: According to Mr Chair's decision posted on Sept 1st, CR0978 to 36.213 (Rel-14, F) in R1-1715328 is agreed.**

- **Text proposal for TS and TR**

[90-18] Alberto (Qualcomm)
Email approval of 1024QAM TR until August 31st
**Done: According to Mr Chair's decision posted on Sept 2nd, TP is agreed in:**
**R1-1714994 TR 36.783 v1.0.0 E-UTRA; Introduction of 1024QAM in LTE downlink (Release 15) Qualcomm**

[90-22] Siva (Ericsson)
Study on Enhanced Support for Aerial Vehicles
5.2.8.4 Email approval until 31st of August about TP
**Done: According to Mr Chair's decision posted on Sept 2nd, version 1.0.0 of TR36.783 is agreed.**
**R1-1714859 TP for key performance indicator, identified problem, evaluation assumptions, channel modelling, and evaluation results Ericsson**

- **Miscellaneous**

[90-04] Mårten (Ericsson)
Shortened TTI and processing time for LTE



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Email discussion about specs

- Rapporteur to provide updated agreements and working assumptions list by Wed Aug 30th .

**Done: The following was distributed on August 30th by the rapporteur:**

**R1-1714998 RAN1 agreements per topic for shortened TTI and processing time for LTE (revision of R1-1709861) Ericsson**

**R1-1714999 RAN1 agreements for shortened TTI and processing time for LTE (revision of R1-1709865) Ericsson**

- [Editors to prepare updated draft CRs including agreements and WA until Wed Sep 27th .
  - Please use [90-04-**spec#**]
- Editors may update CRs by 6 Oct based on comments received until Wed Oct 4th .

[90-05] Kyuhwan (LGE)
Email discussion on DCI formats including how many DCI formats for sTTI, DCI fields for UL grant and DL assignment, estimated DCI payload, until 22nd of Sept
**Done: A summary of the email thread is going to be submitted to the next meeting. See R1-1717249.**

[90-06] Kianoush (Qualcomm)
Email discussion on sPDCCH design, until 20th of Sept
**Done: A summary of the email thread is going to be submitted to the next meeting. See R1-1718118.**

[90-07] Chengyan (Huawei)
Email discussion on sPDCCH search space, until 20th of Sept
**Done: A summary of the email thread is going to be submitted to the next meeting. See R1-1717149.**

[90-08] Karol (Nokia)
Email discussion on sPDCCH muxing with data, including sPDCCH resource reuse scheme, Nokis (Karol), until 22nd of September
**Done: A summary of the email thread is going to be submitted to the next meeting. See R1-1717447.**

[90-09] Xianghui (ZTE)
Email discussion on sPUCCH format design including format selection, remaining PF4b 2/3os format, resource management, bundling, until 15th of Sept
**Done: A summary of the email thread is going to be submitted to the next meeting. See R1-1717702.**

[90-10] Kianoush (Qualcomm)
Email discussion on sTTI CSI reporting, until 22nd of Sept
**Done: A summary of the email thread is going to be submitted to the next meeting. See R1-1718119.**

[90-11] Yubo (Huawei)
Email discussion on sPDSCH/sPUSCH design including TBS scaling, single CW, DL DMRS pattern, configuration of transmission modes, fallback transmission scheme, resource allocation, UL DMRS details, HARQ ACK mapping on sPUSCH, until 22nd of September
**Done: A summary of the email thread is going to be submitted to the next meeting. See R1-1717150.**



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[90-12] Hyunho (LGE)
Email discussion on sPUSCH/sPUCCH power control including both single carrier and multiple carrier scenario and remaining issues on collisions in UL, until 22nd of Sept
**Done: A summary of the email thread is going to be submitted to the next meeting. See R1-1717247.**

[90-13] Jeongho (Samasung)
Email discussions on remaining issues of FS2 including HARQ timing and UL scheduling tables, until 18th of Sept
**Done: A summary of the email thread is going to be submitted to the next meeting. See R1-1717247.**

[90-14] Klaus (Nokia)
Email discussion on remaining issues for max TA and processing time, including how to handle (2,7)? Where to ACK/NACK the three 2os sTTI in a slot (HARQ timing table)? DAI?, until 15th of Sept.
**Done: A summary of the email thread is going to be submitted to the next meeting. See R1-1717155.**

[90-15] Mårten (Ericsson)
R1-1714763 **List of physical layer related RRC parameters for sTTI and short processing time** **Ericsson** **(rev of R1-1712913**
Email approval until 13th of Sept for updated list of RRC parameters after RAN1#90, followed by an LS to RAN2 to inform them about the set of parameters currently agreed.
**Done: According to the email posted on Sept 19th, the latest version of RRC parameters is endorsed in R1-1714985.**

[90-19] Alberto (Qualcomm)
5.2.6.4 Email discussion until 6th Sep. about 64QAM CQI table
**Done: A summary of the email thread is going to be submitted to the next meeting. See R1-1718137.**

[90-20] Magnus (Ericsson)
Email discussion to agree simulation assumptions for NB-IoT and eMTC power consumption evaluation of power saving signal/channel until September 4th
**Done: According to the email posted on Sept 15th, the simulation assumptions are agreed in:**
**R1-1714992 Assumptions for eMTC Power Consumption for Power Saving Signal/Channel Ericsson**
**R1-1714993 Assumptions for NB-IoT Power Consumption for Power Saving Signal/Channel Ericsson**

[90-21]
5.2.8.2 Email discussion about collecting RSRP statistics for Aerial vehicles until 7th September – Shinpei (DOCOMO)
**Done: According to the email posted on Sept 23rd, the conclusions are:**

- **Down select from the two RSRP statistics in RAN1#90bis for interference detection in Aerial Vehicles**
  - **Distance based RSRP statistics**
  - **Geometry based RSRP statistics**
- **One example for distance-based RSRP statistics is given as follows:**

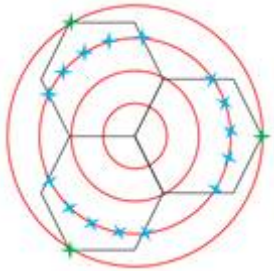
**2D-distance-based RSRP statistics**

- **Only aerial UEs are evaluated**



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- **UE location:**
  - **Fixed 2D distance and UE height are assumed**
    - **Fixed 2D distances are 0.25*(2/3)*ISD, 0.5*(2/3)*ISD, 0.75*(2/3)*ISD, (2/3)*ISD.**



    - **For 0.25*(2/3)*ISD and 0.5*(2/3)*ISD, all UEs are considered**
    - **For 0.75*(2/3)*ISD, UEs dropped on the arc marked by blue stars are considered**
    - **For (2/3)*ISD, UEs dropped in the area marked by green stars are considered**
    - **Fixed UE heights are 1.5, 50, 100, 200, 300 m**
- **Small scale fading is not modeled**
- **RSRP gap between serving cell and n-th strongest neighbor cell is observed**
  - **n = 1, 3, 5, 7, 9**
- **For each n in UMi-AV/UMa-AV/RMa-AV, capture RSRP gap values.**

[90-23] NR spec editors
Please use [90-23-spec#]

- Editors will submit updated versions until August 29th
- Email approvals about specs (i.e., 201, 202, 211, 212, 213, 214, and 215) until September 4th to include this week agreements/WA.

**Done:**

| | | |
|---|---|---|
| **R1-1715319** | **TS38.201 V.0.1.1 NR; Physical layer; General description** | **is endorsed as basis to v1.0.0 (RP-171998) for information to RAN#77** |
| **R1-1715320** | **TS 38.202 v0.1.1 Services provided by the physical layer** | **is endorsed as basis to v1.0.0 (RP-172006) for information to RAN#77** |
| **R1-1715322** | **TS38.212 v0.1.1 NR; Multiplexing and channel coding** | **is endorsed as basis to v1.0.0 (RP-171994) for information to RAN#77** |
| **R1-1715329** | **TS38.211 v0.2.2 NR; Physical channels and modulation** | **is endorsed as basis to v1.0.0 (RP-171991) for information to RAN#77** |
| **R1-1715330** | **TS38.213 v0.1.2 NR; Physical layer procedures for control** | **is endorsed as basis to v1.0.0 (RP-171995) for information to RAN#77** |
| **R1-1715331** | **TS 38.214 v0.1.2 NR; Physical layer procedures for data** | **is endorsed as basis to v1.0.0 (RP-172001) for information to RAN#77** |
| **R1-1715333** | **TS38.215 v0.1.2 NR; Physical layer measurements** | **is endorsed as basis to v1.0.0 (RP-171999) for information to RAN#77** |

[90-24] Daniel (Ericsson)
Email discussion about updated RRC parameter list from Sept. 4th until Sept. 8th. Ericsson shall provide updated RRC parameter list around 5th of September
**Done: According to the email posted on Sept 12th, the latest version of RRC parameters is endorsed in R1-1715337.**



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[90-25]
Email discussion on the set of possible parameters for beam management, and the corresponding possible value(s) till next meeting by using the following list as a starting point (the list is subject to further update) – Sundar (Qualcomm)

- Minimum time between aperiodic CSI-RS for beam management and its DCI shall be at least $K_B$ symbols. Symbols measured from last symbol containing the DCI to first symbol of CSI-RS.
- The number of slots between a CSI-RS burst for beam management and the associated report shall be at least $R_B$ slots.
- Number of slots between indication of the spatial QCL for PDSCH and application of the PDSCH beam switch shall be at least $D_B$
- Number of slots between indication of the spatial QCL for PDCCH and application of the PDCCH beam switch shall be at least $S_B$
- Maximum number of beam changes a UE has to conduct during a slot shall not exceed $B_B$.
- The number of measurement reports with L1-RSRP only per slot, per TRP, per component carrier shall not exceed $C1_B$
- For beam mgmt and CQI, the number of antenna ports per CSI-RS burst, for which the UE measures the channel, shall not exceed $P_B$
- The number of simultaneously triggered CSI report settings is no greater than $C2_B$

[90-28] Yufei (Ericsson)
Email agreement on the definition of $R_{init}$ until Wednesday 30th August
**Done: According to Mr Chair's decision posted on Sept 2nd, the following is agreed:**

- **$R_{init}$ is the effective code rate at initial transmission of the transport block, taking into account:**
  - **the nominal code rate, as signaled in or derived based on control information, where the control information is used to schedule the initial transmission of the transport block; and**
    - **FFS: details of how the nominal code rate is obtained from the control information**
  - **LBRM (if applied)**
- **$R_{init}$ is applied to previous agreements on BG selection, and reflected in TS38.212.**

Contribution summarizing the discussion of [90-28] as input to next NR ad-hoc meeting in R1-1715733.

[90-29] Yufei (Ericsson)
6.1.4.2 K and nFAR for UL Polar Construction
Proposal for email agreement by Wed 30th August
**Done: According to Mr Chair's decision posted on Sept 11th, email summary including the new polynomials should be available as input to next NR meeting (done in R1-1715738).**

[90-30]
Email discussion until the next meeting about eV2X evaluation methodology – Hanbyul (LGE)
**Done: A summary of the email thread is going to be submitted to the next meeting. See R1-1717293.**



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**Annex G: List of participants at RAN1 #90**

Please see excel file attached to this report



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**Annex H: TSG RAN WG1 meetings in 2017 – 2018**

| TITLE | TYPE | DATES | LOCATION | CTRY |
|---|---|---|---|---|
| 3GPPRAN1-NR3 | AH | 18 – 21 Sep 2017 | Nagoya | Japan |
| 3GPPRAN1#90bis | WG | 09 – 13 Oct 2017 | Prague | Rep Czech |
| 3GPPRAN1#91 | WG | 27 Nov – 01 Dec 2017 | Reno | US |
| 3GPPRAN1-AH-1801 | AH | 22 – 26 Jan 2018 | TBD | US |
| 3GPPRAN1#92 | WG | 26 Feb – 2 Mar 2018 | Athens | Greece |
| 3GPPRAN1#92bis | WG | 16 – 20 Apr 2018 | TBD | China |
| 3GPPRAN1#93 | WG | 21 – 25 May 2018 | TBD | Korea |
| 3GPPRAN1#94 | WG | 20 – 24 Aug 2018 | Gothenburg | Sweden |
| 3GPPRAN1#94bis | WG | 8 – 12 Oct 2018 | TBD | China |
| 3GPPRAN1#95 | WG | 12 – 16 Nov 2018 | TBD | US |

| MEETING TYPES | | |
|---|---|---|
| AH = Ad Hoc | ST = Startup Meeting | RG = Rapporteurs Group |
| JM = Joint | WG = Working Group | SG = Steering Group |
| PM = Preparatory Meeting | CM = Chairmen's meeting | TG = Task Group |
| RM = Resolution Meeting | OR = Ordinary | XO = Extraordinary |

*End of document*



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# Appendix 23

# www.3gpp.org / ftp / tsg_ran / WG1_RL1 / TSGR1_AH / NR_AH_1706 / Docs

| sort by name/desc | sort by date/desc | sort by size/desc |
|---|---|---|
| R1-1709880.zip | 2017/06/08 8:07 | 89,9 KB |
| R1-1709881.zip | 2017/06/22 14:16 | 870,4 KB |
| R1-1709882.zip | 2017/06/19 17:58 | 355,1 KB |
| R1-1709883.zip | 2017/06/19 17:58 | 965,8 KB |
| R1-1709884.zip | 2017/06/17 1:46 | 46,8 KB |
| R1-1709885.zip | 2017/06/17 1:47 | 362,9 KB |
| R1-1709886.zip | 2017/06/19 14:05 | 124,9 KB |
| R1-1709887.zip | 2017/06/17 1:47 | 56,4 KB |
| R1-1709888.zip | 2017/06/17 1:47 | 38,6 KB |
| R1-1709889.zip | 2017/06/19 14:06 | 230,7 KB |
| R1-1709890.zip | 2017/06/17 1:48 | 147,3 KB |
| R1-1709891.zip | 2017/06/17 1:48 | 136,4 KB |
| R1-1709892.zip | 2017/06/17 1:48 | 21 KB |
| R1-1709893.zip | 2017/06/17 1:48 | 279,1 KB |
| R1-1709894.zip | 2017/06/17 1:48 | 297,4 KB |
| R1-1709895.zip | 2017/06/17 1:49 | 263,5 KB |
| R1-1709896.zip | 2017/06/17 1:49 | 45,9 KB |
| R1-1709897.zip | 2017/06/17 1:49 | 83,4 KB |
| R1-1709898.zip | 2017/06/17 1:49 | 58,7 KB |
| R1-1709899.zip | 2017/06/17 1:50 | 51,7 KB |
| R1-1709900.zip | 2017/06/17 1:50 | 106,8 KB |
| R1-1709901.zip | 2017/06/15 15:47 | 880,3 KB |
| R1-1709902.zip | 2017/06/15 15:47 | 335,7 KB |
| R1-1709903.zip | 2017/06/15 19:14 | 22,3 KB |
| R1-1709904.zip | 2017/06/16 9:52 | 54,6 KB |
| R1-1709905.zip | 2017/06/16 9:52 | 91,6 KB |
| R1-1709906.zip | 2017/06/16 9:52 | 653,8 KB |

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| R1-1709912.zip | 2017/06/17 3:15 | 807,7 KB |
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| R1-1709926.zip | 2017/06/17 2:57 | 29,4 KB |
| R1-1709927.zip | 2017/06/17 2:57 | 287,3 KB |
| R1-1709928.zip | 2017/06/17 2:57 | 286,1 KB |
| R1-1709929.zip | 2017/06/17 2:57 | 579,1 KB |
| R1-1709930.zip | 2017/06/17 2:57 | 135,5 KB |
| R1-1709931.zip | 2017/06/17 2:57 | 200,3 KB |
| R1-1709932.zip | 2017/06/17 3:15 | 431,6 KB |
| R1-1709933.zip | 2017/06/17 2:57 | 55,8 KB |
| R1-1709934.zip | 2017/06/17 2:54 | 53,4 KB |
| R1-1709935.zip | 2017/06/17 2:54 | 346,4 KB |
| R1-1709936.zip | 2017/06/17 2:54 | 182,2 KB |
| R1-1709937.zip | 2017/06/17 3:15 | 109 KB |
| R1-1709938.zip | 2017/06/17 2:54 | 146,7 KB |
| R1-1709939.zip | 2017/06/17 2:54 | 202,1 KB |
| R1-1709940.zip | 2017/06/17 2:54 | 257,5 KB |

| sort by name/desc | sort by date/desc | sort by size/desc |
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| R1-1709945.zip | 2017/06/17 2:54 | 215,8 KB |
| R1-1709946.zip | 2017/06/17 2:54 | 58,2 KB |
| R1-1709947.zip | 2017/06/17 2:54 | 599,1 KB |
| R1-1709948.zip | 2017/06/17 3:15 | 156,3 KB |
| R1-1709949.zip | 2017/06/17 2:54 | 256,9 KB |
| R1-1709950.zip | 2017/06/17 2:50 | 949,3 KB |
| R1-1709951.zip | 2017/06/17 2:50 | 95,8 KB |
| R1-1709952.zip | 2017/06/17 2:50 | 485,9 KB |
| R1-1709953.zip | 2017/06/17 2:50 | 112,6 KB |
| R1-1709954.zip | 2017/06/17 2:50 | 112,9 KB |
| R1-1709955.zip | 2017/06/17 2:50 | 51,4 KB |
| R1-1709956.zip | 2017/06/17 2:50 | 197,6 KB |
| R1-1709957.zip | 2017/06/17 2:50 | 231,1 KB |
| R1-1709958.zip | 2017/06/17 2:50 | 152,7 KB |
| R1-1709959.zip | 2017/06/17 2:50 | 579,5 KB |
| R1-1709960.zip | 2017/06/17 2:50 | 90,2 KB |
| R1-1709961.zip | 2017/06/17 2:50 | 346,4 KB |
| R1-1709962.zip | 2017/06/17 2:50 | 433,6 KB |
| R1-1709963.zip | 2017/06/17 2:50 | 55,6 KB |
| R1-1709964.zip | 2017/06/17 2:54 | 45,3 KB |
| R1-1709965.zip | 2017/06/17 2:54 | 46,4 KB |
| R1-1709966.zip | 2017/06/17 2:54 | 88,9 KB |
| R1-1709967.zip | 2017/06/17 2:50 | 34,3 KB |
| R1-1709968.zip | 2017/06/17 2:50 | 46,7 KB |
| R1-1709969.zip | 2017/06/17 2:50 | 64,9 KB |
| R1-1709970.zip | 2017/06/17 2:50 | 44,9 KB |
| R1-1709971.zip | 2017/06/17 2:50 | 121,7 KB |
| R1-1709972.zip | 2017/06/17 2:50 | 355,9 KB |
| R1-1709973.zip | 2017/06/17 2:50 | 108,4 KB |
| R1-1709974.zip | 2017/06/17 2:50 | 83,5 KB |

| sort by name/desc | sort by date/desc | sort by size/desc |
|---|---|---|
| R1-1709975.zip | 2017/06/17 2:54 | 42,7 KB |
| R1-1709976.zip | 2017/06/17 2:54 | 49,3 KB |
| R1-1709977.zip | 2017/06/17 2:54 | 34,3 KB |
| R1-1709978.zip | 2017/06/17 2:50 | 188,9 KB |
| R1-1709979.zip | 2017/06/17 2:55 | 316 KB |
| R1-1709980.zip | 2017/06/17 2:55 | 1124,5 KB |
| R1-1709981.zip | 2017/06/17 2:55 | 194,7 KB |
| R1-1709982.zip | 2017/06/17 2:55 | 519,3 KB |
| R1-1709983.zip | 2017/06/17 2:54 | 77,7 KB |
| R1-1709984.zip | 2017/06/17 2:51 | 98,8 KB |
| R1-1709985.zip | 2017/06/17 2:51 | 144,3 KB |
| R1-1709986.zip | 2017/06/17 2:51 | 297,5 KB |
| R1-1709987.zip | 2017/06/17 2:51 | 325,3 KB |
| R1-1709988.zip | 2017/06/17 2:57 | 150,8 KB |
| R1-1709989.zip | 2017/06/17 2:51 | 104,9 KB |
| R1-1709990.zip | 2017/06/17 2:51 | 207,9 KB |
| R1-1709991.zip | 2017/06/17 2:57 | 63,8 KB |
| R1-1709992.zip | 2017/06/17 2:57 | 267,7 KB |
| R1-1709993.zip | 2017/06/17 2:51 | 102,6 KB |
| R1-1709994.zip | 2017/06/17 2:51 | 183,5 KB |
| R1-1709995.zip | 2017/06/20 5:16 | 129,9 KB |
| R1-1709996.zip | 2017/06/20 5:17 | 720,5 KB |
| R1-1709997.zip | 2017/06/20 5:17 | 940,2 KB |
| R1-1709998.zip | 2017/06/20 5:17 | 649,1 KB |
| R1-1709999.zip | 2017/06/20 5:17 | 255,7 KB |
| R1-1710000.zip | 2017/06/20 5:17 | 143,7 KB |
| R1-1710001.zip | 2017/06/20 5:17 | 253,3 KB |
| R1-1710002.zip | 2017/06/20 5:17 | 610,4 KB |
| R1-1710003.zip | 2017/06/20 5:17 | 149 KB |
| R1-1710004.zip | 2017/06/20 5:17 | 2525,9 KB |
| R1-1710005.zip | 2017/06/17 2:57 | 109,5 KB |
| R1-1710006.zip | 2017/06/19 23:09 | 1074,6 KB |
| R1-1710007.zip | 2017/06/17 2:51 | 1497,2 KB |
| R1-1710008.zip | 2017/06/17 2:51 | 392,3 KB |

| sort by name/desc | sort by date/desc | sort by size/desc |
|---|---|---|
| R1-1710009.zip | 2017/06/17 3:15 | 215,4 KB |
| R1-1710010.zip | 2017/06/17 2:56 | 57 KB |
| R1-1710011.zip | 2017/06/17 2:56 | 209,6 KB |
| R1-1710012.zip | 2017/06/17 2:56 | 75,9 KB |
| R1-1710013.zip | 2017/06/17 2:51 | 300,8 KB |
| R1-1710014.zip | 2017/06/17 5:55 | 289,5 KB |
| R1-1710015.zip | 2017/06/17 5:55 | 230,8 KB |
| R1-1710016.zip | 2017/06/17 5:55 | 198,2 KB |
| R1-1710017.zip | 2017/06/17 1:51 | 795,5 KB |
| R1-1710018.zip | 2017/06/17 1:51 | 154,5 KB |
| R1-1710019.zip | 2017/06/17 1:51 | 123,7 KB |
| R1-1710020.zip | 2017/06/17 1:51 | 98,9 KB |
| R1-1710021.zip | 2017/06/16 15:44 | 154 KB |
| R1-1710022.zip | 2017/06/17 3:05 | 86,8 KB |
| R1-1710023.zip | 2017/06/17 3:05 | 134,8 KB |
| R1-1710024.zip | 2017/06/17 3:05 | 81,3 KB |
| R1-1710025.zip | 2017/06/17 3:05 | 52,2 KB |
| R1-1710026.zip | 2017/06/17 3:05 | 49 KB |
| R1-1710027.zip | 2017/06/17 3:05 | 136 KB |
| R1-1710028.zip | 2017/06/17 3:05 | 119,8 KB |
| R1-1710029.zip | 2017/06/17 3:05 | 61,6 KB |
| R1-1710030.zip | 2017/06/17 3:05 | 56,9 KB |
| R1-1710031.zip | 2017/06/17 3:05 | 64,7 KB |
| R1-1710032.zip | 2017/06/17 3:05 | 91,9 KB |
| R1-1710033.zip | 2017/06/17 3:05 | 733,6 KB |
| R1-1710034.zip | 2017/06/17 3:05 | 103,3 KB |
| R1-1710035.zip | 2017/06/17 3:05 | 87,6 KB |
| R1-1710036.zip | 2017/06/17 3:05 | 201,8 KB |
| R1-1710037.zip | 2017/06/17 3:05 | 44,3 KB |
| R1-1710038.zip | 2017/06/17 3:05 | 106,3 KB |
| R1-1710039.zip | 2017/06/17 3:05 | 86,4 KB |
| R1-1710040.zip | 2017/06/17 3:05 | 53,7 KB |
| R1-1710041.zip | 2017/06/17 3:05 | 214,3 KB |
| R1-1710042.zip | 2017/06/17 3:05 | 80,2 KB |

| sort by name/desc | sort by date/desc | sort by size/desc |
|---|---|---|
| R1-1710043.zip | 2017/06/17 3:05 | 289,5 KB |
| R1-1710044.zip | 2017/06/19 7:36 | 88,1 KB |
| R1-1710045.zip | 2017/06/19 7:37 | 572 KB |
| R1-1710046.zip | 2017/06/19 7:37 | 151,5 KB |
| R1-1710047.zip | 2017/06/19 7:37 | 249,6 KB |
| R1-1710048.zip | 2017/06/19 7:38 | 977 KB |
| R1-1710049.zip | 2017/06/17 3:05 | 219,3 KB |
| R1-1710050.zip | 2017/06/17 3:05 | 342,1 KB |
| R1-1710051.zip | 2017/06/17 3:05 | 56,5 KB |
| R1-1710052.zip | 2017/06/17 3:05 | 48,8 KB |
| R1-1710053.zip | 2017/06/17 3:05 | 47,8 KB |
| R1-1710054.zip | 2017/06/17 3:05 | 32,6 KB |
| R1-1710055.zip | 2017/06/17 3:05 | 34,5 KB |
| R1-1710056.zip | 2017/06/17 3:05 | 56,7 KB |
| R1-1710057.zip | 2017/06/17 3:05 | 58,9 KB |
| R1-1710058.zip | 2017/06/17 3:05 | 29 KB |
| R1-1710059.zip | 2017/06/28 13:45 | 76,4 KB |
| R1-1710060.zip | 2017/06/17 3:05 | 57,1 KB |
| R1-1710061.zip | 2017/06/17 3:05 | 21,9 KB |
| R1-1710062.zip | 2017/06/17 3:05 | 52,5 KB |
| R1-1710063.zip | 2017/06/17 3:05 | 61,1 KB |
| R1-1710064.zip | 2017/06/17 3:05 | 87,1 KB |
| R1-1710065.zip | 2017/06/17 3:05 | 70,9 KB |
| R1-1710066.zip | 2017/06/17 3:05 | 149,1 KB |
| R1-1710067.zip | 2017/06/17 3:05 | 143,3 KB |
| R1-1710068.zip | 2017/06/17 3:05 | 125,6 KB |
| R1-1710069.zip | 2017/06/17 3:05 | 135 KB |
| R1-1710070.zip | 2017/06/17 3:05 | 65,2 KB |
| R1-1710071.zip | 2017/06/17 3:05 | 47,9 KB |
| R1-1710072.zip | 2017/06/17 3:05 | 28,1 KB |
| R1-1710073.zip | 2017/06/17 3:05 | 244,6 KB |
| R1-1710074.zip | 2017/06/17 3:05 | 148,5 KB |
| R1-1710075.zip | 2017/06/17 3:05 | 230,5 KB |
| R1-1710076.zip | 2017/06/17 3:05 | 33,3 KB |

| sort by name/desc | sort by date/desc | sort by size/desc |
|---|---|---|
| R1-1710077.zip | 2017/06/17 3:05 | 75,4 KB |
| R1-1710078.zip | 2017/06/17 3:05 | 215 KB |
| R1-1710079.zip | 2017/06/17 3:05 | 162,1 KB |
| R1-1710080.zip | 2017/06/17 3:05 | 46,7 KB |
| R1-1710081.zip | 2017/06/17 3:05 | 55,7 KB |
| R1-1710082.zip | 2017/06/17 3:05 | 59,9 KB |
| R1-1710083.zip | 2017/06/17 3:05 | 185,6 KB |
| R1-1710084.zip | 2017/06/17 3:05 | 431,2 KB |
| R1-1710085.zip | 2017/06/17 3:04 | 54,8 KB |
| R1-1710086.zip | 2017/06/17 3:04 | 53 KB |
| R1-1710087.zip | 2017/06/17 3:04 | 125,6 KB |
| R1-1710088.zip | 2017/06/17 3:04 | 54,9 KB |
| R1-1710089.zip | 2017/06/17 3:04 | 46,8 KB |
| R1-1710090.zip | 2017/06/17 3:04 | 49,8 KB |
| R1-1710091.zip | 2017/06/17 3:04 | 45,1 KB |
| R1-1710092.zip | 2017/06/17 3:05 | 50,6 KB |
| R1-1710093.zip | 2017/06/17 3:05 | 47,3 KB |
| R1-1710094.zip | 2017/06/17 3:05 | 69,5 KB |
| R1-1710095.zip | 2017/06/17 3:05 | 44,3 KB |
| R1-1710096.zip | 2017/06/17 3:05 | 61 KB |
| R1-1710097.zip | 2017/06/17 3:05 | 41,3 KB |
| R1-1710098.zip | 2017/06/17 3:05 | 41,6 KB |
| R1-1710099.zip | 2017/06/17 3:05 | 87,8 KB |
| R1-1710100.zip | 2017/06/17 3:05 | 44,3 KB |
| R1-1710101.zip | 2017/06/17 3:05 | 53,3 KB |
| R1-1710102.zip | 2017/06/17 3:05 | 45,5 KB |
| R1-1710103.zip | 2017/06/17 3:05 | 17,7 KB |
| R1-1710104.zip | 2017/06/17 1:52 | 614 KB |
| R1-1710105.zip | 2017/06/17 1:52 | 445,8 KB |
| R1-1710106.zip | 2017/06/17 1:52 | 43,7 KB |
| R1-1710107.zip | 2017/06/17 1:52 | 103,8 KB |
| R1-1710108.zip | 2017/06/17 1:53 | 198,7 KB |
| R1-1710109.zip | 2017/06/17 1:53 | 139,1 KB |
| R1-1710110.zip | 2017/06/17 1:53 | 111,8 KB |

| sort by name/desc | sort by date/desc | sort by size/desc |
|---|---|---|
| R1-1710111.zip | 2017/06/17 1:53 | 74,6 KB |
| R1-1710112.zip | 2017/06/17 1:54 | 327,8 KB |
| R1-1710113.zip | 2017/06/17 1:54 | 703,6 KB |
| R1-1710114.zip | 2017/06/17 1:54 | 57,9 KB |
| R1-1710115.zip | 2017/06/17 1:55 | 47,7 KB |
| R1-1710116.zip | 2017/06/17 1:56 | 37,7 KB |
| R1-1710117.zip | 2017/06/17 1:57 | 111,1 KB |
| R1-1710118.zip | 2017/06/17 1:57 | 107,7 KB |
| R1-1710119.zip | 2017/06/17 1:57 | 94,9 KB |
| R1-1710120.zip | 2017/06/17 1:57 | 114,8 KB |
| R1-1710121.zip | 2017/06/17 1:57 | 46,6 KB |
| R1-1710122.zip | 2017/06/17 1:58 | 96,7 KB |
| R1-1710123.zip | 2017/06/17 1:58 | 166,6 KB |
| R1-1710124.zip | 2017/06/17 1:58 | 40 KB |
| R1-1710125.zip | 2017/06/17 1:58 | 131,7 KB |
| R1-1710126.zip | 2017/06/17 1:58 | 145,3 KB |
| R1-1710127.zip | 2017/06/16 19:16 | 60,7 KB |
| R1-1710128.zip | 2017/06/16 19:16 | 94,8 KB |
| R1-1710129.zip | 2017/06/16 19:16 | 309,5 KB |
| R1-1710130.zip | 2017/06/16 19:16 | 283,9 KB |
| R1-1710131.zip | 2017/06/16 10:13 | 164 KB |
| R1-1710132.zip | 2017/06/16 10:13 | 20,6 KB |
| R1-1710133.zip | 2017/06/17 7:24 | 97 KB |
| R1-1710134.zip | 2017/06/16 10:13 | 16,4 KB |
| R1-1710135.zip | 2017/06/16 10:13 | 18,2 KB |
| R1-1710136.zip | 2017/06/16 10:13 | 20,1 KB |
| R1-1710137.zip | 2017/06/16 10:13 | 39,8 KB |
| R1-1710138.zip | 2017/06/16 10:13 | 50,4 KB |
| R1-1710139.zip | 2017/06/16 10:13 | 17,9 KB |
| R1-1710140.zip | 2017/06/16 10:13 | 22,3 KB |
| R1-1710141.zip | 2017/06/16 10:13 | 37,3 KB |
| R1-1710142.zip | 2017/06/16 10:13 | 167,5 KB |
| R1-1710143.zip | 2017/06/16 10:13 | 43 KB |
| R1-1710144.zip | 2017/06/16 10:13 | 77 KB |

| sort by name/desc | sort by date/desc | sort by size/desc |
|---|---|---|
| R1-1710145.zip | 2017/06/16 10:13 | 43,7 KB |
| R1-1710146.zip | 2017/06/16 10:13 | 129,6 KB |
| R1-1710147.zip | 2017/06/16 10:13 | 151,4 KB |
| R1-1710148.zip | 2017/06/16 10:13 | 29,6 KB |
| R1-1710149.zip | 2017/06/16 10:13 | 25,6 KB |
| R1-1710150.zip | 2017/06/16 10:13 | 32 KB |
| R1-1710151.zip | 2017/06/16 10:14 | 87,7 KB |
| R1-1710152.zip | 2017/06/16 10:14 | 385,7 KB |
| R1-1710153.zip | 2017/06/16 10:14 | 33,6 KB |
| R1-1710154.zip | 2017/06/16 10:14 | 30,3 KB |
| R1-1710155.zip | 2017/06/16 10:14 | 164,8 KB |
| R1-1710156.zip | 2017/06/16 10:14 | 143,5 KB |
| R1-1710157.zip | 2017/06/16 10:14 | 388,1 KB |
| R1-1710158.zip | 2017/06/16 10:14 | 161 KB |
| R1-1710159.zip | 2017/06/16 10:14 | 40,2 KB |
| R1-1710160.zip | 2017/06/16 10:15 | 110,2 KB |
| R1-1710161.zip | 2017/06/16 10:15 | 131,4 KB |
| R1-1710162.zip | 2017/06/16 10:15 | 46 KB |
| R1-1710163.zip | 2017/06/16 10:15 | 143,4 KB |
| R1-1710164.zip | 2017/06/16 10:15 | 89,3 KB |
| R1-1710165.zip | 2017/06/16 10:15 | 450,8 KB |
| R1-1710166.zip | 2017/06/16 10:15 | 16,4 KB |
| R1-1710167.zip | 2017/06/16 10:15 | 35,6 KB |
| R1-1710168.zip | 2017/06/16 10:15 | 44,6 KB |
| R1-1710169.zip | 2017/06/16 10:15 | 105,8 KB |
| R1-1710170.zip | 2017/06/16 10:15 | 125,4 KB |
| R1-1710171.zip | 2017/06/16 10:16 | 159,6 KB |
| R1-1710172.zip | 2017/06/16 10:16 | 18,7 KB |
| R1-1710173.zip | 2017/06/16 10:16 | 219,2 KB |
| R1-1710174.zip | 2017/06/16 10:16 | 20,8 KB |
| R1-1710175.zip | 2017/06/17 6:02 | 790,8 KB |
| R1-1710176.zip | 2017/06/17 6:02 | 150,2 KB |
| R1-1710177.zip | 2017/06/17 7:34 | 78,6 KB |
| R1-1710178.zip | 2017/06/17 7:59 | 251,3 KB |

| sort by name/desc | sort by date/desc | sort by size/desc |
|---|---|---|
| R1-1710179.zip | 2017/06/17 6:02 | 58,2 KB |
| R1-1710180.zip | 2017/06/17 6:02 | 282,2 KB |
| R1-1710181.zip | 2017/06/17 9:49 | 100,2 KB |
| R1-1710182.zip | 2017/06/17 6:02 | 88,8 KB |
| R1-1710183.zip | 2017/06/17 8:38 | 280,8 KB |
| R1-1710184.zip | 2017/06/17 6:02 | 305,7 KB |
| R1-1710185.zip | 2017/06/17 6:03 | 332,3 KB |
| R1-1710186.zip | 2017/06/17 6:03 | 418,8 KB |
| R1-1710187.zip | 2017/06/17 6:03 | 376,3 KB |
| R1-1710188.zip | 2017/06/17 6:03 | 79 KB |
| R1-1710189.zip | 2017/06/17 6:08 | 79,2 KB |
| R1-1710190.zip | 2017/06/17 6:22 | 107 KB |
| R1-1710191.zip | 2017/06/17 6:27 | 76,3 KB |
| R1-1710192.zip | 2017/06/17 6:34 | 79 KB |
| R1-1710193.zip | 2017/06/17 6:37 | 101,8 KB |
| R1-1710194.zip | 2017/06/17 9:31 | 207,1 KB |
| R1-1710195.zip | 2017/06/17 6:42 | 54,4 KB |
| R1-1710196.zip | 2017/06/17 6:45 | 151,6 KB |
| R1-1710197.zip | 2017/06/17 6:47 | 182,3 KB |
| R1-1710198.zip | 2017/06/17 6:50 | 300,8 KB |
| R1-1710199.zip | 2017/06/17 6:54 | 286,1 KB |
| R1-1710200.zip | 2017/06/17 6:56 | 146,2 KB |
| R1-1710201.zip | 2017/06/17 7:00 | 119,9 KB |
| R1-1710202.zip | 2017/06/17 8:48 | 193,7 KB |
| R1-1710206.zip | 2017/06/17 9:52 | 227,7 KB |
| R1-1710207.zip | 2017/06/17 9:52 | 587,4 KB |
| R1-1710208.zip | 2017/06/17 9:53 | 63,8 KB |
| R1-1710209.zip | 2017/06/17 7:03 | 88,4 KB |
| R1-1710210.zip | 2017/06/17 7:07 | 81,8 KB |
| R1-1710211.zip | 2017/06/12 7:18 | 11,8 KB |
| R1-1710212.zip | 2017/06/12 7:18 | 13,7 KB |
| R1-1710213.zip | 2017/06/12 7:18 | 11,4 KB |
| R1-1710214.zip | 2017/06/12 7:18 | 14,8 KB |
| R1-1710215.zip | 2017/06/12 7:18 | 11,7 KB |

| sort by name/desc | sort by date/desc | sort by size/desc |
|---|---|---|
| R1-1710216.zip | 2017/06/12 7:18 | 9,8 KB |
| R1-1710217.zip | 2017/06/12 7:18 | 12,4 KB |
| R1-1710218.zip | 2017/06/16 0:23 | 168,5 KB |
| R1-1710219.zip | 2017/06/16 0:23 | 69,4 KB |
| R1-1710220.zip | 2017/06/12 9:57 | 10,8 KB |
| R1-1710221.zip | 2017/06/12 9:57 | 11,1 KB |
| R1-1710222.zip | 2017/06/16 14:58 | 220,9 KB |
| R1-1710223.zip | 2017/06/16 9:52 | 157 KB |
| R1-1710224.zip | 2017/06/16 9:52 | 48,6 KB |
| R1-1710225.zip | 2017/06/16 9:52 | 123,2 KB |
| R1-1710226.zip | 2017/06/16 9:52 | 102,4 KB |
| R1-1710228.zip | 2017/06/16 9:17 | 55,3 KB |
| R1-1710229.zip | 2017/06/13 11:58 | 284,2 KB |
| R1-1710230.zip | 2017/06/16 14:58 | 217,8 KB |
| R1-1710231.zip | 2017/06/16 16:40 | 78,6 KB |
| R1-1710232.zip | 2017/06/16 16:40 | 83,6 KB |
| R1-1710233.zip | 2017/06/16 16:40 | 107 KB |
| R1-1710234.zip | 2017/06/16 16:40 | 172,7 KB |
| R1-1710235.zip | 2017/06/16 16:40 | 50 KB |
| R1-1710236.zip | 2017/06/16 16:40 | 49,9 KB |
| R1-1710237.zip | 2017/06/16 16:40 | 176,9 KB |
| R1-1710238.zip | 2017/06/16 16:40 | 55,1 KB |
| R1-1710239.zip | 2017/06/16 16:40 | 227 KB |
| R1-1710240.zip | 2017/06/16 16:40 | 31,2 KB |
| R1-1710241.zip | 2017/06/16 16:40 | 303,9 KB |
| R1-1710242.zip | 2017/06/16 16:40 | 215 KB |
| R1-1710243.zip | 2017/06/16 16:40 | 46,4 KB |
| R1-1710244.zip | 2017/06/17 5:46 | 306,2 KB |
| R1-1710245.zip | 2017/06/17 5:46 | 127,2 KB |
| R1-1710246.zip | 2017/06/17 5:46 | 81 KB |
| R1-1710247.zip | 2017/06/17 5:46 | 88,9 KB |
| R1-1710248.zip | 2017/06/17 5:46 | 34,8 KB |
| R1-1710249.zip | 2017/06/17 5:46 | 308,5 KB |
| R1-1710250.zip | 2017/06/17 5:46 | 65,8 KB |

| sort by name/desc | sort by date/desc | sort by size/desc |
|---|---|---|
| R1-1710251.zip | 2017/06/16 8:51 | 148,3 KB |
| R1-1710255.zip | 2017/06/16 8:51 | 40,5 KB |
| R1-1710256.zip | 2017/06/16 8:51 | 43,6 KB |
| R1-1710257.zip | 2017/06/16 8:51 | 217,7 KB |
| R1-1710258.zip | 2017/06/17 5:29 | 1825,1 KB |
| R1-1710259.zip | 2017/06/17 5:29 | 170,4 KB |
| R1-1710260.zip | 2017/06/17 5:29 | 91,5 KB |
| R1-1710261.zip | 2017/06/17 5:29 | 37,1 KB |
| R1-1710262.zip | 2017/06/17 5:29 | 78,9 KB |
| R1-1710263.zip | 2017/06/17 5:29 | 80,5 KB |
| R1-1710264.zip | 2017/06/17 5:29 | 123,8 KB |
| R1-1710265.zip | 2017/06/17 5:29 | 30,6 KB |
| R1-1710267.zip | 2017/06/17 5:29 | 56,9 KB |
| R1-1710268.zip | 2017/06/17 5:29 | 152,5 KB |
| R1-1710269.zip | 2017/06/17 5:29 | 206,9 KB |
| R1-1710270.zip | 2017/06/17 5:29 | 39,4 KB |
| R1-1710271.zip | 2017/06/17 5:29 | 45,5 KB |
| R1-1710272.zip | 2017/06/17 5:29 | 510 KB |
| R1-1710273.zip | 2017/06/17 5:29 | 41,8 KB |
| R1-1710274.zip | 2017/06/17 5:29 | 43 KB |
| R1-1710275.zip | 2017/06/17 5:29 | 63,2 KB |
| R1-1710276.zip | 2017/06/17 5:29 | 41,5 KB |
| R1-1710277.zip | 2017/06/17 5:30 | 61,1 KB |
| R1-1710278.zip | 2017/06/17 5:30 | 58,5 KB |
| R1-1710279.zip | 2017/06/17 5:30 | 40,8 KB |
| R1-1710280.zip | 2017/06/17 5:30 | 32,4 KB |
| R1-1710281.zip | 2017/06/17 5:30 | 73,4 KB |
| R1-1710282.zip | 2017/06/17 5:30 | 74,2 KB |
| R1-1710283.zip | 2017/06/17 5:30 | 137 KB |
| R1-1710284.zip | 2017/06/17 5:30 | 49,5 KB |
| R1-1710285.zip | 2017/06/17 5:30 | 34,6 KB |
| R1-1710286.zip | 2017/06/17 5:30 | 29,7 KB |
| R1-1710287.zip | 2017/06/17 5:30 | 108,1 KB |
| R1-1710288.zip | 2017/06/17 5:30 | 63,6 KB |

| sort by name/desc | sort by date/desc | sort by size/desc |
|---|---|---|
| R1-1710289.zip | 2017/06/17 5:30 | 59,3 KB |
| R1-1710290.zip | 2017/06/17 5:30 | 94,2 KB |
| R1-1710291.zip | 2017/06/17 5:31 | 532,8 KB |
| R1-1710292.zip | 2017/06/17 5:31 | 95,6 KB |
| R1-1710293.zip | 2017/06/17 5:31 | 161,6 KB |
| R1-1710294.zip | 2017/06/17 5:31 | 64,2 KB |
| R1-1710295.zip | 2017/06/17 5:31 | 33,3 KB |
| R1-1710296.zip | 2017/06/17 5:31 | 232,4 KB |
| R1-1710297.zip | 2017/06/17 5:31 | 223 KB |
| R1-1710298.zip | 2017/06/17 5:31 | 298,6 KB |
| R1-1710299.zip | 2017/06/17 5:31 | 179,2 KB |
| R1-1710300.zip | 2017/06/17 5:31 | 82,6 KB |
| R1-1710301.zip | 2017/06/17 5:32 | 55,5 KB |
| R1-1710302.zip | 2017/06/17 5:32 | 41,2 KB |
| R1-1710303.zip | 2017/06/17 5:32 | 101,6 KB |
| R1-1710304.zip | 2017/06/17 5:32 | 89,5 KB |
| R1-1710305.zip | 2017/06/17 5:32 | 120,7 KB |
| R1-1710306.zip | 2017/06/17 5:32 | 793,1 KB |
| R1-1710307.zip | 2017/06/17 5:32 | 51,8 KB |
| R1-1710308.zip | 2017/06/17 5:32 | 64,5 KB |
| R1-1710309.zip | 2017/06/17 5:32 | 94,7 KB |
| R1-1710310.zip | 2017/06/17 5:32 | 108,8 KB |
| R1-1710311.zip | 2017/06/17 5:32 | 34,2 KB |
| R1-1710312.zip | 2017/06/17 5:32 | 66,5 KB |
| R1-1710313.zip | 2017/06/17 5:32 | 635,8 KB |
| R1-1710314.zip | 2017/06/17 5:32 | 45,3 KB |
| R1-1710315.zip | 2017/06/17 5:32 | 107,9 KB |
| R1-1710316.zip | 2017/06/17 5:32 | 126,8 KB |
| R1-1710317.zip | 2017/06/17 5:32 | 72 KB |
| R1-1710318.zip | 2017/06/17 5:32 | 30,8 KB |
| R1-1710319.zip | 2017/06/17 5:32 | 79,2 KB |
| R1-1710320.zip | 2017/06/17 5:32 | 39,1 KB |
| R1-1710321.zip | 2017/06/17 5:44 | 109,6 KB |
| R1-1710322.zip | 2017/06/17 5:44 | 51,3 KB |

| sort by name/desc | sort by date/desc | sort by size/desc |
|---|---|---|
| R1-1710323.zip | 2017/06/17 5:44 | 194,3 KB |
| R1-1710324.zip | 2017/06/17 5:44 | 62,4 KB |
| R1-1710325.zip | 2017/06/17 5:44 | 37,3 KB |
| R1-1710326.zip | 2017/06/17 5:44 | 51,2 KB |
| R1-1710327.zip | 2017/06/17 5:44 | 54,6 KB |
| R1-1710328.zip | 2017/06/27 15:17 | 150,7 KB |
| R1-1710329.zip | 2017/06/17 5:44 | 38,2 KB |
| R1-1710330.zip | 2017/06/17 5:44 | 89,5 KB |
| R1-1710331.zip | 2017/06/17 5:44 | 79,6 KB |
| R1-1710332.zip | 2017/06/17 5:44 | 79,7 KB |
| R1-1710333.zip | 2017/06/17 5:44 | 61,3 KB |
| R1-1710334.zip | 2017/06/17 5:44 | 41,2 KB |
| R1-1710335.zip | 2017/06/17 5:44 | 40 KB |
| R1-1710336.zip | 2017/06/17 5:44 | 67,3 KB |
| R1-1710337.zip | 2017/06/17 5:44 | 50 KB |
| R1-1710338.zip | 2017/06/17 5:44 | 49,4 KB |
| R1-1710339.zip | 2017/06/17 5:44 | 340,8 KB |
| R1-1710340.zip | 2017/06/17 5:44 | 63,8 KB |
| R1-1710341.zip | 2017/06/20 5:33 | 88,6 KB |
| R1-1710342.zip | 2017/06/20 5:33 | 228,6 KB |
| R1-1710343.zip | 2017/06/20 5:33 | 195 KB |
| R1-1710344.zip | 2017/06/20 5:33 | 108,8 KB |
| R1-1710345.zip | 2017/06/27 15:17 | 79,5 KB |
| R1-1710346.zip | 2017/06/20 5:33 | 95,1 KB |
| R1-1710347.zip | 2017/06/20 5:34 | 985,1 KB |
| R1-1710348.zip | 2017/06/20 5:34 | 390,6 KB |
| R1-1710349.zip | 2017/06/20 5:34 | 68,8 KB |
| R1-1710350.zip | 2017/06/17 5:45 | 81 KB |
| R1-1710351.zip | 2017/06/17 5:45 | 62,1 KB |
| R1-1710352.zip | 2017/06/17 5:45 | 124,3 KB |
| R1-1710353.zip | 2017/06/17 5:45 | 61,1 KB |
| R1-1710354.zip | 2017/06/17 5:45 | 67,2 KB |
| R1-1710355.zip | 2017/06/17 5:45 | 78,9 KB |
| R1-1710356.zip | 2017/06/17 5:45 | 68,6 KB |

| sort by name/desc | sort by date/desc | sort by size/desc |
|---|---|---|
| R1-1710357.zip | 2017/06/17 5:45 | 70,2 KB |
| R1-1710358.zip | 2017/06/17 5:45 | 74,8 KB |
| R1-1710359.zip | 2017/06/16 8:17 | 142,6 KB |
| R1-1710360.zip | 2017/06/16 10:30 | 105,5 KB |
| R1-1710361.zip | 2017/06/16 10:30 | 72,2 KB |
| R1-1710362.zip | 2017/06/16 10:30 | 76,6 KB |
| R1-1710363.zip | 2017/06/16 10:30 | 85,7 KB |
| R1-1710364.zip | 2017/06/16 10:30 | 72,7 KB |
| R1-1710365.zip | 2017/06/16 10:30 | 706,8 KB |
| R1-1710366.zip | 2017/06/16 10:30 | 56,5 KB |
| R1-1710367.zip | 2017/06/16 10:30 | 667,6 KB |
| R1-1710368.zip | 2017/06/16 10:30 | 80,5 KB |
| R1-1710369.zip | 2017/06/16 10:30 | 202,9 KB |
| R1-1710370.zip | 2017/06/19 14:13 | 68,4 KB |
| R1-1710371.zip | 2017/06/16 10:30 | 67,5 KB |
| R1-1710372.zip | 2017/06/17 6:42 | 85,8 KB |
| R1-1710373.zip | 2017/06/20 5:37 | 361,4 KB |
| R1-1710374.zip | 2017/06/17 6:42 | 75,7 KB |
| R1-1710375.zip | 2017/06/17 6:42 | 38,7 KB |
| R1-1710376.zip | 2017/06/20 5:37 | 114,2 KB |
| R1-1710378.zip | 2017/06/17 6:42 | 1039,5 KB |
| R1-1710379.zip | 2017/06/17 6:42 | 114 KB |
| R1-1710380.zip | 2017/06/17 6:42 | 85,2 KB |
| R1-1710381.zip | 2017/06/17 6:42 | 58,8 KB |
| R1-1710382.zip | 2017/06/17 6:42 | 203,4 KB |
| R1-1710383.zip | 2017/06/17 6:42 | 135,5 KB |
| R1-1710384.zip | 2017/06/17 6:42 | 1073,2 KB |
| R1-1710385.zip | 2017/06/17 6:42 | 340,5 KB |
| R1-1710386.zip | 2017/06/17 6:56 | 80,9 KB |
| R1-1710387.zip | 2017/06/17 6:56 | 106,9 KB |
| R1-1710389.zip | 2017/06/17 6:42 | 103,9 KB |
| R1-1710390.zip | 2017/06/17 6:42 | 82,7 KB |
| R1-1710391.zip | 2017/06/17 6:42 | 67,3 KB |
| R1-1710392.zip | 2017/06/17 6:42 | 100,7 KB |

| sort by name/desc | sort by date/desc | sort by size/desc |
|---|---|---|
| R1-1710393.zip | 2017/06/17 6:42 | 49,3 KB |
| R1-1710394.zip | 2017/06/17 6:42 | 64,4 KB |
| R1-1710395.zip | 2017/06/17 6:42 | 72,1 KB |
| R1-1710396.zip | 2017/06/17 6:42 | 131,9 KB |
| R1-1710397.zip | 2017/06/17 6:42 | 76,9 KB |
| R1-1710398.zip | 2017/06/17 6:42 | 148,5 KB |
| R1-1710399.zip | 2017/06/17 6:42 | 118,3 KB |
| R1-1710400.zip | 2017/06/17 6:42 | 255,5 KB |
| R1-1710401.zip | 2017/06/17 6:43 | 685,7 KB |
| R1-1710402.zip | 2017/06/17 6:43 | 2421,2 KB |
| R1-1710403.zip | 2017/06/17 6:43 | 365,4 KB |
| R1-1710404.zip | 2017/06/17 6:43 | 436,1 KB |
| R1-1710405.zip | 2017/06/17 6:43 | 201,8 KB |
| R1-1710406.zip | 2017/06/17 6:43 | 763,3 KB |
| R1-1710407.zip | 2017/06/17 6:43 | 93,4 KB |
| R1-1710408.zip | 2017/06/16 14:58 | 139,3 KB |
| R1-1710409.zip | 2017/06/16 9:52 | 140,4 KB |
| R1-1710410.zip | 2017/06/16 9:52 | 46,8 KB |
| R1-1710411.zip | 2017/06/16 9:52 | 85 KB |
| R1-1710412.zip | 2017/06/17 3:17 | 78,4 KB |
| R1-1710413.zip | 2017/06/17 3:17 | 18,5 KB |
| R1-1710414.zip | 2017/06/17 3:17 | 31 KB |
| R1-1710415.zip | 2017/06/17 3:17 | 371,3 KB |
| R1-1710416.zip | 2017/06/17 3:17 | 55 KB |
| R1-1710417.zip | 2017/06/17 3:17 | 26,7 KB |
| R1-1710418.zip | 2017/06/17 3:17 | 35,9 KB |
| R1-1710419.zip | 2017/06/17 3:17 | 17,7 KB |
| R1-1710420.zip | 2017/06/17 3:17 | 18,2 KB |
| R1-1710421.zip | 2017/06/17 3:17 | 18,7 KB |
| R1-1710422.zip | 2017/06/17 3:17 | 94,8 KB |
| R1-1710423.zip | 2017/06/17 3:17 | 18,2 KB |
| R1-1710424.zip | 2017/06/17 3:17 | 14,4 KB |
| R1-1710425.zip | 2017/06/17 3:17 | 379,2 KB |
| R1-1710426.zip | 2017/06/17 3:17 | 116,4 KB |

| sort by name/desc | sort by date/desc | sort by size/desc |
|---|---|---|
| R1-1710427.zip | 2017/06/17 3:17 | 24,4 KB |
| R1-1710428.zip | 2017/06/17 3:17 | 84,8 KB |
| R1-1710429.zip | 2017/06/17 3:17 | 27,9 KB |
| R1-1710430.zip | 2017/06/17 3:17 | 24,4 KB |
| R1-1710431.zip | 2017/06/17 3:17 | 287,8 KB |
| R1-1710432.zip | 2017/06/17 3:17 | 25,9 KB |
| R1-1710433.zip | 2017/06/17 3:17 | 38,7 KB |
| R1-1710434.zip | 2017/06/17 3:17 | 41,9 KB |
| R1-1710435.zip | 2017/06/17 3:17 | 99 KB |
| R1-1710436.zip | 2017/06/17 3:17 | 24,5 KB |
| R1-1710437.zip | 2017/06/17 3:17 | 81,5 KB |
| R1-1710438.zip | 2017/06/17 3:17 | 47,5 KB |
| R1-1710439.zip | 2017/06/17 3:17 | 25,8 KB |
| R1-1710440.zip | 2017/06/17 3:17 | 24,1 KB |
| R1-1710442.zip | 2017/06/17 3:17 | 26,6 KB |
| R1-1710443.zip | 2017/06/17 3:17 | 27,3 KB |
| R1-1710444.zip | 2017/06/17 3:17 | 63,7 KB |
| R1-1710445.zip | 2017/06/17 2:51 | 65 KB |
| R1-1710446.zip | 2017/06/17 2:57 | 378,4 KB |
| R1-1710447.zip | 2017/06/17 2:57 | 412,7 KB |
| R1-1710448.zip | 2017/06/17 2:57 | 190,7 KB |
| R1-1710449.zip | 2017/06/17 2:57 | 179,1 KB |
| R1-1710450.zip | 2017/06/17 2:57 | 70,6 KB |
| R1-1710451.zip | 2017/06/17 2:57 | 866,3 KB |
| R1-1710452.zip | 2017/06/17 2:57 | 100,8 KB |
| R1-1710453.zip | 2017/06/17 2:57 | 153,4 KB |
| R1-1710454.zip | 2017/06/17 2:57 | 83,5 KB |
| R1-1710455.zip | 2017/06/17 2:56 | 75,3 KB |
| R1-1710456.zip | 2017/06/17 2:56 | 48,6 KB |
| R1-1710457.zip | 2017/06/17 2:56 | 77,2 KB |
| R1-1710458.zip | 2017/06/17 2:56 | 32,3 KB |
| R1-1710459.zip | 2017/06/17 2:56 | 420,1 KB |
| R1-1710460.zip | 2017/06/17 2:56 | 358,9 KB |
| R1-1710461.zip | 2017/06/17 2:56 | 76,2 KB |

| sort by name/desc | sort by date/desc | sort by size/desc |
|---|---|---|
| R1-1710462.zip | 2017/06/17 2:56 | 34,5 KB |
| R1-1710463.zip | 2017/06/17 2:56 | 412,6 KB |
| R1-1710464.zip | 2017/06/17 2:56 | 71,1 KB |
| R1-1710465.zip | 2017/06/17 2:51 | 142,5 KB |
| R1-1710466.zip | 2017/06/17 2:57 | 437,9 KB |
| R1-1710467.zip | 2017/06/17 2:57 | 140,8 KB |
| R1-1710468.zip | 2017/06/17 2:57 | 163,6 KB |
| R1-1710469.zip | 2017/06/17 2:57 | 130,7 KB |
| R1-1710470.zip | 2017/06/20 5:17 | 466,1 KB |
| R1-1710471.zip | 2017/06/20 5:17 | 175,4 KB |
| R1-1710472.zip | 2017/06/20 5:17 | 295,5 KB |
| R1-1710473.zip | 2017/06/17 2:57 | 190,1 KB |
| R1-1710474.zip | 2017/06/17 2:57 | 339,8 KB |
| R1-1710475.zip | 2017/06/17 2:56 | 581,1 KB |
| R1-1710476.zip | 2017/06/17 2:56 | 106,2 KB |
| R1-1710477.zip | 2017/06/17 2:51 | 76,3 KB |
| R1-1710478.zip | 2017/06/17 2:51 | 97,2 KB |
| R1-1710479.zip | 2017/06/20 5:17 | 186,5 KB |
| R1-1710480.zip | 2017/06/20 7:05 | 72,5 KB |
| R1-1710481.zip | 2017/06/20 7:05 | 122 KB |
| R1-1710482.zip | 2017/06/20 7:05 | 78,4 KB |
| R1-1710483.zip | 2017/06/20 7:05 | 71,7 KB |
| R1-1710484.zip | 2017/06/20 7:05 | 86,3 KB |
| R1-1710485.zip | 2017/06/20 7:05 | 203,3 KB |
| R1-1710486.zip | 2017/06/20 7:05 | 76,4 KB |
| R1-1710487.zip | 2017/06/27 15:17 | 99,5 KB |
| R1-1710488.zip | 2017/06/27 15:17 | 84,3 KB |
| R1-1710489.zip | 2017/06/20 7:05 | 83,2 KB |
| R1-1710490.zip | 2017/06/20 7:05 | 1929,8 KB |
| R1-1710491.zip | 2017/06/20 7:05 | 1387,2 KB |
| R1-1710493.zip | 2017/06/20 7:05 | 419,6 KB |
| R1-1710494.zip | 2017/06/20 7:05 | 295,5 KB |
| R1-1710495.zip | 2017/06/20 7:05 | 355,9 KB |
| R1-1710496.zip | 2017/06/20 7:05 | 2079,6 KB |

| sort by name/desc | sort by date/desc | sort by size/desc |
|---|---|---|
| R1-1710497.zip | 2017/06/20 7:05 | 140,3 KB |
| R1-1710498.zip | 2017/06/20 7:05 | 1277 KB |
| R1-1710499.zip | 2017/06/20 7:05 | 209 KB |
| R1-1710500.zip | 2017/06/17 6:15 | 13,5 KB |
| R1-1710501.zip | 2017/06/17 6:15 | 121,3 KB |
| R1-1710502.zip | 2017/06/17 6:15 | 238,5 KB |
| R1-1710503.zip | 2017/06/20 4:44 | 100,6 KB |
| R1-1710504.zip | 2017/06/17 10:18 | 64 KB |
| R1-1710505.zip | 2017/06/17 6:14 | 84,9 KB |
| R1-1710506.zip | 2017/06/20 4:44 | 340,9 KB |
| R1-1710507.zip | 2017/06/17 8:09 | 72,3 KB |
| R1-1710508.zip | 2017/06/17 6:14 | 86,7 KB |
| R1-1710509.zip | 2017/06/17 6:14 | 104 KB |
| R1-1710510.zip | 2017/06/17 6:14 | 86,7 KB |
| R1-1710511.zip | 2017/06/27 15:17 | 690,2 KB |
| R1-1710512.zip | 2017/06/17 6:14 | 98,9 KB |
| R1-1710513.zip | 2017/06/17 6:14 | 99,9 KB |
| R1-1710514.zip | 2017/06/17 7:10 | 66,9 KB |
| R1-1710515.zip | 2017/06/17 7:10 | 87,1 KB |
| R1-1710516.zip | 2017/06/17 6:14 | 65,1 KB |
| R1-1710517.zip | 2017/06/17 6:14 | 207,4 KB |
| R1-1710518.zip | 2017/06/17 6:14 | 94,5 KB |
| R1-1710519.zip | 2017/06/17 6:14 | 100,1 KB |
| R1-1710520.zip | 2017/06/17 6:14 | 93,5 KB |
| R1-1710521.zip | 2017/06/17 6:14 | 229 KB |
| R1-1710522.zip | 2017/06/17 6:14 | 104,9 KB |
| R1-1710523.zip | 2017/06/17 6:14 | 43,9 KB |
| R1-1710524.zip | 2017/06/17 6:14 | 42 KB |
| R1-1710525.zip | 2017/06/17 6:14 | 351,8 KB |
| R1-1710526.zip | 2017/06/17 6:14 | 348,2 KB |
| R1-1710527.zip | 2017/06/17 6:14 | 154,1 KB |
| R1-1710528.zip | 2017/06/17 6:14 | 120,9 KB |
| R1-1710529.zip | 2017/06/17 6:14 | 76,2 KB |
| R1-1710530.zip | 2017/06/17 6:14 | 424,3 KB |

| sort by name/desc | sort by date/desc | sort by size/desc |
|---|---|---|
| R1-1710531.zip | 2017/06/17 6:14 | 43 KB |
| R1-1710532.zip | 2017/06/17 6:14 | 122,9 KB |
| R1-1710533.zip | 2017/06/17 6:14 | 83,8 KB |
| R1-1710534.zip | 2017/06/17 6:14 | 102,7 KB |
| R1-1710535.zip | 2017/06/17 6:14 | 142,9 KB |
| R1-1710536.zip | 2017/06/17 6:14 | 195,3 KB |
| R1-1710537.zip | 2017/06/17 6:14 | 72,7 KB |
| R1-1710538.zip | 2017/06/17 6:14 | 88,7 KB |
| R1-1710539.zip | 2017/06/17 6:14 | 46,2 KB |
| R1-1710540.zip | 2017/06/17 6:14 | 117,3 KB |
| R1-1710541.zip | 2017/06/17 8:50 | 463,2 KB |
| R1-1710542.zip | 2017/06/17 6:14 | 230,8 KB |
| R1-1710543.zip | 2017/06/17 6:15 | 83 KB |
| R1-1710544.zip | 2017/06/17 6:15 | 374,1 KB |
| R1-1710545.zip | 2017/06/17 6:15 | 141 KB |
| R1-1710546.zip | 2017/06/17 6:15 | 142,6 KB |
| R1-1710547.zip | 2017/06/17 6:24 | 70,4 KB |
| R1-1710548.zip | 2017/06/17 6:24 | 124,2 KB |
| R1-1710549.zip | 2017/06/17 6:24 | 57,2 KB |
| R1-1710550.zip | 2017/06/17 6:15 | 58 KB |
| R1-1710551.zip | 2017/06/17 6:15 | 735,2 KB |
| R1-1710552.zip | 2017/06/17 6:15 | 88,6 KB |
| R1-1710553.zip | 2017/06/17 6:15 | 410,4 KB |
| R1-1710554.zip | 2017/06/17 6:15 | 61,5 KB |
| R1-1710555.zip | 2017/06/17 9:30 | 159,3 KB |
| R1-1710556.zip | 2017/06/17 6:15 | 105,2 KB |
| R1-1710557.zip | 2017/06/17 6:15 | 109,2 KB |
| R1-1710558.zip | 2017/06/17 6:15 | 81,1 KB |
| R1-1710559.zip | 2017/06/17 6:15 | 103,9 KB |
| R1-1710560.zip | 2017/06/17 6:15 | 192,4 KB |
| R1-1710561.zip | 2017/06/17 6:15 | 65,2 KB |
| R1-1710562.zip | 2017/06/17 6:15 | 116 KB |
| R1-1710563.zip | 2017/06/17 6:15 | 122 KB |
| R1-1710564.zip | 2017/06/17 6:15 | 284,2 KB |

| sort by name/desc | sort by date/desc | sort by size/desc |
|---|---|---|
| R1-1710565.zip | 2017/06/17 9:35 | 67,6 KB |
| R1-1710566.zip | 2017/06/17 6:24 | 58,7 KB |
| R1-1710567.zip | 2017/06/17 6:15 | 121,2 KB |
| R1-1710568.zip | 2017/06/17 6:15 | 126,1 KB |
| R1-1710569.zip | 2017/06/17 6:24 | 55,5 KB |
| R1-1710570.zip | 2017/06/17 6:15 | 114,3 KB |
| R1-1710571.zip | 2017/06/17 6:15 | 279,4 KB |
| R1-1710572.zip | 2017/06/17 6:15 | 114,4 KB |
| R1-1710573.zip | 2017/06/17 6:15 | 16,2 KB |
| R1-1710574.zip | 2017/06/17 6:15 | 23,7 KB |
| R1-1710575.zip | 2017/06/17 6:15 | 392,6 KB |
| R1-1710576.zip | 2017/06/17 6:15 | 460,5 KB |
| R1-1710577.zip | 2017/06/17 6:15 | 166 KB |
| R1-1710578.zip | 2017/06/17 6:24 | 203,6 KB |
| R1-1710579.zip | 2017/06/17 7:00 | 54,5 KB |
| R1-1710580.zip | 2017/06/17 6:24 | 72,2 KB |
| R1-1710581.zip | 2017/06/17 6:15 | 256,2 KB |
| R1-1710582.zip | 2017/06/17 6:15 | 201,9 KB |
| R1-1710583.zip | 2017/06/17 6:15 | 89,3 KB |
| R1-1710584.zip | 2017/06/17 6:15 | 66,6 KB |
| R1-1710585.zip | 2017/06/17 6:24 | 111,1 KB |
| R1-1710586.zip | 2017/06/17 6:15 | 144,4 KB |
| R1-1710587.zip | 2017/06/20 3:41 | 369,5 KB |
| R1-1710588.zip | 2017/06/16 22:04 | 96,2 KB |
| R1-1710589.zip | 2017/06/16 22:22 | 32,8 KB |
| R1-1710590.zip | 2017/06/16 22:36 | 32,8 KB |
| R1-1710591.zip | 2017/06/20 3:42 | 415,3 KB |
| R1-1710592.zip | 2017/06/16 21:25 | 35 KB |
| R1-1710593.zip | 2017/06/16 10:16 | 91,9 KB |
| R1-1710594.zip | 2017/06/16 18:49 | 167,1 KB |
| R1-1710595.zip | 2017/06/16 18:49 | 66 KB |
| R1-1710596.zip | 2017/06/16 18:49 | 67,5 KB |
| R1-1710597.zip | 2017/06/16 18:49 | 88,6 KB |
| R1-1710598.zip | 2017/06/16 18:49 | 161,5 KB |

| sort by name/desc | sort by date/desc | sort by size/desc |
|---|---|---|
| R1-1710599.zip | 2017/06/16 18:49 | 171,5 KB |
| R1-1710600.zip | 2017/06/16 18:49 | 88,2 KB |
| R1-1710601.zip | 2017/06/16 18:49 | 43,4 KB |
| R1-1710602.zip | 2017/06/16 18:49 | 348,6 KB |
| R1-1710603.zip | 2017/06/16 18:49 | 121,1 KB |
| R1-1710604.zip | 2017/06/16 18:49 | 126,1 KB |
| R1-1710605.zip | 2017/06/16 18:49 | 64,2 KB |
| R1-1710606.zip | 2017/06/16 18:49 | 91 KB |
| R1-1710607.zip | 2017/06/17 6:15 | 44,9 KB |
| R1-1710608.zip | 2017/06/17 2:51 | 61,1 KB |
| R1-1710609.zip | 2017/06/17 2:51 | 88,7 KB |
| R1-1710610.zip | 2017/06/17 2:51 | 127,7 KB |
| R1-1710611.zip | 2017/06/17 2:51 | 136,8 KB |
| R1-1710612.zip | 2017/06/17 2:51 | 261,8 KB |
| R1-1710613.zip | 2017/06/17 2:51 | 79,5 KB |
| R1-1710614.zip | 2017/06/17 2:51 | 192 KB |
| R1-1710615.zip | 2017/06/17 2:51 | 240,7 KB |
| R1-1710616.zip | 2017/06/17 2:51 | 69,9 KB |
| R1-1710617.zip | 2017/06/17 2:51 | 82,7 KB |
| R1-1710618.zip | 2017/06/17 2:52 | 327,3 KB |
| R1-1710619.zip | 2017/06/17 2:52 | 79,9 KB |
| R1-1710620.zip | 2017/06/17 2:52 | 22,4 KB |
| R1-1710621.zip | 2017/06/17 2:52 | 239,2 KB |
| R1-1710622.zip | 2017/06/17 2:52 | 43,9 KB |
| R1-1710623.zip | 2017/06/16 20:00 | 269,4 KB |
| R1-1710624.zip | 2017/06/17 1:00 | 306,9 KB |
| R1-1710625.zip | 2017/06/20 4:47 | 110,8 KB |
| R1-1710626.zip | 2017/06/16 16:24 | 165,8 KB |
| R1-1710627.zip | 2017/06/16 21:00 | 50,3 KB |
| R1-1710628.zip | 2017/06/20 4:50 | 176,7 KB |
| R1-1710629.zip | 2017/06/16 20:00 | 100,7 KB |
| R1-1710630.zip | 2017/06/16 12:28 | 127,7 KB |
| R1-1710631.zip | 2017/06/16 12:28 | 121,3 KB |
| R1-1710632.zip | 2017/06/17 0:42 | 98,2 KB |

| sort by name/desc | sort by date/desc | sort by size/desc |
|---|---|---|
| R1-1710633.zip | 2017/06/16 7:57 | 467,3 KB |
| R1-1710634.zip | 2017/06/16 10:50 | 63,1 KB |
| R1-1710635.zip | 2017/06/16 10:50 | 49,7 KB |
| R1-1710636.zip | 2017/06/16 10:50 | 438,9 KB |
| R1-1710637.zip | 2017/06/16 19:58 | 36,2 KB |
| R1-1710638.zip | 2017/06/16 19:58 | 107,2 KB |
| R1-1710639.zip | 2017/06/16 19:58 | 42,2 KB |
| R1-1710640.zip | 2017/06/17 1:49 | 57,9 KB |
| R1-1710641.zip | 2017/06/16 10:50 | 263,4 KB |
| R1-1710642.zip | 2017/06/16 21:22 | 205 KB |
| R1-1710643.zip | 2017/06/16 20:15 | 208,7 KB |
| R1-1710644.zip | 2017/06/16 21:22 | 216,2 KB |
| R1-1710645.zip | 2017/06/16 6:57 | 124,2 KB |
| R1-1710646.zip | 2017/06/16 6:57 | 154 KB |
| R1-1710647.zip | 2017/06/16 7:43 | 304,4 KB |
| R1-1710648.zip | 2017/06/16 7:43 | 1103,3 KB |
| R1-1710649.zip | 2017/06/16 19:59 | 37,9 KB |
| R1-1710650.zip | 2017/06/16 6:57 | 29,3 KB |
| R1-1710651.zip | 2017/06/16 19:15 | 149,7 KB |
| R1-1710652.zip | 2017/06/16 23:44 | 147,3 KB |
| R1-1710653.zip | 2017/06/16 21:31 | 47,2 KB |
| R1-1710654.zip | 2017/06/16 22:13 | 130,3 KB |
| R1-1710655.zip | 2017/06/17 1:50 | 210,5 KB |
| R1-1710656.zip | 2017/06/16 21:31 | 41,2 KB |
| R1-1710657.zip | 2017/06/16 21:31 | 1081,8 KB |
| R1-1710658.zip | 2017/06/16 21:31 | 724,5 KB |
| R1-1710659.zip | 2017/06/16 21:31 | 101,1 KB |
| R1-1710660.zip | 2017/06/16 6:57 | 74,7 KB |
| R1-1710661.zip | 2017/06/16 22:13 | 38,9 KB |
| R1-1710662.zip | 2017/06/16 22:13 | 38,2 KB |
| R1-1710663.zip | 2017/06/16 22:13 | 128,3 KB |
| R1-1710664.zip | 2017/06/16 22:13 | 87,1 KB |
| R1-1710665.zip | 2017/06/16 23:44 | 50,5 KB |
| R1-1710666.zip | 2017/06/16 0:17 | 270,1 KB |

| sort by name/desc | sort by date/desc | sort by size/desc |
|---|---|---|
| R1-1710667.zip | 2017/06/16 21:22 | 52,2 KB |
| R1-1710668.zip | 2017/06/16 6:57 | 56,9 KB |
| R1-1710669.zip | 2017/06/16 21:22 | 50 KB |
| R1-1710670.zip | 2017/06/16 20:15 | 148,2 KB |
| R1-1710671.zip | 2017/06/16 6:57 | 45,8 KB |
| R1-1710672.zip | 2017/06/16 21:22 | 52 KB |
| R1-1710673.zip | 2017/06/16 20:15 | 268,5 KB |
| R1-1710674.zip | 2017/06/16 20:15 | 40,5 KB |
| R1-1710675.zip | 2017/06/16 21:22 | 156,2 KB |
| R1-1710676.zip | 2017/06/16 6:57 | 258,1 KB |
| R1-1710677.zip | 2017/06/16 18:47 | 87,4 KB |
| R1-1710678.zip | 2017/06/16 7:44 | 45,5 KB |
| R1-1710679.zip | 2017/06/16 7:44 | 35 KB |
| R1-1710680.zip | 2017/06/16 7:44 | 94,9 KB |
| R1-1710681.zip | 2017/06/16 10:13 | 65,7 KB |
| R1-1710682.zip | 2017/06/16 7:25 | 34,1 KB |
| R1-1710683.zip | 2017/06/16 7:46 | 444,3 KB |
| R1-1710684.zip | 2017/06/16 7:46 | 35,6 KB |
| R1-1710685.zip | 2017/06/16 7:46 | 305,7 KB |
| R1-1710686.zip | 2017/06/16 7:58 | 412,9 KB |
| R1-1710687.zip | 2017/06/16 7:58 | 209,2 KB |
| R1-1710688.zip | 2017/06/16 21:31 | 297 KB |
| R1-1710689.zip | 2017/06/16 7:44 | 124,5 KB |
| R1-1710690.zip | 2017/06/16 19:58 | 198,3 KB |
| R1-1710691.zip | 2017/06/16 12:28 | 352,6 KB |
| R1-1710692.zip | 2017/06/16 12:28 | 95,3 KB |
| R1-1710693.zip | 2017/06/17 1:25 | 59,9 KB |
| R1-1710694.zip | 2017/06/16 12:28 | 189,6 KB |
| R1-1710695.zip | 2017/06/16 12:28 | 1100,6 KB |
| R1-1710696.zip | 2017/06/16 12:28 | 113,9 KB |
| R1-1710697.zip | 2017/06/17 1:25 | 50,5 KB |
| R1-1710698.zip | 2017/06/17 1:25 | 54,9 KB |
| R1-1710699.zip | 2017/06/17 1:25 | 49,7 KB |
| R1-1710700.zip | 2017/06/16 7:16 | 52,4 KB |

| sort by name/desc | sort by date/desc | sort by size/desc |
|---|---|---|
| R1-1710701.zip | 2017/06/17 0:42 | 659,4 KB |
| R1-1710702.zip | 2017/06/17 1:25 | 51,1 KB |
| R1-1710703.zip | 2017/06/17 2:42 | 2281,3 KB |
| R1-1710704.zip | 2017/06/17 2:42 | 2186,2 KB |
| R1-1710705.zip | 2017/06/17 1:25 | 54,5 KB |
| R1-1710706.zip | 2017/06/17 1:25 | 54,8 KB |
| R1-1710707.zip | 2017/06/16 12:29 | 27,7 KB |
| R1-1710708.zip | 2017/06/17 2:42 | 618 KB |
| R1-1710709.zip | 2017/06/16 10:51 | 59,3 KB |
| R1-1710710.zip | 2017/06/17 1:25 | 56,9 KB |
| R1-1710711.zip | 2017/06/17 1:25 | 51,2 KB |
| R1-1710712.zip | 2017/06/16 7:16 | 50,8 KB |
| R1-1710713.zip | 2017/06/17 2:42 | 452,8 KB |
| R1-1710714.zip | 2017/06/17 2:42 | 834,2 KB |
| R1-1710716.zip | 2017/06/17 1:25 | 50,5 KB |
| R1-1710717.zip | 2017/06/16 23:44 | 59 KB |
| R1-1710718.zip | 2017/06/17 0:42 | 33,4 KB |
| R1-1710719.zip | 2017/06/16 10:51 | 48,8 KB |
| R1-1710720.zip | 2017/06/16 7:36 | 54,2 KB |
| R1-1710721.zip | 2017/06/16 7:39 | 54,7 KB |
| R1-1710722.zip | 2017/06/16 7:39 | 56,1 KB |
| R1-1710723.zip | 2017/06/16 7:39 | 54,4 KB |
| R1-1710724.zip | 2017/06/16 10:50 | 77,8 KB |
| R1-1710725.zip | 2017/06/16 7:36 | 67,8 KB |
| R1-1710726.zip | 2017/06/16 10:51 | 275 KB |
| R1-1710727.zip | 2017/06/16 10:51 | 169,8 KB |
| R1-1710728.zip | 2017/06/16 10:50 | 51,1 KB |
| R1-1710729.zip | 2017/06/16 10:51 | 167,5 KB |
| R1-1710730.zip | 2017/06/16 7:36 | 50,2 KB |
| R1-1710731.zip | 2017/06/17 1:25 | 49,8 KB |
| R1-1710732.zip | 2017/06/16 7:16 | 92,8 KB |
| R1-1710733.zip | 2017/06/16 12:29 | 99,6 KB |
| R1-1710734.zip | 2017/06/16 7:16 | 52,4 KB |
| R1-1710735.zip | 2017/06/16 7:39 | 101,5 KB |

| sort by name/desc | sort by date/desc | sort by size/desc |
|---|---|---|
| R1-1710736.zip | 2017/06/17 1:25 | 50,5 KB |
| R1-1710737.zip | 2017/06/16 6:51 | 89,2 KB |
| R1-1710738.zip | 2017/06/16 6:51 | 107,8 KB |
| R1-1710739.zip | 2017/06/17 1:25 | 178,7 KB |
| R1-1710740.zip | 2017/06/17 1:25 | 49,9 KB |
| R1-1710741.zip | 2017/06/17 1:25 | 49,8 KB |
| R1-1710742.zip | 2017/06/19 10:54 | 93,7 KB |
| R1-1710743.zip | 2017/06/19 10:54 | 80,5 KB |
| R1-1710744.zip | 2017/06/20 6:35 | 276,4 KB |
| R1-1710745.zip | 2017/06/20 6:35 | 293,2 KB |
| R1-1710746.zip | 2017/06/20 6:35 | 131,8 KB |
| R1-1710747.zip | 2017/06/20 6:35 | 455,8 KB |
| R1-1710748.zip | 2017/06/20 6:36 | 142,9 KB |
| R1-1710749.zip | 2017/06/20 6:36 | 1888,7 KB |
| R1-1710750.zip | 2017/06/20 6:36 | 331,8 KB |
| R1-1710751.zip | 2017/06/20 6:36 | 283,8 KB |
| R1-1710752.zip | 2017/06/20 6:36 | 166 KB |
| R1-1710753.zip | 2017/06/17 1:58 | 19 KB |
| R1-1710754.zip | 2017/06/16 22:13 | 100,3 KB |
| R1-1710755.zip | 2017/06/16 7:53 | 1244,7 KB |
| R1-1710756.zip | 2017/06/16 22:13 | 74,6 KB |
| R1-1710757.zip | 2017/06/16 7:53 | 457,7 KB |
| R1-1710758.zip | 2017/06/16 7:53 | 307,7 KB |
| R1-1710759.zip | 2017/06/16 19:15 | 132,5 KB |
| R1-1710760.zip | 2017/06/16 8:09 | 27,7 KB |
| R1-1710761.zip | 2017/06/16 12:28 | 248 KB |
| R1-1710762.zip | 2017/06/16 12:29 | 56,6 KB |
| R1-1710763.zip | 2017/06/16 9:36 | 447,9 KB |
| R1-1710764.zip | 2017/06/22 3:09 | 51,8 KB |
| R1-1710765.zip | 2017/06/17 2:42 | 39 KB |
| R1-1710766.zip | 2017/06/16 10:50 | 345,7 KB |
| R1-1710767.zip | 2017/06/17 2:42 | 16,2 KB |
| R1-1710768.zip | 2017/06/17 1:58 | 451,6 KB |
| R1-1710769.zip | 2017/06/16 13:47 | 29,9 KB |

| sort by name/desc | sort by date/desc | sort by size/desc |
|---|---|---|
| R1-1710770.zip | 2017/06/19 14:13 | 186,8 KB |
| R1-1710771.zip | 2017/06/16 9:22 | 89,5 KB |
| R1-1710772.zip | 2017/06/16 9:22 | 68,2 KB |
| R1-1710773.zip | 2017/06/17 2:38 | 701,7 KB |
| R1-1710774.zip | 2017/06/17 2:38 | 55,1 KB |
| R1-1710776.zip | 2017/06/17 2:38 | 275,2 KB |
| R1-1710777.zip | 2017/06/17 2:38 | 2168,3 KB |
| R1-1710778.zip | 2017/06/17 2:38 | 474,6 KB |
| R1-1710779.zip | 2017/06/17 2:38 | 41,2 KB |
| R1-1710780.zip | 2017/06/17 2:38 | 107,7 KB |
| R1-1710781.zip | 2017/06/17 2:38 | 38,1 KB |
| R1-1710782.zip | 2017/06/17 2:38 | 75,1 KB |
| R1-1710783.zip | 2017/06/17 2:38 | 354,6 KB |
| R1-1710784.zip | 2017/06/17 2:38 | 194,2 KB |
| R1-1710785.zip | 2017/06/17 2:38 | 125,3 KB |
| R1-1710786.zip | 2017/06/17 2:39 | 45,2 KB |
| R1-1710787.zip | 2017/06/15 9:57 | 88,9 KB |
| R1-1710788.zip | 2017/06/17 5:15 | 386,3 KB |
| R1-1710789.zip | 2017/06/17 5:15 | 1315,4 KB |
| R1-1710790.zip | 2017/06/17 5:15 | 51,4 KB |
| R1-1710791.zip | 2017/06/17 5:15 | 228,4 KB |
| R1-1710792.zip | 2017/06/17 5:15 | 61,2 KB |
| R1-1710793.zip | 2017/06/17 5:15 | 65,3 KB |
| R1-1710794.zip | 2017/06/17 5:15 | 17,2 KB |
| R1-1710795.zip | 2017/06/17 5:15 | 44,4 KB |
| R1-1710796.zip | 2017/06/17 5:15 | 78,7 KB |
| R1-1710797.zip | 2017/06/17 5:15 | 36,1 KB |
| R1-1710798.zip | 2017/06/20 6:01 | 48,4 KB |
| R1-1710799.zip | 2017/06/17 5:15 | 50,9 KB |
| R1-1710800.zip | 2017/06/20 6:02 | 234,3 KB |
| R1-1710801.zip | 2017/06/17 5:47 | 34,4 KB |
| R1-1710802.zip | 2017/06/17 5:15 | 88,1 KB |
| R1-1710803.zip | 2017/06/20 6:01 | 580,6 KB |
| R1-1710804.zip | 2017/06/17 5:15 | 33,1 KB |

| sort by name/desc | sort by date/desc | sort by size/desc |
|---|---|---|
| R1-1710805.zip | 2017/06/17 5:15 | 53,1 KB |
| R1-1710806.zip | 2017/06/17 5:15 | 51,2 KB |
| R1-1710807.zip | 2017/06/17 5:15 | 40,8 KB |
| R1-1710808.zip | 2017/06/17 5:15 | 172 KB |
| R1-1710809.zip | 2017/06/17 5:15 | 439,1 KB |
| R1-1710810.zip | 2017/06/17 5:15 | 166,7 KB |
| R1-1710811.zip | 2017/06/17 5:15 | 114,3 KB |
| R1-1710812.zip | 2017/06/17 5:15 | 51,8 KB |
| R1-1710813.zip | 2017/06/17 5:15 | 69,6 KB |
| R1-1710814.zip | 2017/06/23 20:31 | 17,5 KB |
| R1-1710815.zip | 2017/06/17 5:15 | 253,8 KB |
| R1-1710816.zip | 2017/06/17 5:15 | 105,2 KB |
| R1-1710817.zip | 2017/06/23 20:31 | 26,7 KB |
| R1-1710818.zip | 2017/06/17 5:15 | 417,4 KB |
| R1-1710819.zip | 2017/06/17 5:16 | 1586,8 KB |
| R1-1710820.zip | 2017/06/17 5:16 | 595,6 KB |
| R1-1710821.zip | 2017/06/17 5:16 | 372,9 KB |
| R1-1710822.zip | 2017/06/17 5:16 | 224,4 KB |
| R1-1710823.zip | 2017/06/17 5:16 | 198,5 KB |
| R1-1710824.zip | 2017/06/17 5:16 | 495,2 KB |
| R1-1710825.zip | 2017/06/20 6:01 | 1529,6 KB |
| R1-1710826.zip | 2017/06/20 6:01 | 675 KB |
| R1-1710827.zip | 2017/06/20 6:00 | 2479,9 KB |
| R1-1710828.zip | 2017/06/20 5:59 | 207,5 KB |
| R1-1710829.zip | 2017/06/20 5:59 | 136,7 KB |
| R1-1710830.zip | 2017/06/17 5:16 | 339,6 KB |
| R1-1710831.zip | 2017/06/17 5:16 | 152,9 KB |
| R1-1710832.zip | 2017/06/17 5:17 | 1743 KB |
| R1-1710833.zip | 2017/06/17 5:17 | 122,5 KB |
| R1-1710834.zip | 2017/06/17 5:17 | 116,9 KB |
| R1-1710835.zip | 2017/06/17 5:17 | 324,3 KB |
| R1-1710836.zip | 2017/06/17 5:17 | 107,7 KB |
| R1-1710837.zip | 2017/06/17 5:17 | 438,3 KB |
| R1-1710838.zip | 2017/06/17 5:17 | 100,7 KB |

| sort by name/desc | sort by date/desc | sort by size/desc |
|---|---|---|
| R1-1710839.zip | 2017/06/17 5:17 | 117,6 KB |
| R1-1710840.zip | 2017/06/16 12:39 | 37,8 KB |
| R1-1710841.zip | 2017/06/16 9:52 | 30,5 KB |
| R1-1710842.zip | 2017/06/16 21:38 | 292,9 KB |
| R1-1710843.zip | 2017/06/16 21:38 | 330,2 KB |
| R1-1710844.zip | 2017/06/20 6:38 | 172,4 KB |
| R1-1710845.zip | 2017/06/20 6:34 | 338,5 KB |
| R1-1710846.zip | 2017/06/20 6:35 | 210,3 KB |
| R1-1710847.zip | 2017/06/20 6:36 | 337,9 KB |
| R1-1710848.zip | 2017/06/20 6:36 | 290,5 KB |
| R1-1710849.zip | 2017/06/20 6:37 | 429,8 KB |
| R1-1710850.zip | 2017/06/20 6:38 | 112 KB |
| R1-1710851.zip | 2017/06/16 16:57 | 117,4 KB |
| R1-1710852.zip | 2017/06/16 16:57 | 29,1 KB |
| R1-1710853.zip | 2017/06/16 16:57 | 65,8 KB |
| R1-1710854.zip | 2017/06/16 16:57 | 95,2 KB |
| R1-1710855.zip | 2017/06/16 16:57 | 44 KB |
| R1-1710856.zip | 2017/06/16 16:57 | 17,3 KB |
| R1-1710857.zip | 2017/06/16 16:57 | 16,8 KB |
| R1-1710858.zip | 2017/06/19 20:01 | 110,4 KB |
| R1-1710859.zip | 2017/06/19 20:01 | 205,4 KB |
| R1-1710860.zip | 2017/06/16 16:57 | 89,4 KB |
| R1-1710861.zip | 2017/06/16 16:57 | 46,5 KB |
| R1-1710862.zip | 2017/06/16 16:57 | 67,1 KB |
| R1-1710863.zip | 2017/06/16 16:57 | 37,4 KB |
| R1-1710864.zip | 2017/06/16 16:57 | 37,6 KB |
| R1-1710865.zip | 2017/06/16 16:57 | 139,1 KB |
| R1-1710866.zip | 2017/06/16 16:57 | 46,4 KB |
| R1-1710867.zip | 2017/06/16 16:57 | 18,5 KB |
| R1-1710870.zip | 2017/06/16 20:54 | 36 KB |
| R1-1710871.zip | 2017/06/16 20:54 | 295,2 KB |
| R1-1710872.zip | 2017/06/16 20:54 | 110,2 KB |
| R1-1710873.zip | 2017/06/16 20:54 | 31,1 KB |
| R1-1710874.zip | 2017/06/16 20:54 | 985 KB |

| sort by name/desc | sort by date/desc | sort by size/desc |
|---|---|---|
| R1-1710875.zip | 2017/06/16 20:54 | 40,5 KB |
| R1-1710876.zip | 2017/06/16 20:54 | 94 KB |
| R1-1710877.zip | 2017/06/16 20:54 | 42,6 KB |
| R1-1710878.zip | 2017/06/16 20:54 | 35,8 KB |
| R1-1710879.zip | 2017/06/16 20:54 | 122,6 KB |
| R1-1710880.zip | 2017/06/16 21:30 | 42,7 KB |
| R1-1710881.zip | 2017/06/16 21:30 | 38,1 KB |
| R1-1710882.zip | 2017/06/16 21:30 | 55,1 KB |
| R1-1710883.zip | 2017/06/16 16:34 | 127,9 KB |
| R1-1710884.zip | 2017/06/16 16:34 | 163,6 KB |
| R1-1710885.zip | 2017/06/16 16:34 | 77,8 KB |
| R1-1710886.zip | 2017/06/16 14:58 | 428,9 KB |
| R1-1710887.zip | 2017/06/17 6:15 | 58,2 KB |
| R1-1710889.zip | 2017/06/16 21:12 | 386,2 KB |
| R1-1710890.zip | 2017/06/16 21:12 | 185,1 KB |
| R1-1710891.zip | 2017/06/16 21:12 | 50 KB |
| R1-1710892.zip | 2017/06/16 21:12 | 105,4 KB |
| R1-1710893.zip | 2017/06/16 21:23 | 57,7 KB |
| R1-1710894.zip | 2017/06/16 21:23 | 175,8 KB |
| R1-1710895.zip | 2017/06/16 21:23 | 59,5 KB |
| R1-1710896.zip | 2017/06/16 21:23 | 78,8 KB |
| R1-1710897.zip | 2017/06/16 21:23 | 43,1 KB |
| R1-1710898.zip | 2017/06/16 21:23 | 42,4 KB |
| R1-1710899.zip | 2017/06/16 21:23 | 62,7 KB |
| R1-1710900.zip | 2017/06/16 21:23 | 90,2 KB |
| R1-1710901.zip | 2017/06/16 21:23 | 35,4 KB |
| R1-1710902.zip | 2017/06/16 21:23 | 39,1 KB |
| R1-1710903.zip | 2017/06/17 5:46 | 262,4 KB |
| R1-1710904.zip | 2017/06/17 4:13 | 342,9 KB |
| R1-1710905.zip | 2017/06/17 4:14 | 237 KB |
| R1-1710906.zip | 2017/06/17 4:13 | 30,7 KB |
| R1-1710907.zip | 2017/06/17 4:13 | 74,3 KB |
| R1-1710908.zip | 2017/06/17 4:13 | 28,7 KB |
| R1-1710909.zip | 2017/06/17 2:55 | 142,1 KB |

| sort by name/desc | sort by date/desc | sort by size/desc |
|---|---|---|
| R1-1710910.zip | 2017/06/17 2:55 | 110,4 KB |
| R1-1710911.zip | 2017/06/17 2:55 | 82 KB |
| R1-1710912.zip | 2017/06/16 21:30 | 58,9 KB |
| R1-1710913.zip | 2017/06/17 2:41 | 242,7 KB |
| R1-1710914.zip | 2017/06/17 2:41 | 303,2 KB |
| R1-1710915.zip | 2017/06/20 4:20 | 61 KB |
| R1-1710916.zip | 2017/06/17 2:41 | 144,2 KB |
| R1-1710917.zip | 2017/06/20 4:20 | 452,1 KB |
| R1-1710918.zip | 2017/06/17 2:41 | 685,6 KB |
| R1-1710919.zip | 2017/06/17 2:41 | 122,5 KB |
| R1-1710920.zip | 2017/06/16 23:50 | 147,2 KB |
| R1-1710921.zip | 2017/06/16 23:50 | 151,1 KB |
| R1-1710922.zip | 2017/06/16 23:50 | 93,6 KB |
| R1-1710923.zip | 2017/06/16 23:50 | 126,2 KB |
| R1-1710924.zip | 2017/06/16 23:50 | 493,6 KB |
| R1-1710925.zip | 2017/06/16 23:50 | 75,2 KB |
| R1-1710926.zip | 2017/06/16 23:50 | 83,1 KB |
| R1-1710927.zip | 2017/06/16 23:50 | 30,5 KB |
| R1-1710928.zip | 2017/06/16 23:51 | 30,6 KB |
| R1-1710929.zip | 2017/06/16 10:01 | 124,9 KB |
| R1-1710930.zip | 2017/06/16 10:01 | 140,9 KB |
| R1-1710931.zip | 2017/06/16 23:51 | 1206,7 KB |
| R1-1710932.zip | 2017/06/16 10:01 | 97,6 KB |
| R1-1710933.zip | 2017/06/16 23:51 | 87,2 KB |
| R1-1710934.zip | 2017/06/16 10:01 | 64,6 KB |
| R1-1710935.zip | 2017/06/16 10:01 | 89,9 KB |
| R1-1710936.zip | 2017/06/16 23:51 | 292,8 KB |
| R1-1710937.zip | 2017/06/16 10:01 | 67,6 KB |
| R1-1710938.zip | 2017/06/16 23:51 | 52,9 KB |
| R1-1710939.zip | 2017/06/16 10:01 | 60,6 KB |
| R1-1710940.zip | 2017/06/16 10:01 | 64 KB |
| R1-1710941.zip | 2017/06/16 23:51 | 53,5 KB |
| R1-1710942.zip | 2017/06/16 10:01 | 67,4 KB |
| R1-1710943.zip | 2017/06/16 10:01 | 108,7 KB |

| sort by name/desc | sort by date/desc | sort by size/desc |
|---|---|---|
| R1-1710944.zip | 2017/06/16 23:51 | 178,5 KB |
| R1-1710945.zip | 2017/06/16 23:51 | 75,1 KB |
| R1-1710946.zip | 2017/06/16 23:51 | 74,3 KB |
| R1-1710947.zip | 2017/06/16 23:51 | 53,6 KB |
| R1-1710948.zip | 2017/06/16 23:51 | 50,1 KB |
| R1-1710949.zip | 2017/06/16 23:51 | 177,5 KB |
| R1-1710950.zip | 2017/06/17 5:36 | 460,8 KB |
| R1-1710951.zip | 2017/06/16 23:52 | 127,3 KB |
| R1-1710952.zip | 2017/06/16 23:52 | 137,8 KB |
| R1-1710953.zip | 2017/06/16 23:52 | 136,5 KB |
| R1-1710954.zip | 2017/06/16 23:52 | 55,9 KB |
| R1-1710955.zip | 2017/06/16 23:52 | 51,2 KB |
| R1-1710956.zip | 2017/06/16 23:52 | 122,8 KB |
| R1-1710957.zip | 2017/06/16 23:52 | 50,3 KB |
| R1-1710958.zip | 2017/06/16 23:52 | 98,8 KB |
| R1-1710959.zip | 2017/06/16 23:52 | 406,2 KB |
| R1-1710960.zip | 2017/06/16 23:52 | 263 KB |
| R1-1710961.zip | 2017/06/16 23:52 | 713 KB |
| R1-1710962.zip | 2017/06/16 23:52 | 328,4 KB |
| R1-1710963.zip | 2017/06/16 6:28 | 56,7 KB |
| R1-1710964.zip | 2017/06/16 6:28 | 28,9 KB |
| R1-1710965.zip | 2017/06/16 6:28 | 29,2 KB |
| R1-1710966.zip | 2017/06/16 2:14 | 72,6 KB |
| R1-1710967.zip | 2017/06/16 9:27 | 40,1 KB |
| R1-1710968.zip | 2017/06/28 13:45 | 131,9 KB |
| R1-1710969.zip | 2017/06/16 8:11 | 57,1 KB |
| R1-1710970.zip | 2017/06/16 8:11 | 23,7 KB |
| R1-1710971.zip | 2017/06/16 8:11 | 51,7 KB |
| R1-1710972.zip | 2017/06/16 8:11 | 294,1 KB |
| R1-1710973.zip | 2017/06/16 8:52 | 1060,3 KB |
| R1-1710974.zip | 2017/06/16 8:52 | 106,8 KB |
| R1-1710975.zip | 2017/06/16 8:52 | 723,7 KB |
| R1-1710976.zip | 2017/06/17 2:39 | 55,9 KB |
| R1-1710977.zip | 2017/06/17 2:39 | 223 KB |

| sort by name/desc | sort by date/desc | sort by size/desc |
|---|---|---|
| R1-1710978.zip | 2017/06/17 3:28 | 71,8 KB |
| R1-1710979.zip | 2017/06/17 3:28 | 55,3 KB |
| R1-1710980.zip | 2017/06/17 3:28 | 70,6 KB |
| R1-1710981.zip | 2017/06/17 3:28 | 50,2 KB |
| R1-1710982.zip | 2017/06/17 3:28 | 83,8 KB |
| R1-1710983.zip | 2017/06/17 3:28 | 47,8 KB |
| R1-1710984.zip | 2017/06/17 3:28 | 34,7 KB |
| R1-1710985.zip | 2017/06/17 3:28 | 35,5 KB |
| R1-1710986.zip | 2017/06/17 3:28 | 37,9 KB |
| R1-1710987.zip | 2017/06/17 3:28 | 48,7 KB |
| R1-1710988.zip | 2017/06/17 3:28 | 59,8 KB |
| R1-1710989.zip | 2017/06/17 3:28 | 47,3 KB |
| R1-1710990.zip | 2017/06/17 3:28 | 102,6 KB |
| R1-1710991.zip | 2017/06/17 3:28 | 41,8 KB |
| R1-1710992.zip | 2017/06/17 3:28 | 44,6 KB |
| R1-1710993.zip | 2017/06/17 3:28 | 36,1 KB |
| R1-1710994.zip | 2017/06/17 3:28 | 122,1 KB |
| R1-1710995.zip | 2017/06/17 3:28 | 175,3 KB |
| R1-1710996.zip | 2017/06/17 3:28 | 39,1 KB |
| R1-1710997.zip | 2017/06/17 3:28 | 42,7 KB |
| R1-1710998.zip | 2017/06/17 3:28 | 93,1 KB |
| R1-1710999.zip | 2017/06/17 3:28 | 64,7 KB |
| R1-1711000.zip | 2017/06/17 3:28 | 45,9 KB |
| R1-1711001.zip | 2017/06/17 3:28 | 39,5 KB |
| R1-1711002.zip | 2017/06/17 3:28 | 36,1 KB |
| R1-1711003.zip | 2017/06/17 3:28 | 62,5 KB |
| R1-1711004.zip | 2017/06/17 3:28 | 106,8 KB |
| R1-1711005.zip | 2017/06/17 4:36 | 90,8 KB |
| R1-1711006.zip | 2017/06/16 20:22 | 27,4 KB |
| R1-1711007.zip | 2017/06/17 5:26 | 123,6 KB |
| R1-1711008.zip | 2017/06/17 5:26 | 209,7 KB |
| R1-1711009.zip | 2017/06/17 5:26 | 89 KB |
| R1-1711010.zip | 2017/06/17 5:26 | 97,1 KB |
| R1-1711011.zip | 2017/06/17 5:26 | 256,3 KB |

| sort by name/desc | sort by date/desc | sort by size/desc |
|---|---|---|
| R1-1711012.zip | 2017/06/17 5:26 | 121,3 KB |
| R1-1711013.zip | 2017/06/17 5:26 | 33,2 KB |
| R1-1711014.zip | 2017/06/17 5:26 | 38 KB |
| R1-1711015.zip | 2017/06/17 5:26 | 225,5 KB |
| R1-1711016.zip | 2017/06/17 5:26 | 66,4 KB |
| R1-1711017.zip | 2017/06/17 5:26 | 437,8 KB |
| R1-1711018.zip | 2017/06/17 5:26 | 49,7 KB |
| R1-1711019.zip | 2017/06/17 5:26 | 127,9 KB |
| R1-1711020.zip | 2017/06/17 5:26 | 113,2 KB |
| R1-1711021.zip | 2017/06/17 5:26 | 407,5 KB |
| R1-1711022.zip | 2017/06/17 5:26 | 49,2 KB |
| R1-1711023.zip | 2017/06/17 5:26 | 238,5 KB |
| R1-1711024.zip | 2017/06/17 5:26 | 150,7 KB |
| R1-1711025.zip | 2017/06/17 5:26 | 68 KB |
| R1-1711026.zip | 2017/06/17 5:26 | 41,4 KB |
| R1-1711027.zip | 2017/06/17 5:26 | 63 KB |
| R1-1711028.zip | 2017/06/17 5:26 | 61,3 KB |
| R1-1711029.zip | 2017/06/17 5:26 | 45,3 KB |
| R1-1711030.zip | 2017/06/17 5:26 | 35,9 KB |
| R1-1711031.zip | 2017/06/17 5:26 | 91,3 KB |
| R1-1711032.zip | 2017/06/17 5:26 | 105,1 KB |
| R1-1711033.zip | 2017/06/17 5:26 | 107,2 KB |
| R1-1711034.zip | 2017/06/17 5:26 | 552,1 KB |
| R1-1711035.zip | 2017/06/17 5:26 | 196,7 KB |
| R1-1711036.zip | 2017/06/17 5:26 | 68,7 KB |
| R1-1711037.zip | 2017/06/17 5:26 | 88,7 KB |
| R1-1711038.zip | 2017/06/17 5:26 | 42,8 KB |
| R1-1711039.zip | 2017/06/17 5:26 | 114,7 KB |
| R1-1711040.zip | 2017/06/17 5:26 | 35,4 KB |
| R1-1711041.zip | 2017/06/17 5:56 | 123,7 KB |
| R1-1711042.zip | 2017/06/17 5:26 | 399,1 KB |
| R1-1711043.zip | 2017/06/17 5:26 | 276,5 KB |
| R1-1711044.zip | 2017/06/17 5:26 | 751,3 KB |
| R1-1711045.zip | 2017/06/17 5:26 | 133,2 KB |

| sort by name/desc | sort by date/desc | sort by size/desc |
|---|---|---|
| R1-1711046.zip | 2017/06/17 5:26 | 468,1 KB |
| R1-1711047.zip | 2017/06/17 5:26 | 574,2 KB |
| R1-1711048.zip | 2017/06/17 5:26 | 219,9 KB |
| R1-1711049.zip | 2017/06/17 5:26 | 302,4 KB |
| R1-1711050.zip | 2017/06/17 5:26 | 4441,6 KB |
| R1-1711051.zip | 2017/06/17 5:26 | 639,5 KB |
| R1-1711052.zip | 2017/06/17 5:26 | 93,7 KB |
| R1-1711053.zip | 2017/06/17 5:26 | 271,3 KB |
| R1-1711054.zip | 2017/06/17 5:26 | 53,3 KB |
| R1-1711055.zip | 2017/06/17 4:13 | 61,5 KB |
| R1-1711056.zip | 2017/06/17 3:26 | 73,1 KB |
| R1-1711057.zip | 2017/06/17 3:26 | 73,6 KB |
| R1-1711058.zip | 2017/06/20 5:34 | 102,9 KB |
| R1-1711059.zip | 2017/06/17 3:26 | 141 KB |
| R1-1711060.zip | 2017/06/17 3:26 | 56,4 KB |
| R1-1711061.zip | 2017/06/20 5:34 | 144,1 KB |
| R1-1711062.zip | 2017/06/17 3:26 | 87 KB |
| R1-1711063.zip | 2017/06/17 3:26 | 103,6 KB |
| R1-1711064.zip | 2017/06/17 3:26 | 189,5 KB |
| R1-1711065.zip | 2017/06/17 3:27 | 145,2 KB |
| R1-1711066.zip | 2017/06/17 3:27 | 107 KB |
| R1-1711067.zip | 2017/06/17 3:27 | 47,5 KB |
| R1-1711068.zip | 2017/06/17 3:27 | 68,1 KB |
| R1-1711069.zip | 2017/06/17 3:27 | 34 KB |
| R1-1711070.zip | 2017/06/17 3:27 | 36,7 KB |
| R1-1711071.zip | 2017/06/17 3:27 | 70 KB |
| R1-1711072.zip | 2017/06/17 5:25 | 110,2 KB |
| R1-1711073.zip | 2017/06/17 3:27 | 94,3 KB |
| R1-1711074.zip | 2017/06/17 3:27 | 115 KB |
| R1-1711075.zip | 2017/06/17 5:25 | 250,5 KB |
| R1-1711076.zip | 2017/06/17 5:25 | 307,7 KB |
| R1-1711077.zip | 2017/06/17 5:25 | 486,2 KB |
| R1-1711078.zip | 2017/06/17 5:25 | 749,2 KB |
| R1-1711079.zip | 2017/06/17 5:25 | 135,6 KB |

| sort by name/desc | sort by date/desc | sort by size/desc |
|---|---|---|
| R1-1711080.zip | 2017/06/17 5:25 | 52,5 KB |
| R1-1711081.zip | 2017/06/17 5:25 | 122 KB |
| R1-1711082.zip | 2017/06/17 5:25 | 79,3 KB |
| R1-1711083.zip | 2017/06/17 5:25 | 75,1 KB |
| R1-1711084.zip | 2017/06/16 16:33 | 1005 KB |
| R1-1711085.zip | 2017/06/16 16:33 | 130,5 KB |
| R1-1711086.zip | 2017/06/16 16:33 | 82 KB |
| R1-1711087.zip | 2017/06/17 5:25 | 83,8 KB |
| R1-1711088.zip | 2017/06/17 4:13 | 148,2 KB |
| R1-1711089.zip | 2017/06/17 4:13 | 142,5 KB |
| R1-1711090.zip | 2017/06/17 4:13 | 64,7 KB |
| R1-1711091.zip | 2017/06/17 4:13 | 94,7 KB |
| R1-1711092.zip | 2017/06/17 4:13 | 78,8 KB |
| R1-1711093.zip | 2017/06/17 4:13 | 140,2 KB |
| R1-1711094.zip | 2017/06/17 4:13 | 73,8 KB |
| R1-1711095.zip | 2017/06/17 4:13 | 94,2 KB |
| R1-1711096.zip | 2017/06/17 4:13 | 82 KB |
| R1-1711097.zip | 2017/06/17 4:13 | 64,9 KB |
| R1-1711098.zip | 2017/06/17 4:13 | 1039,7 KB |
| R1-1711099.zip | 2017/06/17 4:13 | 541,2 KB |
| R1-1711100.zip | 2017/06/17 4:13 | 144,2 KB |
| R1-1711101.zip | 2017/06/17 4:13 | 102,1 KB |
| R1-1711102.zip | 2017/06/17 4:13 | 66 KB |
| R1-1711103.zip | 2017/06/17 4:13 | 73,3 KB |
| R1-1711104.zip | 2017/06/17 4:13 | 98,6 KB |
| R1-1711105.zip | 2017/06/17 4:13 | 99,1 KB |
| R1-1711106.zip | 2017/06/17 4:13 | 60,4 KB |
| R1-1711107.zip | 2017/06/17 4:13 | 69,6 KB |
| R1-1711108.zip | 2017/06/17 4:13 | 138,9 KB |
| R1-1711109.zip | 2017/06/17 4:13 | 56,2 KB |
| R1-1711110.zip | 2017/06/17 4:13 | 213,2 KB |
| R1-1711111.zip | 2017/06/17 4:13 | 82,3 KB |
| R1-1711112.zip | 2017/06/17 4:13 | 111,3 KB |
| R1-1711113.zip | 2017/06/17 4:13 | 70,6 KB |

| sort by name/desc | sort by date/desc | sort by size/desc |
|---|---|---|
| R1-1711114.zip | 2017/06/17 4:13 | 151,7 KB |
| R1-1711115.zip | 2017/06/17 4:13 | 71,9 KB |
| R1-1711116.zip | 2017/06/17 4:13 | 77,1 KB |
| R1-1711117.zip | 2017/06/17 4:13 | 120,1 KB |
| R1-1711118.zip | 2017/06/17 4:13 | 60 KB |
| R1-1711119.zip | 2017/06/17 4:13 | 60,6 KB |
| R1-1711120.zip | 2017/06/17 4:13 | 90,8 KB |
| R1-1711121.zip | 2017/06/17 4:13 | 60,9 KB |
| R1-1711122.zip | 2017/06/17 4:13 | 59 KB |
| R1-1711123.zip | 2017/06/17 4:13 | 60,2 KB |
| R1-1711124.zip | 2017/06/20 3:00 | 407,9 KB |
| R1-1711125.zip | 2017/06/20 3:00 | 633 KB |
| R1-1711126.zip | 2017/06/20 3:00 | 376,7 KB |
| R1-1711127.zip | 2017/06/20 3:00 | 415,4 KB |
| R1-1711128.zip | 2017/06/20 3:00 | 563,4 KB |
| R1-1711129.zip | 2017/06/17 4:13 | 183,9 KB |
| R1-1711130.zip | 2017/06/17 4:13 | 40,1 KB |
| R1-1711131.zip | 2017/06/16 16:33 | 163 KB |
| R1-1711132.zip | 2017/06/16 10:05 | 199,5 KB |
| R1-1711133.zip | 2017/06/17 3:27 | 80,8 KB |
| R1-1711134.zip | 2017/06/17 3:27 | 54,8 KB |
| R1-1711135.zip | 2017/06/17 6:58 | 166,6 KB |
| R1-1711136.zip | 2017/06/17 6:58 | 147,3 KB |
| R1-1711137.zip | 2017/06/20 4:56 | 3038,1 KB |
| R1-1711138.zip | 2017/06/17 6:58 | 100,4 KB |
| R1-1711139.zip | 2017/06/17 6:58 | 69,7 KB |
| R1-1711140.zip | 2017/06/20 4:56 | 212 KB |
| R1-1711141.zip | 2017/06/17 6:58 | 104,2 KB |
| R1-1711142.zip | 2017/06/17 6:58 | 97,1 KB |
| R1-1711143.zip | 2017/06/17 6:58 | 53,2 KB |
| R1-1711144.zip | 2017/06/17 6:58 | 89 KB |
| R1-1711145.zip | 2017/06/17 6:58 | 109,3 KB |
| R1-1711146.zip | 2017/06/17 6:58 | 177,6 KB |
| R1-1711147.zip | 2017/06/17 6:58 | 43,6 KB |

| sort by name/desc | sort by date/desc | sort by size/desc |
|---|---|---|
| R1-1711148.zip | 2017/06/17 6:58 | 358,9 KB |
| R1-1711149.zip | 2017/06/17 6:58 | 71 KB |
| R1-1711150.zip | 2017/06/17 6:58 | 20,6 KB |
| R1-1711151.zip | 2017/06/17 7:04 | 78,5 KB |
| R1-1711152.zip | 2017/06/17 5:16 | 1813,8 KB |
| R1-1711153.zip | 2017/06/17 5:58 | 70,3 KB |
| R1-1711154.zip | 2017/06/17 5:59 | 65,1 KB |
| R1-1711155.zip | 2017/06/17 5:32 | 202,1 KB |
| R1-1711156.zip | 2017/06/17 5:16 | 614,1 KB |
| R1-1711157.zip | 2017/06/17 5:16 | 112,8 KB |
| R1-1711158.zip | 2017/06/17 6:01 | 121,9 KB |
| R1-1711159.zip | 2017/06/17 6:02 | 24,6 KB |
| R1-1711160.zip | 2017/06/17 5:16 | 262,8 KB |
| R1-1711161.zip | 2017/06/17 5:16 | 51,8 KB |
| R1-1711162.zip | 2017/06/17 6:05 | 125,3 KB |
| R1-1711163.zip | 2017/06/17 6:05 | 92,8 KB |
| R1-1711164.zip | 2017/06/17 5:50 | 108,3 KB |
| R1-1711165.zip | 2017/06/17 5:51 | 167 KB |
| R1-1711166.zip | 2017/06/17 5:52 | 66,5 KB |
| R1-1711167.zip | 2017/06/17 5:16 | 287,2 KB |
| R1-1711168.zip | 2017/06/17 5:54 | 466,8 KB |
| R1-1711169.zip | 2017/06/17 5:32 | 238,4 KB |
| R1-1711170.zip | 2017/06/17 5:16 | 342,2 KB |
| R1-1711171.zip | 2017/06/17 5:16 | 714,1 KB |
| R1-1711172.zip | 2017/06/17 5:16 | 2079,2 KB |
| R1-1711173.zip | 2017/06/17 5:16 | 382,8 KB |
| R1-1711174.zip | 2017/06/17 5:16 | 115,7 KB |
| R1-1711175.zip | 2017/06/17 6:09 | 1140,6 KB |
| R1-1711176.zip | 2017/06/17 6:09 | 90,9 KB |
| R1-1711177.zip | 2017/06/17 6:48 | 1707,4 KB |
| R1-1711178.zip | 2017/06/17 6:48 | 654,5 KB |
| R1-1711179.zip | 2017/06/17 6:48 | 57,4 KB |
| R1-1711180.zip | 2017/06/17 6:48 | 341,2 KB |
| R1-1711182.zip | 2017/06/17 6:48 | 65,9 KB |

| sort by name/desc | sort by date/desc | sort by size/desc |
|---|---|---|
| R1-1711183.zip | 2017/06/17 6:48 | 66,5 KB |
| R1-1711184.zip | 2017/06/17 6:48 | 201,9 KB |
| R1-1711185.zip | 2017/06/17 6:48 | 67,2 KB |
| R1-1711186.zip | 2017/06/17 6:40 | 512,9 KB |
| R1-1711187.zip | 2017/06/17 6:40 | 337 KB |
| R1-1711188.zip | 2017/06/17 5:16 | 189,1 KB |
| R1-1711189.zip | 2017/06/17 5:32 | 171,1 KB |
| R1-1711190.zip | 2017/06/17 5:16 | 312,3 KB |
| R1-1711191.zip | 2017/06/17 6:37 | 115,3 KB |
| R1-1711192.zip | 2017/06/17 5:16 | 135,9 KB |
| R1-1711193.zip | 2017/06/17 5:34 | 258,1 KB |
| R1-1711194.zip | 2017/06/17 5:16 | 71,5 KB |
| R1-1711195.zip | 2017/06/17 5:16 | 80,3 KB |
| R1-1711196.zip | 2017/06/17 5:38 | 541,9 KB |
| R1-1711197.zip | 2017/06/17 5:16 | 248,6 KB |
| R1-1711198.zip | 2017/06/17 5:16 | 93,1 KB |
| R1-1711199.zip | 2017/06/17 5:16 | 51,1 KB |
| R1-1711200.zip | 2017/06/17 5:16 | 282,4 KB |
| R1-1711201.zip | 2017/06/17 5:16 | 68,2 KB |
| R1-1711202.zip | 2017/06/18 23:49 | 110,7 KB |
| R1-1711203.zip | 2017/06/18 23:49 | 128,3 KB |
| R1-1711204.zip | 2017/06/18 23:49 | 89,9 KB |
| R1-1711205.zip | 2017/06/17 5:17 | 688,5 KB |
| R1-1711206.zip | 2017/06/18 23:50 | 220,8 KB |
| R1-1711207.zip | 2017/06/17 6:12 | 221,8 KB |
| R1-1711208.zip | 2017/06/17 5:17 | 63,8 KB |
| R1-1711209.zip | 2017/06/23 20:31 | 67,8 KB |
| R1-1711210.zip | 2017/06/20 5:19 | 120,2 KB |
| R1-1711211.zip | 2017/06/20 5:19 | 147,1 KB |
| R1-1711212.zip | 2017/06/20 5:19 | 149,9 KB |
| R1-1711213.zip | 2017/06/20 5:19 | 1007 KB |
| R1-1711214.zip | 2017/06/20 6:50 | 234,8 KB |
| R1-1711215.zip | 2017/06/20 6:50 | 790 KB |
| R1-1711216.zip | 2017/06/20 6:50 | 100,5 KB |

| sort by name/desc | sort by date/desc | sort by size/desc |
|---|---|---|
| R1-1711217.zip | 2017/06/20 6:25 | 286 KB |
| R1-1711218.zip | 2017/06/20 6:50 | 567,9 KB |
| R1-1711219.zip | 2017/06/20 6:25 | 282,6 KB |
| R1-1711220.zip | 2017/06/20 6:25 | 291,3 KB |
| R1-1711221.zip | 2017/06/20 6:25 | 162,3 KB |
| R1-1711222.zip | 2017/06/20 6:25 | 665,8 KB |
| R1-1711223.zip | 2017/06/20 5:24 | 158,9 KB |
| R1-1711224.zip | 2017/06/18 23:49 | 151,5 KB |
| R1-1711225.zip | 2017/06/17 6:20 | 64,4 KB |
| R1-1711226.zip | 2017/06/17 6:20 | 297,9 KB |
| R1-1711227.zip | 2017/06/17 6:20 | 139,4 KB |
| R1-1711228.zip | 2017/06/17 6:20 | 232,8 KB |
| R1-1711229.zip | 2017/06/17 6:20 | 111,6 KB |
| R1-1711230.zip | 2017/06/17 5:17 | 143,5 KB |
| R1-1711232.zip | 2017/06/17 1:26 | 63,7 KB |
| R1-1711233.zip | 2017/06/17 1:26 | 47,3 KB |
| R1-1711234.zip | 2017/06/17 1:26 | 63,8 KB |
| R1-1711235.zip | 2017/06/17 1:26 | 61,1 KB |
| R1-1711236.zip | 2017/06/17 1:26 | 248,4 KB |
| R1-1711237.zip | 2017/06/17 1:26 | 58,8 KB |
| R1-1711238.zip | 2017/06/17 1:26 | 63,1 KB |
| R1-1711239.zip | 2017/06/17 1:26 | 59,1 KB |
| R1-1711240.zip | 2017/06/17 1:26 | 66,5 KB |
| R1-1711241.zip | 2017/06/17 1:26 | 64,6 KB |
| R1-1711242.zip | 2017/06/17 1:26 | 69,8 KB |
| R1-1711243.zip | 2017/06/17 1:26 | 71 KB |
| R1-1711244.zip | 2017/06/17 1:26 | 69,4 KB |
| R1-1711245.zip | 2017/06/17 1:26 | 430,7 KB |
| R1-1711246.zip | 2017/06/17 5:17 | 517 KB |
| R1-1711247.zip | 2017/06/23 20:31 | 242,4 KB |
| R1-1711251.zip | 2017/06/17 5:24 | 76,1 KB |
| R1-1711252.zip | 2017/06/17 5:25 | 97,1 KB |
| R1-1711253.zip | 2017/06/16 11:03 | 55,4 KB |
| R1-1711254.zip | 2017/06/16 12:14 | 181,7 KB |

| sort by name/desc | sort by date/desc | sort by size/desc |
|---|---|---|
| R1-1711255.zip | 2017/06/17 3:37 | 44,9 KB |
| R1-1711256.zip | 2017/06/17 3:37 | 86,4 KB |
| R1-1711257.zip | 2017/06/17 1:28 | 52,7 KB |
| R1-1711258.zip | 2017/06/17 1:28 | 36,1 KB |
| R1-1711259.zip | 2017/06/17 1:28 | 34,7 KB |
| R1-1711260.zip | 2017/06/16 18:12 | 125,4 KB |
| R1-1711261.zip | 2017/06/16 18:12 | 407,9 KB |
| R1-1711262.zip | 2017/06/16 18:13 | 95,8 KB |
| R1-1711263.zip | 2017/06/16 18:13 | 129,1 KB |
| R1-1711264.zip | 2017/06/16 18:13 | 199,1 KB |
| R1-1711265.zip | 2017/06/16 18:13 | 107 KB |
| R1-1711266.zip | 2017/06/16 18:13 | 60,5 KB |
| R1-1711267.zip | 2017/06/16 18:12 | 62,9 KB |
| R1-1711268.zip | 2017/06/16 18:12 | 51,9 KB |
| R1-1711269.zip | 2017/06/16 18:12 | 40,7 KB |
| R1-1711270.zip | 2017/06/16 21:18 | 284,6 KB |
| R1-1711271.zip | 2017/06/16 18:12 | 87,7 KB |
| R1-1711272.zip | 2017/06/16 10:58 | 69,9 KB |
| R1-1711273.zip | 2017/06/16 10:59 | 180,1 KB |
| R1-1711274.zip | 2017/06/18 3:18 | 95,1 KB |
| R1-1711275.zip | 2017/06/17 6:12 | 385,6 KB |
| R1-1711276.zip | 2017/06/20 6:28 | 62,8 KB |
| R1-1711277.zip | 2017/06/19 3:12 | 30,2 KB |
| R1-1711278.zip | 2017/06/20 6:28 | 75,1 KB |
| R1-1711279.zip | 2017/06/17 5:58 | 77,1 KB |
| R1-1711280.zip | 2017/06/19 6:24 | 18 KB |
| R1-1711281.zip | 2017/06/19 3:12 | 25,4 KB |
| R1-1711282.zip | 2017/06/26 9:06 | 474 KB |
| R1-1711283.zip | 2017/06/19 3:12 | 67,1 KB |
| R1-1711284.zip | 2017/06/16 21:14 | 846,7 KB |
| R1-1711285.zip | 2017/06/16 21:15 | 112,9 KB |
| R1-1711286.zip | 2017/06/16 21:15 | 36,1 KB |
| R1-1711287.zip | 2017/06/16 21:14 | 38,9 KB |
| R1-1711288.zip | 2017/06/16 21:14 | 152,7 KB |

| sort by name/desc | sort by date/desc | sort by size/desc |
|---|---|---|
| R1-1711289.zip | 2017/06/16 21:14 | 35,6 KB |
| R1-1711290.zip | 2017/06/16 21:14 | 112,7 KB |
| R1-1711291.zip | 2017/06/16 21:14 | 263,7 KB |
| R1-1711292.zip | 2017/06/16 21:14 | 332,8 KB |
| R1-1711293.zip | 2017/06/17 5:30 | 137,1 KB |
| R1-1711294.zip | 2017/06/16 21:13 | 154 KB |
| R1-1711295.zip | 2017/06/16 21:15 | 99,9 KB |
| R1-1711296.zip | 2017/06/16 21:15 | 152,1 KB |
| R1-1711297.zip | 2017/06/16 21:15 | 147,4 KB |
| R1-1711298.zip | 2017/06/16 21:15 | 38,9 KB |
| R1-1711299.zip | 2017/06/16 21:15 | 435,7 KB |
| R1-1711300.zip | 2017/06/16 21:15 | 38,7 KB |
| R1-1711301.zip | 2017/06/16 21:15 | 46,2 KB |
| R1-1711302.zip | 2017/06/17 5:31 | 132,5 KB |
| R1-1711303.zip | 2017/06/16 21:15 | 46,1 KB |
| R1-1711304.zip | 2017/06/16 21:16 | 489,3 KB |
| R1-1711305.zip | 2017/06/16 21:16 | 150,6 KB |
| R1-1711306.zip | 2017/06/16 21:16 | 419,7 KB |
| R1-1711307.zip | 2017/06/16 21:16 | 47,8 KB |
| R1-1711308.zip | 2017/06/16 21:16 | 154,3 KB |
| R1-1711309.zip | 2017/06/16 21:16 | 40,6 KB |
| R1-1711310.zip | 2017/06/16 21:16 | 61,8 KB |
| R1-1711311.zip | 2017/06/16 21:16 | 340,3 KB |
| R1-1711312.zip | 2017/06/16 21:16 | 120,5 KB |
| R1-1711313.zip | 2017/06/16 18:18 | 70,8 KB |
| R1-1711314.zip | 2017/06/16 18:18 | 163,6 KB |
| R1-1711315.zip | 2017/06/16 18:18 | 43,3 KB |
| R1-1711316.zip | 2017/06/16 9:58 | 55,5 KB |
| R1-1711317.zip | 2017/06/16 12:44 | 21,8 KB |
| R1-1711318.zip | 2017/06/16 11:31 | 60,7 KB |
| R1-1711319.zip | 2017/06/16 11:32 | 99 KB |
| R1-1711320.zip | 2017/06/16 11:54 | 75,4 KB |
| R1-1711321.zip | 2017/06/16 11:33 | 53,6 KB |
| R1-1711322.zip | 2017/06/16 11:36 | 54,6 KB |

| sort by name/desc | sort by date/desc | sort by size/desc |
|---|---|---|
| R1-1711323.zip | 2017/06/16 11:37 | 52,7 KB |
| R1-1711324.zip | 2017/06/16 11:47 | 59 KB |
| R1-1711325.zip | 2017/06/16 11:48 | 56,2 KB |
| R1-1711326.zip | 2017/06/16 11:37 | 53,9 KB |
| R1-1711327.zip | 2017/06/16 11:49 | 200,1 KB |
| R1-1711328.zip | 2017/06/16 11:50 | 69,5 KB |
| R1-1711329.zip | 2017/06/16 11:51 | 77,6 KB |
| R1-1711330.zip | 2017/06/16 11:39 | 423,5 KB |
| R1-1711331.zip | 2017/06/16 11:40 | 74,1 KB |
| R1-1711332.zip | 2017/06/16 11:41 | 82,5 KB |
| R1-1711333.zip | 2017/06/16 11:52 | 129,5 KB |
| R1-1711334.zip | 2017/06/16 17:56 | 23 KB |
| R1-1711335.zip | 2017/06/16 17:56 | 22,6 KB |
| R1-1711336.zip | 2017/06/17 5:45 | 441 KB |
| R1-1711337.zip | 2017/06/17 5:46 | 249,9 KB |
| R1-1711338.zip | 2017/06/16 9:11 | 32,4 KB |
| R1-1711339.zip | 2017/06/16 9:11 | 92,9 KB |
| R1-1711340.zip | 2017/06/16 9:11 | 117,6 KB |
| R1-1711341.zip | 2017/06/16 9:11 | 20,6 KB |
| R1-1711342.zip | 2017/06/16 9:11 | 19,6 KB |
| R1-1711343.zip | 2017/06/16 10:33 | 107,6 KB |
| R1-1711344.zip | 2017/06/20 5:18 | 55,2 KB |
| R1-1711345.zip | 2017/06/20 5:20 | 94,2 KB |
| R1-1711346.zip | 2017/06/20 5:20 | 137,3 KB |
| R1-1711347.zip | 2017/06/20 6:23 | 813,8 KB |
| R1-1711348.zip | 2017/06/20 6:23 | 507,2 KB |
| R1-1711349.zip | 2017/06/20 5:20 | 25 KB |
| R1-1711350.zip | 2017/06/17 10:46 | 136,5 KB |
| R1-1711351.zip | 2017/06/19 6:27 | 231,5 KB |
| R1-1711352.zip | 2017/06/17 10:46 | 136,2 KB |
| R1-1711353.zip | 2017/06/17 10:46 | 81,4 KB |
| R1-1711354.zip | 2017/06/17 8:03 | 126,8 KB |
| R1-1711355.zip | 2017/06/17 8:04 | 83,8 KB |
| R1-1711356.zip | 2017/06/17 8:04 | 182,6 KB |

| sort by name/desc | sort by date/desc | sort by size/desc |
|---|---|---|
| R1-1711357.zip | 2017/06/17 8:04 | 194 KB |
| R1-1711358.zip | 2017/06/17 8:04 | 163,9 KB |
| R1-1711359.zip | 2017/06/17 8:04 | 63,5 KB |
| R1-1711360.zip | 2017/06/17 8:04 | 87,6 KB |
| R1-1711361.zip | 2017/06/17 8:04 | 88,3 KB |
| R1-1711362.zip | 2017/06/17 8:04 | 161,6 KB |
| R1-1711363.zip | 2017/06/17 2:48 | 20,8 KB |
| R1-1711364.zip | 2017/06/17 2:49 | 20,4 KB |
| R1-1711365.zip | 2017/06/16 15:23 | 67,6 KB |
| R1-1711366.zip | 2017/06/19 7:47 | 506,3 KB |
| R1-1711367.zip | 2017/06/16 15:16 | 75,6 KB |
| R1-1711368.zip | 2017/06/16 11:53 | 70,2 KB |
| R1-1711369.zip | 2017/06/16 11:53 | 71,3 KB |
| R1-1711371.zip | 2017/06/17 5:46 | 80,5 KB |
| R1-1711372.zip | 2017/06/17 5:46 | 143,7 KB |
| R1-1711373.zip | 2017/06/19 21:15 | 297,8 KB |
| R1-1711374.zip | 2017/06/17 5:46 | 72,6 KB |
| R1-1711375.zip | 2017/06/19 21:15 | 158 KB |
| R1-1711376.zip | 2017/06/17 5:46 | 116,9 KB |
| R1-1711377.zip | 2017/06/17 5:46 | 136,4 KB |
| R1-1711378.zip | 2017/06/17 5:46 | 52,1 KB |
| R1-1711379.zip | 2017/06/17 5:46 | 72,9 KB |
| R1-1711380.zip | 2017/06/17 5:46 | 203,9 KB |
| R1-1711381.zip | 2017/06/17 5:46 | 465,6 KB |
| R1-1711382.zip | 2017/06/17 5:46 | 58,3 KB |
| R1-1711383.zip | 2017/06/17 5:46 | 1483,9 KB |
| R1-1711384.zip | 2017/06/17 5:46 | 348,6 KB |
| R1-1711385.zip | 2017/06/17 5:46 | 471,7 KB |
| R1-1711386.zip | 2017/06/17 5:46 | 135,3 KB |
| R1-1711387.zip | 2017/06/17 5:46 | 78,3 KB |
| R1-1711388.zip | 2017/06/17 5:46 | 56,8 KB |
| R1-1711389.zip | 2017/06/17 5:46 | 41,9 KB |
| R1-1711390.zip | 2017/06/16 11:53 | 90,4 KB |
| R1-1711391.zip | 2017/06/19 11:19 | 54,3 KB |

| sort by name/desc | sort by date/desc | sort by size/desc |
|---|---|---|
| R1-1711392.zip | 2017/06/16 18:12 | 194,2 KB |
| R1-1711393.zip | 2017/06/17 4:32 | 200,7 KB |
| R1-1711394.zip | 2017/06/17 3:55 | 401,7 KB |
| R1-1711395.zip | 2017/06/17 3:56 | 127,3 KB |
| R1-1711396.zip | 2017/06/16 16:22 | 120,5 KB |
| R1-1711397.zip | 2017/06/16 16:22 | 390,1 KB |
| R1-1711398.zip | 2017/06/16 18:22 | 110,5 KB |
| R1-1711399.zip | 2017/06/16 18:44 | 524,6 KB |
| R1-1711400.zip | 2017/06/16 18:44 | 76,5 KB |
| R1-1711401.zip | 2017/06/17 3:15 | 105,7 KB |
| R1-1711402.zip | 2017/06/17 3:15 | 41,9 KB |
| R1-1711403.zip | 2017/06/17 3:15 | 53,6 KB |
| R1-1711404.zip | 2017/06/17 4:46 | 207,2 KB |
| R1-1711405.zip | 2017/06/17 3:15 | 51 KB |
| R1-1711406.zip | 2017/06/17 3:15 | 29,5 KB |
| R1-1711407.zip | 2017/06/17 5:30 | 109,7 KB |
| R1-1711408.zip | 2017/06/17 3:15 | 41,6 KB |
| R1-1711409.zip | 2017/06/17 3:15 | 180,6 KB |
| R1-1711410.zip | 2017/06/17 3:15 | 325,9 KB |
| R1-1711411.zip | 2017/06/17 2:56 | 388 KB |
| R1-1711412.zip | 2017/06/17 2:56 | 543,4 KB |
| R1-1711413.zip | 2017/06/17 2:56 | 801,7 KB |
| R1-1711414.zip | 2017/06/17 2:56 | 314,4 KB |
| R1-1711415.zip | 2017/06/17 2:56 | 203,1 KB |
| R1-1711416.zip | 2017/06/17 2:56 | 390 KB |
| R1-1711417.zip | 2017/06/17 2:56 | 166,4 KB |
| R1-1711418.zip | 2017/06/17 2:56 | 30,4 KB |
| R1-1711419.zip | 2017/06/17 2:56 | 210 KB |
| R1-1711420.zip | 2017/06/17 2:56 | 169,7 KB |
| R1-1711421.zip | 2017/06/17 2:56 | 67,3 KB |
| R1-1711422.zip | 2017/06/17 2:56 | 93,2 KB |
| R1-1711423.zip | 2017/06/17 2:56 | 119,1 KB |
| R1-1711424.zip | 2017/06/17 2:51 | 111,1 KB |
| R1-1711425.zip | 2017/06/17 2:56 | 41 KB |

| sort by name/desc | sort by date/desc | sort by size/desc |
|---|---|---|
| R1-1711426.zip | 2017/06/17 2:57 | 37,4 KB |
| R1-1711427.zip | 2017/06/17 2:57 | 117 KB |
| R1-1711428.zip | 2017/06/17 2:57 | 62,6 KB |
| R1-1711429.zip | 2017/06/17 2:57 | 55,4 KB |
| R1-1711430.zip | 2017/06/17 2:57 | 172,7 KB |
| R1-1711431.zip | 2017/06/17 2:57 | 103,5 KB |
| R1-1711432.zip | 2017/06/17 2:57 | 202,6 KB |
| R1-1711433.zip | 2017/06/17 3:15 | 108,6 KB |
| R1-1711434.zip | 2017/06/17 3:15 | 106,7 KB |
| R1-1711435.zip | 2017/06/17 3:15 | 253,8 KB |
| R1-1711436.zip | 2017/06/27 15:17 | 421 KB |
| R1-1711437.zip | 2017/06/27 15:17 | 337,3 KB |
| R1-1711438.zip | 2017/06/20 5:18 | 292,7 KB |
| R1-1711439.zip | 2017/06/20 5:18 | 83,7 KB |
| R1-1711441.zip | 2017/06/18 14:26 | 73,1 KB |
| R1-1711442.zip | 2017/06/20 5:17 | 2909,2 KB |
| R1-1711443.zip | 2017/06/20 5:17 | 109,9 KB |
| R1-1711444.zip | 2017/06/16 19:58 | 1347,4 KB |
| R1-1711445.zip | 2017/06/16 19:58 | 149,3 KB |
| R1-1711446.zip | 2017/06/16 19:58 | 157,2 KB |
| R1-1711447.zip | 2017/06/16 19:58 | 44,6 KB |
| R1-1711448.zip | 2017/06/16 19:58 | 46,7 KB |
| R1-1711449.zip | 2017/06/16 19:58 | 330,4 KB |
| R1-1711450.zip | 2017/06/17 1:58 | 44 KB |
| R1-1711451.zip | 2017/06/17 1:59 | 55,5 KB |
| R1-1711452.zip | 2017/06/17 1:59 | 124,2 KB |
| R1-1711453.zip | 2017/06/16 19:58 | 64,1 KB |
| R1-1711454.zip | 2017/06/17 1:59 | 449,9 KB |
| R1-1711455.zip | 2017/06/16 19:58 | 57,6 KB |
| R1-1711456.zip | 2017/06/16 19:58 | 82 KB |
| R1-1711457.zip | 2017/06/17 1:59 | 101,3 KB |
| R1-1711458.zip | 2017/06/17 1:59 | 62,4 KB |
| R1-1711459.zip | 2017/06/17 1:59 | 137,9 KB |
| R1-1711460.zip | 2017/06/17 2:00 | 44,5 KB |

| sort by name/desc | sort by date/desc | sort by size/desc |
|---|---|---|
| R1-1711461.zip | 2017/06/17 2:00 | 660,8 KB |
| R1-1711462.zip | 2017/06/17 2:00 | 117 KB |
| R1-1711463.zip | 2017/06/17 2:00 | 326 KB |
| R1-1711464.zip | 2017/06/17 2:51 | 111,9 KB |
| R1-1711465.zip | 2017/06/17 2:51 | 408,5 KB |
| R1-1711466.zip | 2017/06/17 2:51 | 595,2 KB |
| R1-1711467.zip | 2017/06/17 2:51 | 115,2 KB |
| R1-1711468.zip | 2017/06/16 13:21 | 93,3 KB |
| R1-1711469.zip | 2017/06/17 2:51 | 31,3 KB |
| R1-1711470.zip | 2017/06/17 2:51 | 136 KB |
| R1-1711471.zip | 2017/06/16 13:21 | 242,6 KB |
| R1-1711472.zip | 2017/06/16 13:21 | 130,7 KB |
| R1-1711473.zip | 2017/06/16 13:21 | 34,3 KB |
| R1-1711474.zip | 2017/06/16 13:21 | 21,6 KB |
| R1-1711475.zip | 2017/06/16 13:21 | 71,9 KB |
| R1-1711476.zip | 2017/06/17 5:59 | 43,2 KB |
| R1-1711477.zip | 2017/06/17 5:59 | 450,1 KB |
| R1-1711478.zip | 2017/06/17 5:59 | 184,4 KB |
| R1-1711479.zip | 2017/06/17 5:59 | 48,1 KB |
| R1-1711480.zip | 2017/06/17 5:59 | 55,7 KB |
| R1-1711481.zip | 2017/06/17 5:59 | 47,1 KB |
| R1-1711482.zip | 2017/06/17 5:59 | 86,1 KB |
| R1-1711483.zip | 2017/06/17 6:05 | 47,5 KB |
| R1-1711484.zip | 2017/06/17 6:05 | 50,7 KB |
| R1-1711485.zip | 2017/06/17 6:05 | 48,7 KB |
| R1-1711486.zip | 2017/06/17 5:59 | 287 KB |
| R1-1711487.zip | 2017/06/17 5:59 | 407,4 KB |
| R1-1711488.zip | 2017/06/17 5:59 | 596,4 KB |
| R1-1711489.zip | 2017/06/17 5:59 | 119,9 KB |
| R1-1711490.zip | 2017/06/17 5:59 | 222,7 KB |
| R1-1711491.zip | 2017/06/17 5:59 | 326,9 KB |
| R1-1711492.zip | 2017/06/17 5:59 | 27 KB |
| R1-1711493.zip | 2017/06/17 5:59 | 44,9 KB |
| R1-1711494.zip | 2017/06/17 5:59 | 243 KB |

| sort by name/desc | sort by date/desc | sort by size/desc |
|---|---|---|
| R1-1711495.zip | 2017/06/17 5:59 | 182,3 KB |
| R1-1711496.zip | 2017/06/17 5:59 | 93,1 KB |
| R1-1711497.zip | 2017/06/17 5:59 | 39,6 KB |
| R1-1711498.zip | 2017/06/17 5:59 | 458,8 KB |
| R1-1711499.zip | 2017/06/17 5:59 | 66,5 KB |
| R1-1711500.zip | 2017/06/17 5:59 | 39,8 KB |
| R1-1711501.zip | 2017/06/17 5:59 | 104,3 KB |
| R1-1711502.zip | 2017/06/17 5:59 | 44,5 KB |
| R1-1711503.zip | 2017/06/17 5:59 | 42,4 KB |
| R1-1711504.zip | 2017/06/17 5:59 | 43,3 KB |
| R1-1711505.zip | 2017/06/17 5:59 | 81,8 KB |
| R1-1711506.zip | 2017/06/17 5:59 | 79,1 KB |
| R1-1711507.zip | 2017/06/17 5:59 | 46,5 KB |
| R1-1711508.zip | 2017/06/17 5:59 | 40,1 KB |
| R1-1711509.zip | 2017/06/17 6:00 | 30,2 KB |
| R1-1711510.zip | 2017/06/17 5:59 | 86,4 KB |
| R1-1711511.zip | 2017/06/17 5:59 | 43,9 KB |
| R1-1711512.zip | 2017/06/17 5:59 | 32,8 KB |
| R1-1711513.zip | 2017/06/17 5:59 | 41,1 KB |
| R1-1711514.zip | 2017/06/17 5:59 | 38,9 KB |
| R1-1711515.zip | 2017/06/17 5:59 | 48,4 KB |
| R1-1711516.zip | 2017/06/17 5:59 | 26,6 KB |
| R1-1711517.zip | 2017/06/17 5:59 | 78,6 KB |
| R1-1711518.zip | 2017/06/17 5:59 | 33,2 KB |
| R1-1711519.zip | 2017/06/17 5:59 | 21,3 KB |
| R1-1711520.zip | 2017/06/17 5:59 | 68 KB |
| R1-1711521.zip | 2017/06/17 5:59 | 66,8 KB |
| R1-1711522.zip | 2017/06/17 5:59 | 66,9 KB |
| R1-1711523.zip | 2017/06/17 5:59 | 165,8 KB |
| R1-1711524.zip | 2017/06/17 5:59 | 68,2 KB |
| R1-1711525.zip | 2017/06/17 5:59 | 67,6 KB |
| R1-1711526.zip | 2017/06/17 5:59 | 16,5 KB |
| R1-1711527.zip | 2017/06/17 3:52 | 108 KB |
| R1-1711528.zip | 2017/06/16 18:49 | 18 KB |

| sort by name/desc | sort by date/desc | sort by size/desc |
|---|---|---|
| R1-1711529.zip | 2017/06/16 18:50 | 18,6 KB |
| R1-1711530.zip | 2017/06/16 13:39 | 192,3 KB |
| R1-1711531.zip | 2017/06/16 13:39 | 147,3 KB |
| R1-1711532.zip | 2017/06/19 20:30 | 56,1 KB |
| R1-1711533.zip | 2017/06/19 20:30 | 87,8 KB |
| R1-1711534.zip | 2017/06/19 20:30 | 157,9 KB |
| R1-1711535.zip | 2017/06/19 20:30 | 76,7 KB |
| R1-1711536.zip | 2017/06/19 20:30 | 153 KB |
| R1-1711537.zip | 2017/06/27 15:17 | 232,8 KB |
| R1-1711538.zip | 2017/06/19 20:30 | 537,5 KB |
| R1-1711539.zip | 2017/06/19 20:30 | 149,9 KB |
| R1-1711540.zip | 2017/06/19 20:30 | 135 KB |
| R1-1711541.zip | 2017/06/25 11:52 | 110,2 KB |
| R1-1711542.zip | 2017/06/19 20:30 | 450,5 KB |
| R1-1711543.zip | 2017/06/19 20:30 | 224,3 KB |
| R1-1711544.zip | 2017/06/19 20:30 | 79 KB |
| R1-1711545.zip | 2017/06/19 20:30 | 78,8 KB |
| R1-1711546.zip | 2017/06/19 20:30 | 126,8 KB |
| R1-1711547.zip | 2017/06/16 13:39 | 116,9 KB |
| R1-1711548.zip | 2017/06/16 13:39 | 167,3 KB |
| R1-1711549.zip | 2017/06/16 16:38 | 36,1 KB |
| R1-1711550.zip | 2017/06/16 17:39 | 54,6 KB |
| R1-1711551.zip | 2017/06/16 14:06 | 53,4 KB |
| R1-1711552.zip | 2017/06/17 5:17 | 69,3 KB |
| R1-1711553.zip | 2017/06/17 5:17 | 149,5 KB |
| R1-1711554.zip | 2017/06/17 5:17 | 185,4 KB |
| R1-1711555.zip | 2017/06/17 5:17 | 99,9 KB |
| R1-1711556.zip | 2017/06/17 5:17 | 233,1 KB |
| R1-1711557.zip | 2017/06/20 6:25 | 132 KB |
| R1-1711558.zip | 2017/06/17 5:26 | 36,5 KB |
| R1-1711560.zip | 2017/06/16 15:22 | 2888,3 KB |
| R1-1711561.zip | 2017/06/17 4:31 | 99,8 KB |
| R1-1711562.zip | 2017/06/17 4:31 | 222,2 KB |
| R1-1711563.zip | 2017/06/17 4:31 | 75,1 KB |

| sort by name/desc | sort by date/desc | sort by size/desc |
|---|---|---|
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| R1-1711565.zip | 2017/06/16 21:30 | 41,6 KB |
| R1-1711566.zip | 2017/06/16 21:13 | 54,4 KB |
| R1-1711567.zip | 2017/06/27 15:17 | 29,4 KB |
| R1-1711568.zip | 2017/06/16 16:39 | 144,6 KB |
| R1-1711569.zip | 2017/06/16 21:32 | 157,3 KB |
| R1-1711570.zip | 2017/06/20 2:58 | 285,1 KB |
| R1-1711571.zip | 2017/06/20 2:58 | 116,3 KB |
| R1-1711573.zip | 2017/06/28 13:45 | 577,5 KB |
| R1-1711574.zip | 2017/06/17 10:09 | 52,8 KB |
| R1-1711575.zip | 2017/06/19 8:58 | 220,5 KB |
| R1-1711576.zip | 2017/06/20 7:43 | 43,6 KB |
| R1-1711577.zip | 2017/06/20 7:43 | 68,9 KB |
| R1-1711578.zip | 2017/06/27 15:17 | 57,8 KB |
| R1-1711579.zip | 2017/06/21 16:29 | 50,6 KB |
| R1-1711580.zip | 2017/06/27 15:17 | 306,3 KB |
| R1-1711581.zip | 2017/06/28 13:45 | 108,4 KB |
| R1-1711582.zip | 2017/06/21 16:29 | 886,4 KB |
| R1-1711583.zip | 2017/06/23 20:31 | 225,9 KB |
| R1-1711584.zip | 2017/06/23 20:31 | 69,3 KB |
| R1-1711585.zip | 2017/06/23 20:31 | 121,7 KB |
| R1-1711586.zip | 2017/06/21 16:29 | 69,3 KB |
| R1-1711587.zip | 2017/06/27 15:17 | 339,9 KB |
| R1-1711588.zip | 2017/06/27 15:17 | 210,2 KB |
| R1-1711589.zip | 2017/06/23 20:31 | 231,8 KB |
| R1-1711590.zip | 2017/06/22 8:57 | 355,7 KB |
| R1-1711591.zip | 2017/06/23 20:31 | 223,8 KB |
| R1-1711592.zip | 2017/06/23 20:31 | 278,8 KB |
| R1-1711593.zip | 2017/06/23 20:31 | 27,8 KB |
| R1-1711594.zip | 2017/06/23 20:31 | 423,2 KB |
| R1-1711595.zip | 2017/06/27 15:17 | 115,8 KB |
| R1-1711596.zip | 2017/06/23 20:31 | 74,1 KB |
| R1-1711597.zip | 2017/06/23 20:31 | 131,2 KB |
| R1-1711598.zip | 2017/06/23 20:31 | 481,1 KB |

| sort by name/desc | sort by date/desc | sort by size/desc |
|---|---|---|
| R1-1711599.zip | 2017/06/23 20:31 | 159,8 KB |
| R1-1711600.zip | 2017/06/22 14:56 | 961,1 KB |
| R1-1711601.zip | 2017/06/22 14:15 | 93,5 KB |
| R1-1711602.zip | 2017/06/22 14:56 | 331 KB |
| R1-1711603.zip | 2017/06/23 20:31 | 185,4 KB |
| R1-1711604.zip | 2017/06/23 20:31 | 169,4 KB |
| R1-1711605.zip | 2017/06/27 15:17 | 208,2 KB |
| R1-1711606.zip | 2017/06/25 11:52 | 914,3 KB |
| R1-1711607.zip | 2017/06/25 11:52 | 353 KB |
| R1-1711608.zip | 2017/06/25 11:52 | 80,8 KB |
| R1-1711609.zip | 2017/06/26 3:03 | 48,2 KB |
| R1-1711610.zip | 2017/06/26 9:06 | 199,3 KB |
| R1-1711611.zip | 2017/06/25 2:48 | 250 KB |
| R1-1711612.zip | 2017/06/25 2:48 | 807,1 KB |
| R1-1711613.zip | 2017/06/26 1:09 | 3141,2 KB |
| R1-1711614.zip | 2017/06/24 6:59 | 54 KB |
| R1-1711615.zip | 2017/06/24 6:59 | 3034,9 KB |
| R1-1711616.zip | 2017/06/24 6:59 | 26,9 KB |
| R1-1711617.zip | 2017/06/24 6:59 | 103,8 KB |
| R1-1711618.zip | 2017/06/26 1:09 | 720,3 KB |
| R1-1711619.zip | 2017/06/24 6:59 | 157 KB |
| R1-1711620.zip | 2017/06/24 6:59 | 272,9 KB |
| R1-1711621.zip | 2017/06/24 6:59 | 465,3 KB |
| R1-1711622.zip | 2017/06/27 15:16 | 147,4 KB |
| R1-1711623.zip | 2017/06/28 13:44 | 44,8 KB |
| R1-1711624.zip | 2017/06/28 13:44 | 86,8 KB |
| R1-1711625.zip | 2017/06/24 6:59 | 199,5 KB |
| R1-1711626.zip | 2017/06/24 6:59 | 41,7 KB |
| R1-1711627.zip | 2017/06/27 15:16 | 222,6 KB |
| R1-1711628.zip | 2017/06/27 15:16 | 219,5 KB |
| R1-1711629.zip | 2017/06/27 15:16 | 438 KB |
| R1-1711630.zip | 2017/06/27 15:16 | 438,7 KB |
| R1-1711631.zip | 2017/06/24 14:35 | 218,1 KB |
| R1-1711632.zip | 2017/06/25 11:52 | 391,4 KB |

| sort by name/desc | sort by date/desc | sort by size/desc |
|---|---|---|
| R1-1711633.zip | 2017/06/25 2:49 | 1707,8 KB |
| R1-1711634.zip | 2017/06/25 2:49 | 801,7 KB |
| R1-1711636.zip | 2017/06/25 11:52 | 171,7 KB |
| R1-1711637.zip | 2017/06/25 11:52 | 54,3 KB |
| R1-1711638.zip | 2017/06/25 11:52 | 265,1 KB |
| R1-1711639.zip | 2017/06/27 15:16 | 533,8 KB |
| R1-1711641.zip | 2017/06/27 15:16 | 1498,9 KB |
| R1-1711642.zip | 2017/06/26 9:06 | 11,9 KB |
| R1-1711643.zip | 2017/06/27 15:16 | 192,7 KB |
| R1-1711644.zip | 2017/06/27 15:16 | 1004 KB |
| R1-1711645.zip | 2017/06/27 15:15 | 382,7 KB |
| R1-1711646.zip | 2017/06/27 15:16 | 3065,5 KB |
| R1-1711647.zip | 2017/06/27 15:15 | 301,1 KB |
| R1-1711648.zip | 2017/06/27 15:15 | 871,4 KB |
| R1-1711649.zip | 2017/06/27 15:15 | 412,1 KB |
| R1-1711650.zip | 2017/06/27 15:15 | 247,4 KB |
| R1-1711652.zip | 2017/06/27 15:15 | 57,6 KB |
| R1-1711653.zip | 2017/06/27 15:15 | 111,4 KB |
| R1-1711654.zip | 2017/06/27 15:15 | 203,4 KB |
| R1-1711655.zip | 2017/06/27 15:15 | 562,6 KB |
| R1-1711657.zip | 2017/07/01 0:57 | 15,1 KB |
| R1-1711658.zip | 2017/06/27 15:15 | 163,9 KB |
| R1-1711659.zip | 2017/06/27 15:15 | 205,1 KB |
| R1-1711660.zip | 2017/06/28 13:44 | 66,2 KB |
| R1-1711661.zip | 2017/06/27 15:14 | 63,5 KB |
| R1-1711662.zip | 2017/06/28 13:44 | 52,6 KB |
| R1-1711664.zip | 2017/07/01 0:57 | 25,4 KB |
| R1-1711665.zip | 2017/07/01 0:57 | 24,8 KB |
| R1-1711666.zip | 2017/06/29 12:37 | 24,7 KB |
| R1-1711667.zip | 2017/06/28 13:44 | 27,3 KB |
| R1-1711668.zip | 2017/06/29 12:37 | 24,4 KB |
| R1-1711669.zip | 2017/06/27 15:14 | 171,8 KB |
| R1-1711671.zip | 2017/06/27 15:14 | 98,6 KB |
| R1-1711672.zip | 2017/06/27 15:14 | 59,4 KB |

| sort by name/desc | sort by date/desc | sort by size/desc |
|---|---|---|
| R1-1711674.zip | 2017/06/28 13:44 | 42,5 KB |
| R1-1711675.zip | 2017/06/27 15:14 | 44,6 KB |
| R1-1711677.zip | 2017/06/28 13:44 | 356,6 KB |
| R1-1711678.zip | 2017/06/29 12:37 | 61,5 KB |
| R1-1711679.zip | 2017/06/28 13:44 | 295,9 KB |
| R1-1711681.zip | 2017/06/27 15:14 | 31,1 KB |
| R1-1711682.zip | 2017/06/27 15:14 | 35,5 KB |
| R1-1711683.zip | 2017/07/01 0:57 | 16,6 KB |
| R1-1711684.zip | 2017/06/29 12:37 | 18,7 KB |
| R1-1711685.zip | 2017/07/01 0:57 | 14,5 KB |
| R1-1711686.zip | 2017/08/12 9:40 | 17,8 KB |
| R1-1711688.zip | 2017/06/29 12:37 | 33,7 KB |
| R1-1711689.zip | 2017/07/03 14:01 | 36,4 KB |
| R1-1711690.zip | 2017/06/28 13:44 | 95,6 KB |
| R1-1711691.zip | 2017/06/28 13:44 | 51,3 KB |
| R1-1711692.zip | 2017/06/27 15:14 | 17,1 KB |
| R1-1711693.zip | 2017/06/27 15:14 | 158,2 KB |
| R1-1711694.zip | 2017/06/27 15:14 | 186,2 KB |
| R1-1711695.zip | 2017/06/27 15:14 | 51,9 KB |
| R1-1711696.zip | 2017/06/27 15:14 | 254,2 KB |
| R1-1711697.zip | 2017/06/29 12:37 | 33,1 KB |
| R1-1711698.zip | 2017/06/29 12:37 | 29,7 KB |
| R1-1711699.zip | 2017/06/29 12:37 | 34,7 KB |
| R1-1711700.zip | 2017/06/27 15:14 | 35,3 KB |
| R1-1711701.zip | 2017/06/27 15:14 | 114,9 KB |
| R1-1711702.zip | 2017/06/28 13:44 | 434,6 KB |
| R1-1711705.zip | 2017/06/27 15:14 | 24,3 KB |
| R1-1711707.zip | 2017/06/27 15:14 | 39,8 KB |
| R1-1711708.zip | 2017/06/27 15:14 | 38,3 KB |
| R1-1711709.zip | 2017/06/27 15:14 | 29 KB |
| R1-1711710.zip | 2017/06/29 12:37 | 26,4 KB |
| R1-1711711.zip | 2017/06/27 15:14 | 255,4 KB |
| R1-1711712.zip | 2017/07/01 0:57 | 91 KB |
| R1-1711714.zip | 2017/06/28 13:44 | 110,1 KB |

| sort by name/desc | sort by date/desc | sort by size/desc |
|---|---|---|
| R1-1711715.zip | 2017/07/01 0:57 | 111,9 KB |
| R1-1711716.zip | 2017/07/01 0:57 | 111,7 KB |
| R1-1711717.zip | 2017/07/01 0:57 | 119,2 KB |
| R1-1711719.zip | 2017/07/01 0:57 | 104,6 KB |
| R1-1711720.zip | 2017/07/01 0:57 | 100,9 KB |
| R1-1711721.zip | 2017/06/29 12:37 | 100,8 KB |
| R1-1711722.zip | 2017/06/29 12:37 | 106,3 KB |
| R1-1711723.zip | 2017/06/28 13:44 | 166,1 KB |
| R1-1711724.zip | 2017/06/29 12:37 | 101,1 KB |
| R1-1711725.zip | 2017/07/01 0:57 | 20,5 KB |
| R1-1711727.zip | 2017/06/27 15:14 | 421,5 KB |
| R1-1711728.zip | 2017/06/28 13:44 | 31,7 KB |
| R1-1711729.zip | 2017/07/01 0:57 | 64,6 KB |
| R1-1711730.zip | 2017/06/28 13:44 | 506,9 KB |
| R1-1711731.zip | 2017/07/01 0:57 | 29,8 KB |
| R1-1711747.zip | 2017/07/01 0:57 | 675,1 KB |
| R1-1711748.zip | 2017/07/01 0:57 | 382,6 KB |
| R1-1711749.zip | 2017/07/01 0:57 | 611,9 KB |
| R1-1711750.zip | 2017/07/01 0:56 | 61 KB |
| R1-1711751.zip | 2017/06/28 13:44 | 312,2 KB |
| R1-1711752.zip | 2017/06/28 13:44 | 658,4 KB |
| R1-1711753.zip | 2017/06/29 12:37 | 33,4 KB |
| R1-1711754.zip | 2017/06/28 13:44 | 43,6 KB |
| R1-1711755.zip | 2017/06/28 13:44 | 76,5 KB |
| R1-1711757.zip | 2017/06/28 13:44 | 1305,2 KB |
| R1-1711758.zip | 2017/07/01 0:56 | 18,8 KB |
| R1-1711759.zip | 2017/06/28 13:43 | 53,6 KB |
| R1-1711760.zip | 2017/07/01 0:56 | 76,1 KB |
| R1-1711761.zip | 2017/06/28 13:43 | 47,2 KB |
| R1-1711762.zip | 2017/06/28 13:43 | 49,6 KB |
| R1-1711763.zip | 2017/06/28 13:43 | 45,7 KB |
| R1-1711764.zip | 2017/06/28 13:43 | 139,6 KB |
| R1-1711765.zip | 2017/06/29 12:37 | 44 KB |
| R1-1711766.zip | 2017/07/01 0:56 | 37,1 KB |

| sort by name/desc | sort by date/desc | sort by size/desc |
|---|---|---|
| R1-1711767.zip | 2017/06/29 12:37 | 37,1 KB |
| R1-1711768.zip | 2017/06/28 13:43 | 39 KB |
| R1-1711769.zip | 2017/07/01 0:56 | 133,6 KB |
| R1-1711770.zip | 2017/06/28 13:43 | 107,1 KB |
| R1-1711771.zip | 2017/06/28 13:43 | 106,5 KB |
| R1-1711772.zip | 2017/06/29 12:37 | 130,3 KB |
| R1-1711773.zip | 2017/06/29 12:37 | 33,4 KB |
| R1-1711774.zip | 2017/06/28 13:43 | 81,1 KB |
| R1-1711775.zip | 2017/06/28 13:43 | 59,2 KB |
| R1-1711776.zip | 2017/07/01 0:56 | 39,3 KB |
| R1-1711777.zip | 2017/07/01 0:56 | 37,4 KB |
| R1-1711778.zip | 2017/06/29 12:37 | 68,8 KB |
| R1-1711779.zip | 2017/06/28 13:43 | 23,7 KB |
| R1-1711780.zip | 2017/06/28 13:43 | 25,3 KB |
| R1-1711781.zip | 2017/06/29 12:37 | 311 KB |
| R1-1711782.zip | 2017/06/28 13:43 | 41,4 KB |
| R1-1711783.zip | 2017/06/28 13:43 | 38,6 KB |
| R1-1711784.zip | 2017/06/29 12:37 | 33,5 KB |
| R1-1711785.zip | 2017/07/01 0:56 | 43,5 KB |
| R1-1711786.zip | 2017/07/01 0:56 | 169,5 KB |
| R1-1711787.zip | 2017/06/29 12:36 | 60,4 KB |
| R1-1711788.zip | 2017/06/28 13:43 | 38,8 KB |
| R1-1711789.zip | 2017/06/28 13:43 | 33,3 KB |
| R1-1711790.zip | 2017/06/28 13:43 | 433,5 KB |
| R1-1711791.zip | 2017/06/29 12:36 | 53,5 KB |
| R1-1711792.zip | 2017/07/01 0:56 | 37,5 KB |
| R1-1711793.zip | 2017/07/01 0:56 | 38,7 KB |
| R1-1711794.zip | 2017/06/29 12:36 | 71 KB |
| R1-1711795.zip | 2017/06/28 13:43 | 40 KB |
| R1-1711796.zip | 2017/06/28 13:43 | 29,5 KB |
| R1-1711797.zip | 2017/06/29 12:36 | 61 KB |
| R1-1711798.zip | 2017/06/28 13:43 | 54,4 KB |
| R1-1711799.zip | 2017/06/29 12:36 | 60,8 KB |
| R1-1711800.zip | 2017/06/29 12:36 | 37,8 KB |

| sort by name/desc | sort by date/desc | sort by size/desc |
|---|---|---|
| R1-1711801.zip | 2017/06/28 13:43 | 47,7 KB |
| R1-1711802.zip | 2017/06/28 13:43 | 31 KB |
| R1-1711803.zip | 2017/06/28 13:43 | 34,6 KB |
| R1-1711804.zip | 2017/06/28 13:43 | 33,2 KB |
| R1-1711805.zip | 2017/06/28 13:43 | 122,1 KB |
| R1-1711806.zip | 2017/06/28 13:43 | 36,4 KB |
| R1-1711807.zip | 2017/06/28 13:43 | 50,7 KB |
| R1-1711808.zip | 2017/06/28 13:43 | 34,9 KB |
| R1-1711809.zip | 2017/07/01 0:56 | 39,6 KB |
| R1-1711810.zip | 2017/06/28 13:43 | 76,8 KB |
| R1-1711811.zip | 2017/07/01 0:56 | 48,8 KB |
| R1-1711812.zip | 2017/06/29 12:36 | 41 KB |
| R1-1711813.zip | 2017/06/29 12:36 | 39,7 KB |
| R1-1711814.zip | 2017/06/29 12:36 | 42,8 KB |
| R1-1711815.zip | 2017/06/29 12:36 | 41,1 KB |
| R1-1711816.zip | 2017/06/29 12:36 | 107 KB |
| R1-1711817.zip | 2017/06/29 12:36 | 84,7 KB |
| R1-1711818.zip | 2017/06/29 12:36 | 36,9 KB |
| R1-1711819.zip | 2017/06/29 12:36 | 37,4 KB |
| R1-1711820.zip | 2017/06/29 12:35 | 10,3 KB |
| R1-1711822.zip | 2017/06/29 12:36 | 2019,3 KB |
| R1-1711823.zip | 2017/07/03 14:01 | 369,9 KB |
| R1-1711824.zip | 2017/06/28 13:43 | 23,4 KB |
| R1-1711825.zip | 2017/06/28 13:43 | 63,7 KB |
| R1-1711827.zip | 2017/06/29 12:35 | 86,6 KB |
| R1-1711828.zip | 2017/06/29 12:35 | 32,4 KB |
| R1-1711829.zip | 2017/06/28 13:43 | 51,2 KB |
| R1-1711830.zip | 2017/06/29 12:35 | 41,3 KB |
| R1-1711831.zip | 2017/06/29 12:35 | 38 KB |
| R1-1711832.zip | 2017/06/29 12:35 | 35,3 KB |
| R1-1711833.zip | 2017/06/29 12:35 | 35,3 KB |
| R1-1711834.zip | 2017/06/28 13:43 | 31,8 KB |
| R1-1711835.zip | 2017/06/28 13:42 | 30,5 KB |
| R1-1711836.zip | 2017/07/01 0:56 | 48,2 KB |

| sort by name/desc | sort by date/desc | sort by size/desc |
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# Appendix 24

**3GPP TSG RAN WG1 Meeting #90** **R1-171xxxx**
**Prague, Czech Rep, 21st – 25th August 2017**

**Source:** **MCC Support**

**Title:** **Draft Report of 3GPP TSG RAN WG1 #AH_NR2 v0.1.0 (Qingdao, China, 27th – 30th June 2017)**

**Document for:** **Comments**

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**3GPP TSG RAN WG1 Meeting #90** **R1-171xxxx**
**Prague, Czech Rep, 21st – 25th August 2017**

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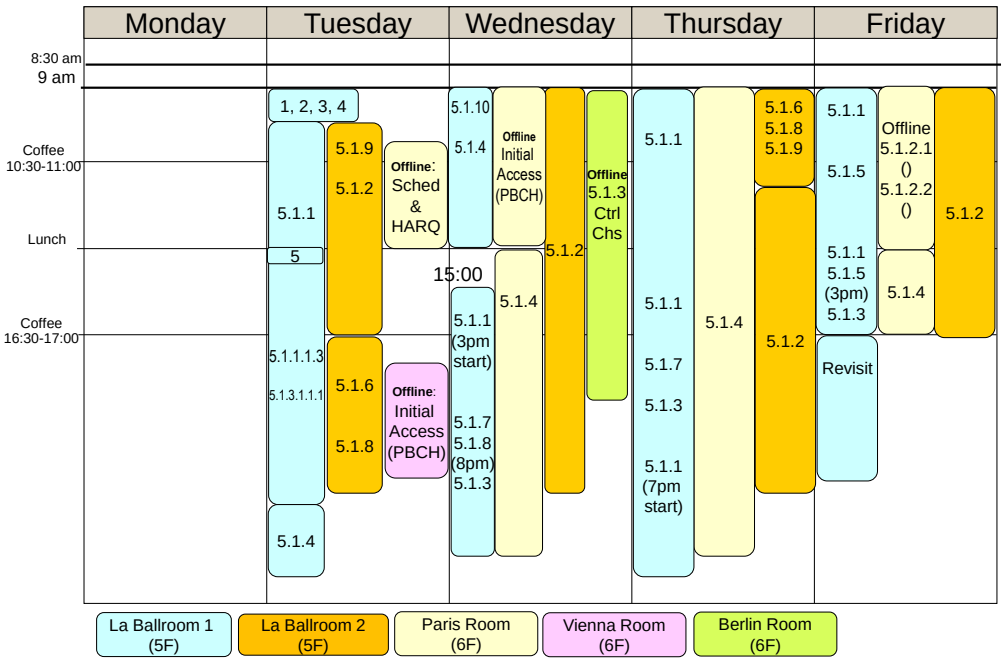
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**3GPP TSG RAN WG1 Meeting #90** **R1-171xxxx**
**Prague, Czech Rep, 21st – 25th August 2017**

**Main facts summary**

The second 3GPP TSG WG RAN1 ad-hoc meeting on NR, hosted by ZTE Corporation, was held at the Meridien Qingdao, China.
The meeting started at 9:00 on Tuesday 27th June and finished at 20:15 on Friday 30th June 2017.
The number of attending delegates, having confirmed their participation through the electronic check-in application, was **394.**
Note that the number of registered was 557.

The schedule of the week was as follows:




Note: The empty slots are devoted to offline sessions.

**The list of action points that required RAN1 close follow-up is listed in Annex F (end of document).**

The number of contributions for this meeting was xxxx, and those documents were categorized as followed.

| Agenda Item | Input Document | Treated Document |
|---|---|---|
| All | | |

Note: The amount of documents includes those discussed during the email discussion session post meeting.

| | |
|---|---|
| | Contribution is agreed/approved |
| | Contribution is not pursued (no consensus) |
| | Further discussion is required – come-back needed |
| | Working assumption |
| | Specific action needed from MCC |
| | Contribution is for email discussion/approval |



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**3GPP TSG RAN WG1 Meeting #90** **R1-171xxxx**
**Prague, Czech Rep, 21st – 25th August 2017**

# 1 Opening of the meeting

Mr Matthew Baker (Vice Chairman) welcomed the participants of the RAN WG1 ad-hoc meeting and opened the meeting at 09:00.
Mr Xinhui Wang on behalf of ZTE welcomed the delegates, and detailed the domestic arrangements for the full week.

## *1.1 Call for IPR*

*The attention of the members of this Technical Specification Group was drawn to the fact* ***that 3GPP Individual Members have the obligation*** *under the IPR Policies of their respective Organizational Partners to* ***inform their respective*** *Organizational Partners* ***of Essential IPRs they become aware of****.*
*The members take note that they are hereby invited:*

- *to investigate whether their organization or any other organization owns IPRs which were, or were likely to become Essential in respect of the work of 3GPP.*
- *to notify their respective Organizational Partners of all potential IPRs, e.g., for ETSI, by means of the IPR Information Statement and the Licensing declaration forms (e.g. see the ETSI IPR forms http://webapp.etsi.org/Ipr/).*

## *1.2 Competition law statement*

*The Chairman also drew Member's attention to the fact that 3GPP activities are subject to antitrust and competition laws and that compliance with said laws is therefore required of any participant of this WG meeting including the Chairman and Vice Chairmen. In case of question, please contact your legal counsel.*
*The present meeting will be conducted with strict impartiality and in the interests of 3GPP.*
*Furthermore, the Chairman reminded Members that timely submission of work items/contributions in advance of WG meetings is important to allow for full and fair consideration of such matters.*

## *1.3 Network usage conditions*

*The PCG has laid down the following network usage conditions:*

**Users shall not use the network to engage in illegal activities. This includes activities such as copyright violation, hacking, espionage or any other activity that may be prohibited by local laws**.

**Users shall not engage in non-work related activities that consume excessive bandwidth** or cause significant degradation of the performance of the network.
Since the **network is a shared resource**, users should exercise some basic etiquette when using the 3GPP network at a meeting. It is understood that high bandwidth applications such as downloading large files or video streaming might be required for business purposes, but delegates should be strongly discouraged in performing these activities for personal use. Downloading a movie or doing something in an interactive environment for personal use essentially wastes bandwidth that others need to make the meeting effective. The meeting chairman should remind end users that the network is a shared resource; the more one user grabs, the less there is for another. Email and its attachments already take up significant bandwidth (certain email programs are not very bandwidth efficient). In case of need the chair can ask the delegates to restrict IT usage to things that are essential for the meeting itself.

**1. DON'T place your WiFi device in ad-hoc mode**
**2. DON'T set up a personal hotspot in the meeting room**
**3. DO try 802.11a if your WiFi device supports it**
**4. DON'T manually allocate an IP address**
**5. DON'T be a bandwidth hog by streaming video, playing online games, or downloading huge files**
**6. DON'T use packet probing software which clogs the local network (e.g., packet sniffers or port scanners)**

# 2 Approval of Agenda

**R1-1711601** **Draft Agenda of RAN1#AH_NR2 meetingRAN1 Chair**
Matthew Baker (Vice Chairman) proposed the agenda for the meeting, as well the schedule of the week.
**Decision:** The agenda is approved.



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# 3 Approval of Minutes from previous meetings

**R1-1709881** **Report of RAN1#89 meeting** **ETSI**
The document was presented by Patrick Merias from MCC (ETSI Mobile Competence Center) and provides a draft of the report from last RAN1#89 meeting in Hangzhou.
**Discussion:** MCC recalled that the report is a draft for information, with focus on the NR part – final report will be presented for approval at the next ordinary meeting (RAN1#90).
**Decision:** The document is approved.

**R1-1711586** **Selected highlights from RAN#76 of relevance to RAN1** **RAN1 Chair**
The document (slide 3 relevant to NR) was presented by Matthew Baker (Vice Chairman) on behalf of RAN1 Chair and provides highlights relevant to RAN1 from the last plenary.
**Discussion:** Confirmation of one additional ad-hoc meeting in January 2018.
Panasonic understanding is that RAN1 works for eMBB low latency (December 2017), no need to work the solution satisfying URLLC at this meeting
Ericsson: the low latency part should be specified until December, independently of use cases (eMMB or URLLC). No need to limit our work to eMBB use case only for December. If clarification needed, should be a RAN discussion/decision
**Decision:** The document is noted.

# 4 Incoming Liaison Statements

**NR Rel-15**
**R1-1710211** **LS on SR design principles in NR** **RAN2, Samsung**
The document was presented by … from Samsung and informs RAN1 of RAN2 most recent agreements on SR design principles for NR. RAN2 would like to inform RAN1 that it does not see the need for multi-bit SR support and ask RAN1 to take all this information into account in its own work on SR design.
**Decision:** The document is noted.

**R1-1710212** **LS on UE measurement capabilities across LTE and NR** **RAN2, NTT DOCOMO**
The document was presented by Hiroki Harada from NTT DOCOMO and asks RAN4 to investigate the UE measurement capabilities and answer the 5 questions listed in the LS.
**Discussion:** No action to RAN1.
**Decision:** The document is noted.

**R1-1710215** **Response LS on reading time index indication for RRM measurements** **RAN2, Intel**
The document was presented by Daewon Lee from Intel and is a reply to R1-1706707:

- From RAN2 point of view, the UE should be able to perform beam/cell measurement and identification quickly and reliably with minimal need for measurement gaps. Therefore, if there is considerable delay due to reading the time index from PBCH, RAN2 observes that this may impact handover performance and UE power consumption. RAN2 would like to ask RAN1 to consider the above information in RAN1 design.
- In addition, RAN2 would like to ask RAN1 if the time index indication needs to be acquired by the UE for every measurement sample and if the UE also need to acquire the time index indication in the idle/inactive mode.

**Discussion:** Suggested reply in R1-1710500.
**Decision:** The document is noted.

**R1-1710500** **Draft Reply LS on reading time index indication for RRM measurements** **Intel Corporation**
The document was presented by Daewon Lee from Intel and is a reply to R2-1706160 (R1-1710215).

- For UEs in CONNECTED mode, UE may be able to infer the SS block time index indication for detected NR PSS/SSS of neighbour cell, if the UE has successfully retrieve the SS block time index of any SS block from the neighbour cell. However, depending of network deployment scenario, configured SS burst set periodicity, and mobility situation of the UE, the UE may need to re-retrieve the SS block time index of neighbour cells time to time and possibly in every few measurement samples when SS burst set periodicity is configured to be very long (e.g. 160 msec). The frequency and instances in which the UE is required to read the SS block time index of the detected SS block is implementation specific. In case of inter-frequency RRM measurements, UE may be required to read the SS block time index within the measurement gap at least once.
- For UEs in IDLE/INACTIVE mode, UEs may not necessarily need the SS block time index for the cell re-selection process. UEs will be able to uniquely identify whether two SS blocks from a cell are from the same beam or not by interval between the two SS blocks. If the SS blocks are separately by integer multiple of the configured SS burst set periodicity, the two SS blocks are from the same beam. Otherwise, they are from different beam. Given that the UE is able to uniquely identify SS blocks (although it may not have the SS block time index information), it can perform per beam filtering of the measurements and ultimately derive the cell level quality. It should be noted that when the UE needs to camp on a cell, it will be required to successfully read the SS block time index information (as well as SFN in NR PBCH) to derive the slot and radio frame boundaries.



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**Decision:** The document is noted. To be treated under 5.1.1.1.3 for the preparation of the final answer.
**Friday:**
**R1-1711907 [DRAFT] Reply LS response on reading time index indication for RRM measurements Intel**
**Decision:** The document is noted and final LS is approved in R1-1711966.

**R1-1710216 LS on Emergency Support in NR SA2, Nokia**
The document was presented by Karri Ranta-aho from Nokia and asks RAN to clarify and confirm the support for emergency services including regulatory requirements in NR for Rel-15.
**Discussion:** No action to RAN1.
**Decision:** The document is noted.

**R1-1710220 Reply LS on Emergency Support in NR RAN, T-Mobile**
The document was presented by Scott Migaldi from T-Mobile and is the reply to R1-1710216.

- RAN confirms that support for Emergency Services and the corresponding support for Location Services is included in the scope for release 15 work. Support for Emergency Services and the corresponding support for Location Services will be specified by June 2018, and will be applicable for both a non-standalone NR UE that is supported with a LTE PCell and for a standalone NR UE. This work will not delay the previously approved December 2017 completion goal deadline for non-standalone NR.
- The regulatory performance targets in any radio access technology are specified in the US by the FCC as shown below:

| FCC BENCHMARK | ACCURACY REQUIREMENT |
|---|---|
| APRIL 2017 | 40% of all 911 Calls <= 50m |
| APRIL 2018 | 50% of all 911 Calls <= 50m |
| APRIL 2020 | 70% of all 911 Calls <= 50m |
| APRIL 2021 | 80% of all 911 Calls <= 50m |

**Decision:** The document is noted.

**R1-1710217 LS on Support for fake gNB detection mechanisms SA3, Nokia**
The document was presented by Karri Ranta-aho from Nokia.
**Discussion:** .Nokia suggested RAN1 looking at questions 4 and 5.
T-Mobile → make sure our reply won't have impact to roaming
**Decision:** The document is noted. Draft a reply in R1-1711657 – (Nokia)
**Friday:**
**R1-1711657 [DRAFT] Response LS on Support for fake gNB detection mechanisms Nokia**
**Decision:** The document is noted and final LS is approved in R1-1711997.

**R1-1710213 LS on UE categories for NR and LTE-NR Dual Connectivity RAN2, NTT DOCOMO**
The document was presented by Fred Takeda from NTT DOCOMO and asks RAN1 to provide input for Layer 1 parameter set today associated with UE category for LTE-NR DC and the NR standalone operation.
**Decision:** The document is noted.

**R1-1710221 Reply LS on UE categories for NR and LTE-NR Dual Connectivity RAN, NTT DOCOMO**
The document was presented by Fred Takeda from NTT DOCOMO and is a preliminary reply to R1-1710213.
Regrarding item 1) The necessity of UE categories for UE in the LTE-NR DC (Opt. 3/4/7) as well as the NR standalone (Opt. 2)
RAN foresees industrial demand that LTE-NR DC (Option 3/4/7 series) enables operators to provide a certain peak data rate, as well as the NR standalone (Option 2). RAN would like to let RAN WGs to decide how the target peak data rate can be supported for LTE-NR DC and NR standalone in the specifications, e.g. whether the existing concept of UE category is inherited or a new concept in defining the target peak data rate is introduced. RAN sees that it is important that practical UE constraints are also taken into account in the UE capabilities and categories e.g. UE constraints due to hardware sharing during LTE – NR DC operations. It is also up to RAN WGs how the UE categories and capabilities are defined for LTE-NR DC as well as NR standalone.

Regarding item 2) The target peak data rate in DL and UL to be supported for Option 3 until December 2017 and item 3) The target peak data rate in DL and UL to be supported for the other options until June 2018.
RAN will discuss these items by email until TSG-RAN #77 and aim to decide the target value(s) at the #77 meeting.
**Decision:** The document is noted.

**R1-1710214 LS reply to SA2 on maximum data rate RAN2, MediaTek**
The document was presented by … from MediaTek and inform RAN1 of RAN2's conclusion that Options 3 also targets the same maximum data rate as NR SA, i.e. 20Gbps for downlink and 10Gbps for uplink per UE.
**Decision:** The document is noted.



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**R1-1711055 Initial views on UE category NTT DOCOMO, INC.**
The document was presented by Fred Takeda from NTT DOCOMO.
Proposal 1: Define UE category based on the maximum number of DL/UL-SCH transport block bits transmitted/received within a fixed/reference time duration (e.g., 1ms).
- Difference in subcarrier-spacing is not visible in the UE category.
- FFS: different capabilities of MIMO/MCS results in different UE categories or in the same UE category with different values on some parameters.

One list of UE category is used for the use-cases of eMBB, URLLC, and mMTC.
Proposal 2: Identify soft-buffer definition for the LTE-NR dual connectivity, and inform RAN1's understanding to RAN2.
- Option 1: Soft-buffer sizes are defined for LTE operation and NR operation, respectively.
- Option 2: Soft-buffer size is defined as the sum of LTE and NR, and the soft-buffer is shared by LTE and NR in semi-static or dynamic manner.

**Discussion:** Panasonic → hard to downselect between option 1 & 2 in a timely manner (likely not before Dec 17).
Qualcomm → RAN1 should not worry too much at this meeting, mainly RAN2 issues.
Ericsson → no sure whether different UE categories are needed for eMBB, URLLC, and mMTC
**Decision:** The document is noted.

**R1-1711476 On UE Categories/Capabilities Ericsson**
The document was presented by Daniel Larsson from Ericsson.
- Proposal 1: In NR, the number of supported MIMO layers is signalled as explicit capability (possibly per band) and not part of a UE category.
- Proposal 2: In NR, the modulation schemes is signalled as explicit UE capability and not part of a UE category.
- Proposal 3: Discuss whether NR capability signalling should allow the UE to indicate a peak data rate being lower than the peak L1 data rate derived from the supported scheduling bandwidth and modulation and MIMO schemes.
- Proposal 4: If it is agreed that UEs should be able to indicate a baseband processing restriction (see Proposal 2), the UEs indicate the total number of supported code blocks separately for UL and DL instead of a L1-bit-rate.
- Proposal 5: If Proposal 3 is agreed, the NW derives the UE's amount of supported soft buffer from the total number of supported code blocks in DL (hence, there is no need to specify and signal the soft-buffer size explicitly).
- Proposal 6: NR UEs should be able to advertise also a maximum scheduling bandwidth. The details need to be further studied
- Proposal 7: Discuss whether the total number of code block does not need to be signalled and this property can be derived from the maximum scheduling BW in addition to the other throughput affecting capabilities that the UE indicates

**Decision:** The document is noted.

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**LSs received during the meeting from other WGs**
**R1-1711892 Reply LS on PBCH content RAN2, Huawei**
**Decision:** The document is noted.

**R1-1711940 LS to RAN1 on NR basic handover RAN2, Ericsson**
**Decision:** The document is noted. Prepare draft LS to RAN2 in R1-1711968 – Dhiraj (Samsung)
**R1-1711968 [DRAFT] Reply LS response on NR basic handover Samsung**
**Decision:** The document is noted and final LS is approved in R1-1711987 with the addition of the following sentence in Section 1
*RAN1 will inform RAN2 when more details on RACH resources and the corresponding associations are available.*

**R1-1711950 LS to RAN1 on Random Access RAN2, Samsung**
**Decision:** The document is noted.

Not treated.
R1-1711949 Reply LS to RAN1 on UL data transmission without UL grant for NR RAN2, Huawei

# 5 NR

## *5.1 New Radio Access Technology - WID in RP-171485*

**R1-1711642 NR topics requiring coordination between RAN1 and RAN2 RAN2 Chair**
The document was presented by RAN1 Vice Chair on behalf of RAN2.
1. Beam management / recovery procedures: RAN2 assume that RAN1 is leading this topic and RAN2 will wait for RAN1 to make progress before discussing in detail. Once RAN1 has started to make progress then RAN2 will look at implications to RAN2 specifications. Input from RAN1 before the August WG meeting is preferable.
2. Beam aspects of random access procedures: Input from RAN1 before the August WG meeting is preferable.
3. UL/DL HARQ: RAN2 would like to receive input on e.g. the impact due to multiple numerologies, HARQ retransmission across numerologies, any other differences compared to LTE, etc. Initial input from RAN1 before the August WG meeting is preferable

4. UL grant free transmission and relation to UL SPS: Based on LS R1-1709805, RAN2 understands that discussion in RAN1 is still ongoing and expects to receive further information from a future meeting about any differences between UL SPS and grant free. Until such information is received RAN2 will continue to progress on RAN2 aspects of UL SPS, agreed to be as LTE as baseline. Additionally RAN2 will discuss some aspects of UL grant free and SPS, e.g. if any difference between them from RAN2 point of view, and will aim to provide input to RAN1 this meeting. Input from RAN1 before the August WG meeting is preferable
5. Impact of PDCCH design (e.g. 'core set') on PDCCH monitoring and DRX: RAN2 would like to receive input on e.g. the impact of the 'core set', beam related aspects, etc. Input from RAN1 before the August WG meeting is preferable.
6. PHR: RAN2 assume that RAN1 is leading this topic and we will implement any MAC signalling aspects as required (i.e. similar working arrangement as for LTE). Input from RAN1 before the October WG meeting is preferable.
7. UL power sharing between LTE/NR: RAN2 will need to be informed regarding the conclusions of RAN1 discussions on UL power sharing between LTE and NR.
8. Transport block sizes: RAN2 assume that RAN1 is leading this topic but that some coordination will be needed between RAN1 and RAN2.
9. L1 parameters to be configured by RRC: Initial input from RAN1 in advance of October WG meeting is preferable (in advance means enough time to enable the parameters to be analysed and contributions to be submitted to the October WG meeting). This implies the initial input should be available at the end of the September RAN1 ad hoc. It is acceptable if there is some degree of revision to the parameter set after the October WG meeting.
10. UE capabilities: RAN2 assume that we will lead the discussion of the UE category question delegated from RAN plenary (i.e. " RAN WGs to decide how the target peak data rate can be supported for LTE-NR DC and NR standalone in the specifications, e.g. whether the existing concept of UE category is inherited or a new concept in defining the target peak data rate is introduced" from LS RP-171480). RAN2 also has ongoing discussion on capability sharing and coordination between LTE and NR, where the exact capabilities for will require coordination with RAN1 and RAN4. RAN1 can begin discussions of the L1 capability parameters in parallel.

**Discussion:** Suggestion by VC to provide a reply per point (through an LS – at least for some of the bullets)
Ericsson: Make sure RAN1 is not starting email discussions during the upcoming summer period.
CATT: concern regarding RAN2's intention on point 4 (expecting info from RAN1, but has already decided to progress further).
CATT: also has concern of the impact to RAN2 if RAN1 cannot draw a clear answer to each of RAN2's questioning.
Huawei: let's continue RAN1 discussion on UL grant free transmission/UL SPS and later in the week liaise to RAN2.
**Decision:** The document is noted.

Coordinators for LSs to RAN2 (review status on Friday):

1. Beam management: Sundar (Qualcomm) R1-1711683
2. Beam aspects of Random Access: Teck Hu (Huawei) R1-1711684
3. UL/DL HARQ: Karri Ranta-aho (Nokia) R1-1711685
4. UL SPS / grant free: Fred (NTT DOCOMO) R1-1711686
5. PDCCH monitoring and DRX: Tony (CATT) R1-1711687 - see 5.1.3.1

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**Friday**

**R1-1711879** **[Draft] LS on Beam Aspects of NR RACH** **Huawei**
**Decision:** The document is noted and final LS is approved in R1-1711880 with following updates
NR RACH procedures support ~~multiple beams~~ using a PRACH preamble format (Option 1) whereby the CP is inserted at the beginning of the single or consecutive multiple/repeated RACH sequences, the CP/GT between RACH sequences is omitted and the GT is reserved at the end of the single or consecutive multiple/repeated RACH sequences e.g. potentially used for gNB R~~r~~x beam sweeping.~~.~~

A~~n~~ 4-step RACH procedure is supported in NR and~~,~~ a RACH transmission occasion is defined as the time-frequency resource on which a PRACH message 1 is transmitted using the configured PRACH preamble format with a single particular tx beam. The random access configuration is included in the remaining minimum SI. In NR, the RACH configuration provides at least the RACH time/freq. information and the RACH preamble format. gNB can configure an association between one or multiple occasion for SS Block and a subset of RACH resources and/or a subset of preamble indices. Tx Beam for Msg 1 and Msg 3 transmissions (for UE in IDLE mode) is selected by the UE and downlink Tx beam for Msg 2 can be obtained by the detected preamble and/or the RACH resource.

Email approval of the LS on beam management until July 10th – Qualcomm
Email approval of the LS on UL/DL HARQ until July 6th – Nokia

R1-1711318 Discussion on the options in NR design Panasonic
R1-1711366 "TS38.211 v0.0.1 NR; Physical channels and modulation" Ericsson LM
**R1-1711886** **"TS38.211 v0.0.2 NR; Physical channels and modulation"** **Ericsson LM**



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**Discussion:** Panasonic → as already commented earlier in the week, RAN1 should strive to endorse specs on day one of a meeting as the review of the specs during the meeting is very challenging and difficult.
**Decision:** The document is endorsed as v0.1.0 in R1-1712004 as basis for further updates.

Email discussion until August meeting about all specs

- 1st step: All spec editors will provide new draft specs (including all agreements and WA) until July 14th
- 2nd step: All spec editors will provide further updated specs (including all agreements and WA) until August 4th
- All companies are recommended checking these specs and comment via the reflector
- All spec editors will update specs via the reflector and submit them to the August meeting (RAN1#90)
- Objective is to get the updated specs endorsed on Monday on Monday (day 1 of RAN1#90)

Email discussion until the August meeting w.r.t the RRC parameters list for NR

- Daniel (Ericsson) will provide an initial RRC parameters list until August 9th
- All companies are recommended checking it and comment via the reflector
- Daniel (Ericsson) will update it via the reflector and submit it to the August meeting (RAN1#90)
- Objective is to get the (updated) RRC parameters list agreed on Monday (day 1 of RAN1#90)

### 5.1.1 Initial access and mobility

*Refer to R1-1709821 for work plan.*

**Friday**
**R1-1711984** **[Draft] LS on NR initial access and mobility** **NTT DOCOMO**
**Decision:** The document is noted and final LS to RAN2 is approved in R1-1712001.

**R1-1711985** **[Draft] LS on NR initial access and mobility** **NTT DOCOMO**
**Decision:** The document is noted and final LS to RAN4 is approved in R1-1712002 with following updates
Confirm Working Assumption for NR-SSS design from RAN1#89, with following updates~~except for~~:

- Ordering of initial state:
  - NR-SSS, initial value x(0) = 1, x(1) = 0, x(2) = 0, x(3) = 0, x(4) = 0, x(5) = 0, x(6) = 0

#### *5.1.1.1 Synchronization signal and initial access procedure*

##### 5.1.1.1.1 Remaining details on SS sequence design

*Include confirmation of WA of NR-SSS, and other details on NR-SSS such as sequence to RE mapping*
*Note that NR-PSS and NR-SSS sequence design and RE mapping need to be finalized in this meeting*

**R1-1710501** **NR PSS and SSS design** **Intel Corporation**

- Proposal 1: Confirm the WA on NR-SSS made in RAN1#89 meeting.
- Proposal 2: Capture in the specification the text proposed in Section 3.

**Decision:** The document is noted.

**R1-1710807** **On the Robustness of NR SSS in Frequency Offset** **MediaTek Inc.**

- Observation 1: Due to the selection of $m_0$, current NR-SSS design is quite vulnerable to frequency offset.
- Proposal 1: NR-SSS should adopt the following $m_0$ and $m_1$ mapping:

$$m_0 = \left(3\left\lfloor \frac{N_{ID}^{(1)}}{112} \right\rfloor + N_{ID}^{(2)}\right) \times 5; \quad m_1 = \left(N_{ID}^{(1)} \mod 112\right) + 1$$

**Discussion:** Huawei → no evaluations have motivated this proposal
**Decision:** The document is noted.

~~Agreement~~: Confirm Working Assumption for NR-SSS design from RAN1#89, except for:

- Ordering of initial state:
  - NR-SSS, initial value x(0) = 1, x(1) = 0, x(2) = 0, x(3) = 0, x(4) = 0, x(5) = 0, x(6) = 0
- Cyclic shift values m0 and m1:
  - FFS between formulae in the RAN1#89 working assumption and the following formulae, to be evaluated during this week and confirmed by Friday:

$$m_0 = \left(3\left\lfloor \frac{N_{ID}^{(1)}}{112} \right\rfloor + N_{ID}^{(2)}\right) \times 5; \quad m_1 = \left(N_{ID}^{(1)} \mod 112\right)$$

**Thursday**
Above agreement is modified as follows:



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Agreement: Confirm Working Assumption for NR-SSS design from RAN1#89, with the following updates:

- Ordering of initial state:
  - NR-SSS, initial value x(0) = 1, x(1) = 0, x(2) = 0, x(3) = 0, x(4) = 0, x(5) = 0, x(6) = 0
- Cyclic shift values m0 and m1 (as defined in R1-1711888)

**R1-1711810** **Analysis of SSS Proposals** **Intel Corporation**
**Decision:** The document is noted.
**R1-1711860** **Evaluation of NR-SS** **Huawei, HiSilicon**
**Decision:** The document is noted.
**R1-1711888** **WF on $m_0$ and $m_1$ for NR-SSS** **NTT DOCOMO, ITL, Intel, Samsung, InterDigital, Motorola Mobility, Lenovo**

- The cyclic shift values $m_0$ and $m_1$ are jointly determined by the cell IDs carried by NR PSS (i.e., $N_{\mathrm{ID}}^{(2)} = 0,\ 1,\ 2$) and NR SSS (i.e., $N_{\mathrm{ID}}^{(1)} = 0,\ 1,\ \ldots,\ 335$)), where the cell ID is given by $N_{\mathrm{ID}}^{\mathrm{cell}} = 3N_{\mathrm{ID}}^{(1)} + N_{\mathrm{ID}}^{(2)}$
  - $m_0 = \left(3\left\lfloor \frac{N_{\mathrm{ID}}^{(1)}}{112} \right\rfloor + N_{\mathrm{ID}}^{(2)}\right)5$
  - $m_1 = \left(N_{ID}^{(1)} \mod 112\right)$

**Discussion:** Also supported by Mediatek, LGE, ZTE.
**Decision:** The document is agreed.

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Agreement: For NR-PSS:

- initial value x(0) = 0, x(1) = 1, x(2) = 1, x(3) = 0, x(4) = 1, x(5) = 1, x(6) = 1

**R1-1711654** **WF on NR-SS sequence design** **NTT DOCOMO, ZTE, InterDigital**

- Update agreements on NR-PSS with following change
  - Number of PSS sequences: 3
    - PSS sequence details:
      - Frequency domain-based pure BPSK M sequence (fixing the time/freq. offset ambiguity)
        - 1 polynomial: Decimal 145 (i.e. g(x) = x7 + x4 + 1)
        - In freq. domain 3 cyclic shifts (0, 43, 86) to get the 3 PSS signals
        - Initial poly shift register value: x(0) = 0, x(1) = 1, x(2) = 1, x(3) = 0, x(4) = 1, x(5) = 1, x(6) = 1
- Confirm working assumptions on NR-SSS with following changes
  - NR-SSS sequence design is 1 polynomial with 127 cyclic shifts, and 1 another polynomial with 9 cyclic shifts
    - Two generator polynomials will be defined for m-sequences, and cyclic shift according to NR-cell ID is applied to each m-sequence
    - Two polynomials are generated by g0(x) = x7 + x4 + 1 and g1(x) = x7 + x + 1
      - Initial poly shift register value: x(0) = 1, x(1) = 0, x(2) = 0, x(3) = 0, x(4) = 0, x(5) = 0, x(6) = 0
      - The cyclic shift values $m_0$ and $m_1$ are jointly determined by the cell IDs carried by NR PSS (i.e., $N_{\mathrm{ID}}^{(2)} = 0,\ 1,\ 2$) and NR SSS (i.e., $N_{\mathrm{ID}}^{(1)} = 0,\ 1,\ \ldots,\ 335$)), where the cell ID is given by $N_{\mathrm{ID}}^{\mathrm{cell}} = 3N_{\mathrm{ID}}^{(1)} + N_{\mathrm{ID}}^{(2)}$
        - Option 1
          - $m_0 = 3\left\lfloor \frac{N_{ID}^{(1)}}{112} \right\rfloor + N_{ID}^{(2)}$
          - $m_1 = \left(N_{ID}^{(1)} \mod 112\right) + m_0 + 1$
        - Option 2
          - $m_0 = \left(3\left\lfloor \frac{N_{\mathrm{ID}}^{(1)}}{112} \right\rfloor + N_{\mathrm{ID}}^{(2)}\right)K$, where K > 1 (e.g., 5)
          - $m_1 = \left(N_{ID}^{(1)} \mod 112\right)$
        - Down-selection of above options will be done within this meeting
- NR-SSS sequence is mapped to consecutive 127 subcarriers as well as NR-PSS
- Frequency center of NR-PSS/SSS is aligned with frequency center of NR-PBCH
- Update agreements on number of NR-SSS signals with following change
  - Number of SSS signals: 1008 post-scrambling
    - Note that number of NR physical cell IDs is 1008

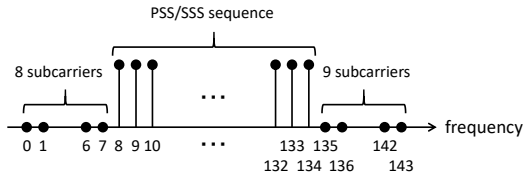
**Decision:** The document is noted.

Agreements:

- NR-SSS sequence is mapped to consecutive 127 subcarriers as well as NR-PSS as follows:



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- Centre frequency of NR-PSS/SSS is aligned with centre frequency of NR-PBCH
  - i.e. mapped on the 7th to 18th PRBs of the 24 PRBs used for the SS block
- Update agreements on number of NR-SSS signals with following change
  - Number of SSS signals: 1008 post-scrambling
- The number of NR physical cell IDs is 1008

Not treated.

R1-1709884 NR-SS sequence design ZTE
R1-1709911 Finalization of the NR-SSS Huawei, HiSilicon
R1-1710022 Remaining detail of NR-PSS and NR-SSS Sequence Design and RE mapping CATT
R1-1710258 Remaining issue on SS Sequence Design LG Electronics
R1-1710623 Remaining details on SS sequence design Samsung
R1-1710913 On Design of Synchronization Signal Sequences in NR InterDigital, Inc.
R1-1710975 Considerations and Evaluation on SS Sequence Design for New Radio ITRI
R1-1711056 Discussion on remaining details on SS sequence design for NR NTT DOCOMO, INC.
R1-1711135 Synchronization signal sequence design Qualcomm Incorporated
R1-1711260 Remaining open issues on NR Synchronisation signal design Nokia, Alcatel-Lucent Shanghai Bell
R1-1711275 Discussion on NR-SSS working assumption Motorola Mobility, Lenovo
R1-1711371 Remaining details on NR-SS sequence design Ericsson

#### 5.1.1.1.2 SS burst set composition

*Include candidate locations of SS block within a slot*

**R1-1711372 SS burst set composition Ericsson**

- Proposal 1: The network decides whether a SS block position should be allocated or not.
- Proposal 2: For compositions with two SS blocks per a slot, for 15, 30 and 120 kHz, the SS blocks start at the 3rd and 9th symbols.
- Proposal 3: For 15 kHz subcarrier spacing and below 3 GHz carrier frequency, an SS block may be initiated at the 3rd symbol in a 14 symbol slot. SS blocks are transmitted in consecutive slots.
- Proposal 4: For 15 kHz subcarrier spacing and between 3 and 6 GHz carrier frequency, an SS block may be initiated at the 3rd and 9th symbols per 14 symbol slot.
- Proposal 5: For 30 kHz subcarrier spacing, an SS block may be initiated at the 3rd and 9th symbols in a 14 symbol slot. SS blocks are transmitted in every 2nd slot.
- Proposal 6: For 120 kHz, an SS burst is composed by up to 8 SS blocks.
- Proposal 7: For 120 kHz, the SS burst set is composed by up to 8 SS bursts with 1 DL/UL slot in-between SS bursts.
- Proposal 8: For 240 kHz, an SS slot pair is composed by SS blocks every 5th symbol, starting at the 5th symbol.
- Proposal 9: For 240 kHz, an SS burst is composed by up to 16 SS blocks (4 SS slot pairs).
- Proposal 10: For 240 kHz, the SS burst set is composed by up to 4 SS bursts with 8 DL/UL slots in-between bursts.

**Decision:** The document is noted.

**R1-1710412 NR SS block and burst set composition AT&T**

- Proposal 1: For 15kHz, 30kHz, and 120kHz SS Block SCS, the two candidate SS Block positions within a 14 symbol slot are symbols 4-7 and 8-11.
- Proposal 2: For 240kHz SS Block SCS, the four candidate SS Block positions within two consecutive slots of 14 symbols are symbols 4-7 and 8-11 of the first slot, and symbols 2-5 and 6-9 of the second slot.
- Proposal 3: NR should support dedicated signalling for UE-specific indication of valid SS block time locations within a given SS burst set which accommodate different SS burst set periodicities.

**Decision:** The document is noted.

**R1-1711580 SS burst set composition Samsung** (Revision of R1-1710624)

- Proposal 1: For each frequency band, the NR-SS block mapping pattern is fixed/predefined.
- Proposal 2: For below 6GHz NR, the SS block mapping patterns shown in FIGURE 1 should be considered for SS burst set composition.



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- Proposal3: For above 6GHz NR, the SS block mapping patterns shown in FIGURE 3 should be considered for SS burst set composition.
- Proposal 4: SS blocks comprising an SS burst set shall be mapped in max 2~4ms duration, starting from a beginning of a frame or a half-frame.

**Decision:** The document is noted.

**R1-1711645** **SS burst set composition consideration** **Qualcomm Incorporated** (Revision of R1-1711136)

- Proposal 1: For burst-set with $L = 4$ SS blocks, the blocks start in OFDM symbols {2,8,17,21}. Burst-set pattern with $L \in \{8, 64\}$ SS blocks is obtained by further tiling the burst-set pattern for $L = 4$.
- Observation 1: For burst-set with $L = 4$ blocks, each pair of blocks has a unique inter-block distance. These 4-choose-2 unique distances are $\{4, 6, 9, 13, 15, 19\}$.
- Observation 2: In burst-set pattern with $L \leq 8$ blocks, for any two pairs of blocks $\{l_1, l_2\}$ and $\{l_3, l_4\}$ such that $\Delta(\{l_1, l_2\}) = \Delta(\{l_3, l_4\})$, we have that $l_1 + l_2 = l_3 + l_4$ and thus $\delta(\{l_1, l_2\}) = \delta(\{l_3, l_4\})$. In words, all blocks pairs with the same inter-block distance have the same bit-difference between their indices (and thus the same bit-difference between their PBCH payloads.)
- Proposal 2: When UE assumes SS burst set periodicity of x ms (e.g. x = 20ms), UE assumes the same set of SS blocks within SS burst set are transmitted with periodicity of x ms
- Proposal 3: When UE assumes SS burst set periodicity of x ms (e.g. x = 20ms), if NW transmits the SS burst set with a smaller periodicity y ms (y < x, e.g. y=10ms), UE can assume that the same set of SS blocks within SS burst set are transmitted with periodicity of y ms
- Proposal 4: UE assumes that the transmitted SS blocks in a SS burst set are always logically consecutive, i.e. between any two transmitted SS blocks in a SS burst set, there are no gaps of non-transmitted SS block(s)

**Decision:** The document is noted.

- FFS offline (Jorma Kaikkonen, Nokia):
  a. 7 symbol slot is only considered for 15 kHz subcarrier spacing?
  b. 1 or 2 SS blocks within a 14 symbol slot?
  c. If 2 SS blocks, is there a need for gaps between SS blocks in a 14 symbol slot?
  d. Which are the starting symbols for SS blocks for each subcarrier spacing?

Revisit on Wednesday afternoon - R1-1711678

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**Thursday**

**R1-1711678** **Way forward on the mapping of SS blocks** **Nokia**
**R1-1711899** **Way forward on the mapping of SS blocks** **Nokia**

Agreements:

- Agree on pages 5, 7, 8 (30 kHz subcarrier spacing case) in R1-1711899
- Working assumption on pages 9, 10 (120, 240 kHz subcarrier spacing cases) in R1-1711899
  - Working assumption can be revisited if there are serious implications to UE AGC operation.

Agreements:

- For 15 kHz subcarrier spacing case,
  - Map two SS blocks candidate locations to the slot of 14 symbols as follows
    - First candidate location is at symbols 2-5
    - Second candidate location is at symbols 8-11

**R1-1711939** **Way forward on the mapping of SS blocks with 30kHz SCS** **Huawei, HiSilicon, CATT, CATR, OPPO, MediaTek, Vivo**

Possible agreements:

- For 30 kHz subcarrier spacing case, try to agree on Option 1 or Option 3 until Friday, but if not, RAN1 will conclude that no consensus in RAN1 about the second SS block mapping pattern

– Option 1:
  – Map two SS blocks candidate locations to the slot of 14 symbols as follows
    - First candidate location is at symbols 2-5
    - Second candidate location is at symbols 8-11
  – Supported by Intel, LGE, Qualcomm, DOCOMO, ETRI, Samsung, ZTE, Ericsson, ITL (9)
– Option 3:
  - For slot of 14 symbols, two SS blocks are mapped within 14 symbols
    – First candidate SS block location is at symbols 1-4
    – Second candidate SS block location is at symbols 8-11
  - For slot of 7 symbols, one SS block is mapped within 7 symbols

  - Candidate SS block location is at symbols 1-4
- Supported by Huawei, HiSilicon, CATT, CATR, OPPO, MediaTek, vivo (7)

**Friday**

**R1-1711939 Way forward on the mapping of SS blocks with 30kHz SCS Huawei, HiSilicon, CATT, CATR, OPPO, MediaTek, Vivo**

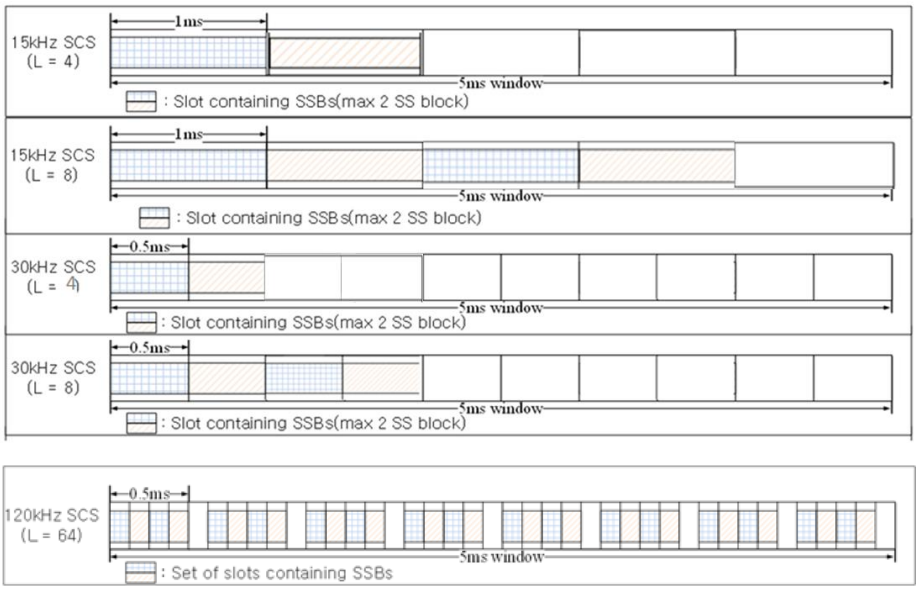
Agreements:

- For 30 kHz subcarrier spacing case, the second SS block mapping pattern is
  - Map two SS blocks candidate locations to the slot of 14 symbols as follows
    - First candidate location is at symbols 2-5
    - Second candidate location is at symbols 8-11
- Note: In the case of NR-LTE coexistence, the first SS block mapping pattern (i.e., page 7 in R1-1711899) can be used
- Note: It is up to RAN4 to decide the SS block mapping pattern for each frequency band

**R1-1711854 SS burst set composition LG Electronics, Nokia**
Updated in **R1-1711906**

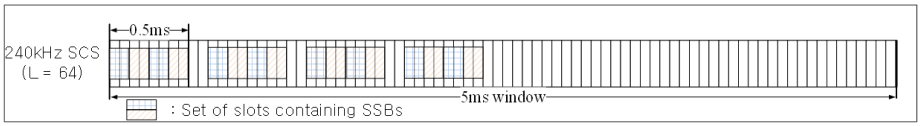
Agreements:

- For 15k Hz, 30 kHz, and 120 kHz subcarrier spacing, the following mapping to slots in a half radio frame is agreed
  - Note: For NR and LTE coexistence, duplex direction alignment can be achieved by subframe offset




Agreement:

- For 240 kHz subcarrier spacing, the following mapping slot in a half radio frame is agreed






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Not treated.

| | | |
|---|---|---|
| R1-1710372 | Remaining issues on SS block and SS burst set composition | vivo |
| R1-1709885 | The composition of SS burst sets | ZTE |
| R1-1709912 | SS Burst Set and Block Composition | Huawei, HiSilicon |
| R1-1710023 | SS Burst Set Composition and SS Block Configuration | CATT |
| R1-1710131 | Discussion on design of SS block | Guangdong OPPO Mobile Telecom. |
| R1-1710259 | Discussion on SS burst set composition | LG Electronics |
| R1-1710371 | Remaining issues on the subcarrier spacing of SS block | Spreadtrum Communications |
| R1-1710502 | SS Burst Set Composition | Intel Corporation |
| R1-1710798 | Discussion on SS burst set composition | MediaTek Inc. |
| R1-1710914 | On SS Burst Set Composition and Multiplexing | InterDigital, Inc. |
| R1-1711057 | Discussion on SS burst set composition for NR | NTT DOCOMO, INC. |
| R1-1711232 | Indication of actually transmitted SS blocks | Sharp |
| R1-1711261 | On SS Burst Set Composition | Nokia, Alcatel-Lucent Shanghai Bell |
| R1-1711394 | Discussion on SS Burst Set Design | Convida Wireless LLC |

#### 5.1.1.1.3 Timing indication based on SS block

*Include discussion and evaluation based on email discussion [89-15] such as SS block time index indication mechanism, identification of radio frame boundary and identification of SFN*
*Note that SS block time index indication mechanism needs to be finalized in this meeting*

**R1-1711646** **Timing indication based on SS block consideration** **Qualcomm Incorporated** (Revision of R1-1711137)

- Proposal 1: PBCH payload carries the synchronization signal block index and 5ms timing boundary.
- Proposal 2: For 10-bit SFN $(s_9, s_8, \dots, s_2, s_1, s_0)$, all bits except $(s_2, s_1)$ are sent in PBCH payload. Furthermore, two bits $(s_2, s_1)$ are signalled in PBCH scrambling or in SSS/DMRS.
- Observation 1: Multi-cell interference should be considered in deriving the number of bits that can be carried over PBCH DMRS, as cross-correlation between DMRS sequences across cells significantly impacts DMRS detection performance.
- Observation 2: For single-shot DMRS detection at -6dB SINR, only 2 bits are reliably delivered with 1/3 DMRS while less than 2 bits are reliably delivered with 1/4 DMRS for any PCI combinations.
- Observation 3: The capability of carrying information in DMRS reduces significantly if a high DMRS detection requirement is required e.g., 0.1% DMRS detection error.

**Decision:** The document is noted.

**R1-1711589** **Timing indication based on SS block** **Samsung** (Revision of R1-1710625)

Proposal 1: 7-bit MSB of SFN explicitly indicated in MIB and 3-bit LSB of SFN implicitly indicated by using scrambling.
Proposal 2: Multiple NR-DMRS sequences are introduced to indicate the SS block index within an SS burst set.
- 1st preference: DMRS to indicate SS block indices in order to avoid additional latency and power consumption of reading PBCH payload.
- 2nd preference: DMRS to indicate partial SS block indices and offload remaining SS block indices in explicit bits of PBCH payload, if this design can satisfy the reliability and latency issues addressed by LS R2-1706160.

Observations:
- NR-DMRS sequence detection for NR-SS block index identification is much more robust than PBCH explicit indication, even more robust against interference in multi-cell scenarios.
- NR-DMRS sequence detection has no impact on the channel estimation for NR-PBCH detection.
- NR-DMRS uneven RE mapping cannot improve PBCH detection but only results in DMRS performance loss, compared with even mapping assuming similar DMRS overhead.

Proposal 3: NR-DMRS with even RE mapping is preferred for SS block index indication.

**Decision:** The document is noted.

**R1-1710905** **Signaling of SS block index** **Apple Inc.**

- Proposal 1: SS block should avoid the 1st symbol of every 0.5ms, which has longer duration compared to other OFDM symbols, to avoid ambiguity in UE detection.
- Proposal 2: nominal SS blocks are partitioned into SS bursts (or groups). Which SS blocks/bursts are actually transmitted can be configured by the network, although the indexing is based on the nominal SS blocks.
- Proposal 3: SS burst index is included in information bits of PBCH, while SS block index within a SS burst is signaled through PBCH implicitly, e.g., with different scrambling codes.
- Proposal 4: SS blocks within each SS burst can be combined to improve PBCH decoding reliability.
- Proposal 5: the set of K different scrambling codes can be selected from existing class of LFSR based sequences, such as M-sequence, Gold sequence, etc.
- Proposal 6: the number of SS blocks per SS burst (or group) K should be pre-determined, and can be band dependent.



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- Observation 1: gNB beam mapping to SS blocks is transparent to UEs, regardless of the selection of Kand M

**Decision:** The document is noted.

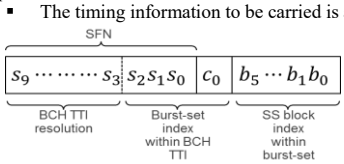
**R1-1711373** **Timing indication based on SS block** **Ericsson**

- Proposal 1: The timing indication includes half-frame indication, slot/slot pair indication within a half-frame and the SS block indication within a slot/slot pair.
- Proposal 2: The slot group with consecutive or nonconsecutive slots to cover four possible SS block locations is proposed to unify the time indication design for all frequency ranges.
- Proposal 3: The half-frame specific scramble sequence is applied on the coded bits of NR-PBCH payload to indicate the half frame number $n_{\text{half sfn}} = \{0, \ldots, 15\}$.
- Proposal 4: The explicit bits attached with the NR-PBCH MIB are used to indicate the slot group location.
- Proposal 5: The cover sequence can be used to implicitly indicate the four possible SS block positions within a slot group.

**Decision:** The document is noted.

Proposal:

- The timing information to be carried is as follows:




- This information is carried at least partly explicitly on the PBCH
- Options for a hybrid solution:
  - SS block index within burst set is carried by DMRS
    - 2 bits below 3 GHz, 3 bits for 3-6 GHz, 6 bits above 6 GHz
      - Achieves latency gain by enabling reception without decoding
      - Concerns on ability to carry so many bits on DMRS, and would require the DMRS to be invariant
  - SS block index (2/3 bits) within burst is carried by DMRS
    - 4/3 bits to indicate the burst in the burst set are carried in NR-PBCH payload
    - Can achieve latency gain below 3/6 GHz
    - Can enable the UE to obtain the beam index for inclusion in SS block measurement reporting without NR-PBCH decoding
    - But would still require the DMRS to be invariant
  - 2 bits of SFN carried by DMRS
    - Achieves complexity gain but not latency gain
  - SS block index (2 bits) within burst is carried by scrambling of both NR-PBCH and DMRS
    - 4 bits to indicate the burst in the burst set are carried in NR-PBCH payload
    - Achieves latency gain below 3 GHz
  - 3 bits of SFN carried by NR-PBCH payload scrambling

~~Agreement:~~

- One of the following two alternatives will be adopted (It is not precluded to adopt a different one of these alternatives below and above 6 GHz):
  - Alt1: 3 bits of SS block index are carried by changing the DMRS sequence within each 5ms period
    - It can be further considered to limit the number of bits carried in this way to 2 if carrying 3 bits is shown to cause problems
  - Alt2: 2 bits of SFN are carried by changing the DMRS sequence every 20ms
  - Check on Friday whether a decision can already be made between Alt 1 and Alt 2
- It can be further considered whether, in addition to the above, 3 bits of the SFN can be carried by scrambling of the PBCH
- Remaining bits of the timing indication are carried explicitly in the NR-PBCH payload
- Note that it is suggested that the above 2 bullets are actually equivalent.

---

**Thursday**

Alt.1 supported by ZTE, Samsung, NTT DOCOMO, Intel, vivo, Fujitsu, Nokia, InterDigital, Sharp, LGE, Sony

- Objected by Motorola mobility, Mediatek, Qualcomm, Huawei, HiSilicon, OPPO, Lenovo

Alt.2 supported by Qualcomm, MotM, CATT, Huawei, HiSilicon, Ericsson, Lenovo, OPPO

- Objected by Samsung, LGE, NTT DOCOMO, vivo, Fujitsu, Interdigital, ZTE, Nokia



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Conclusion: RAN1 will definitely select either Alt. 1 or Alt. 2 until Friday (11am), and all proponents are recommended to have following additional evaluations

- Individual pair of cell ID with the condition of worst case
- Random cell ID association with the separation of worst case DMRS pairs to different frequency shift position

Continue discussions until Friday – Samsung (Le)/Qualcomm (Peter)

---

**Friday**
Situation unchanged

Ericsson: Ok with either way – everyone should compromise, do not understandand the companies objecting to these proposals
Qualcomm: decision should not be taken on counting the number of supporting companies and would like to see evaluation (asynchronous networks) and performance results of alternative 1. Suggested that the synchronization indication is included in the system information and RRM configuration.
Ericsson: could RAN1 decide first on synch indication and then make the choice between Alt 1 & 2?

Agreements:

- An indication related to the synchronization information is provided to the UE
  - When there is the indication for a carrier, UE can utilize serving cell timing to derive the index of SS block transmitted by neighbour cell (e.g., radio frame or SFN or symbol level synchronization)
  - Note that it is up to RAN2 how to provide this indication
  - Note that it is up to RAN4 about the feasibility of synchronization and its requirement

Chair : new round of show of hands
Alt.1 supported by ITL, vivo, Sony, Samsung, ZTE, DOCOMO, LGE, Sharp, ETRI, Fujitsu, Interdigital, Nokia, Intel (13)

- Objected by Qualcomm, Apple, Motorola Mobility (3)

Alt.2 supported by Qualcomm, Mediatek, OPPO, Huawei, HiSilicon, Xiaomi, Sequans, Motorola mobility, Lenovo, Apple, CATT (11)

- Objected by LGE, Samsung (2)

Qualcomm: still objecting to Alt.1 – has not got a technical answer showing the benefit of Alt 1 vs Alt 2
Samsung: RAN1 agreed synch indication, Alt 1 should be agreeable - very disappointed by Qualcomm
Let's revisit in the afternoon.

For sake of making progress, MotM and Apple withdrew their objection to Alt.1
Qualcomm could agree to take it as a working assumption

Agreements:

- Working assumption: 3 bits of SS block index are carried by changing the DMRS sequence within each 5ms period
  - It can be further considered to limit the number of bits carried in this way to 2 if carrying 3 bits is shown to cause problems
- FFS: details of scrambling of the PBCH which may or may not carry a part of timing information
- FFS: 5 ms half radio frame interval indication
- Remaining bits of the timing information are carried explicitly in the NR-PBCH payload

**R1-1711868** **WF on DMRS indication Samsung**
**R1-1711946** **WF on DMRS indication Samsung**
**R1-1711967** **Timing information indicated by DMRS ZTE**
**R1-1711952** **Performance evaluation of interference randomization Qualcomm Incorporated**

Not treated.

| | | |
|---|---|---|
| R1-1709886 | Timing indication based on SS blocks | ZTE |
| R1-1709901 | Scrambling pattern for timing indication over PBCH | Sequans Communications |
| R1-1709913 | Time Index Indication | Huawei, HiSilicon |
| R1-1710024 | SS-block time index indication | CATT |
| R1-1710132 | Discussion on the timing indication of SS block | Guangdong OPPO Mobile Telecom. |
| R1-1710223 | Discussion on timing indication based on SS block | Beijing Xinwei Telecom Techn. |
| R1-1710231 | Consideration on timing indication based on SS block | Fujitsu |
| R1-1710260 | Discussion on SS block time index indication | LG Electronics |
| R1-1710370 | Discussion on time index indication | Spreadtrum Communications |
| R1-1710373 | Discussion on SS block time index indication | vivo |
| R1-1710419 | SS block time index indication | AT&T |



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| | | |
|---|---|---|
| R1-1710503 | Time Index Signaling for SS Blocks | Intel Corporation |
| R1-1710799 | Further discussion on SS block index indication | MediaTek Inc. |
| R1-1710858 | Discussion on SS block time index indication | Sony |
| R1-1710915 | On SS Block Based Timing Indication in NR | InterDigital, Inc. |
| R1-1711058 | Discussion on timing indication based on SS block for NR | NTT DOCOMO, INC. |
| R1-1711262 | SS block time index indication | Nokia, Alcatel-Lucent Shanghai Bell |
| R1-1711274 | Discussion on location and timing indication of SS block | Xiaomi Technology |
| R1-1711276 | Indication of SS block timing information | Motorola Mobility, Lenovo |
| R1-1711351 | On timing indication for NR | ITL |

#### 5.1.1.1.4 Remaining details on multiple SS block transmissions in wideband CC

*Include number of SS blocks in wideband CC, RRM measurement with multiple SS blocks in wideband CC, and how to inform UE about presence/parameters of SS block(s)*

| | | |
|---|---|---|
| R1-1709887 | Multiple SS blocks in wideband CC | ZTE |
| R1-1709973 | On initial access for wideband carrier | Huawei, HiSilicon |
| R1-1710025 | Multiple SS block Transmission in wideband | CATT |
| R1-1710133 | Remaining details on multiple SS block transmissions in wideband CC | Guangdong OPPO Mobile Telecom. |
| R1-1710261 | Remaining issues on Multiple SS block transmissions in wideband CC | LG Electronics |
| R1-1710374 | SS block transmissions and RRM measurement in wideband CC | vivo |
| R1-1710420 | SS block transmissions in a wideband CC | AT&T |
| R1-1710504 | SS Block(s) in Wideband Operation | Intel Corporation |
| R1-1710626 | Remaining details on mulitple SS block transmissions in wideband CC | Samsung |
| R1-1710882 | Multiple SS Blocks in wideband carrier | Ericsson AB |
| R1-1711059 | Discussion on remaining details on multiple SS block transmissions in wideband CC for NR | NTT DOCOMO, INC. |
| R1-1711138 | Multiple SS block transmissions design in wideband CC | Qualcomm Incorporated |
| R1-1711263 | SS-block transmission in multi CC deployments | Nokia, Alcatel-Lucent Shanghai Bell |
| R1-1711352 | Multiple SS block indication in wideband CC | ITL |
| R1-1711364 | Multiple SS block transmissions in a wideband CC | ASUSTEK COMPUTER (SHANGHAI) |

### *5.1.1.2 Broadcast signal/channel*

#### 5.1.1.2.1 NR-PBCH contents and payload size

*Include NR-PBCH contents, required number of bits for each content and corresponding payload size*

| | | |
|---|---|---|
| R1-1709888 | NR-PBCH contents | ZTE |
| R1-1709914 | NR-PBCH contents and payload size | Huawei, HiSilicon |
| R1-1710026 | NR PBCH Contents and Payload Size | CATT |
| R1-1710262 | Consideration on NR-PBCH contents and payload size | LG Electronics |
| R1-1710375 | Views on NR-PBCH contents and payload size | vivo |
| R1-1710421 | Details of NR-PBCH contents | AT&T |
| R1-1710505 | NR PBCH Design | Intel Corporation |
| R1-1710627 | NR-PBCH contents and payload size | Samsung |
| R1-1710797 | Discussion on PBCH Contents | MediaTek Inc. |
| R1-1710916 | On Physical Broadcast Channel in NR | InterDigital, Inc. |
| R1-1711060 | Discussion on NR-PBCH contents and payload size | NTT DOCOMO, INC. |
| R1-1711139 | PBCH contents and payload size consideration | Qualcomm Incorporated |
| R1-1711264 | NR-PBCH content | Nokia, Alcatel-Lucent Shanghai Bell |
| R1-1711277 | Discussion on NR-PBCH contents | Motorola Mobility, Lenovo |
| R1-1711374 | NR-PBCH Content and payload size | Ericsson |

#### 5.1.1.2.2 NR-PBCH RE mapping and SS block composition

*Include discussion and evaluation based on email discussion [89-15] such as SS block composition, NR-PBCH RE mapping, etc. Note that SS block composition needs to be finalized in this meeting*

From Wednesday morning offline

Agreements:

- For the case of 2 PBCH symbols within the SS block: PSS-PBCH-SSS-PBCH
- PBCH RE mapping: Alt. 1, NR-PBCH coded bits of the NR-PBCH code block(s) are mapped across REs in N PBCH symbols, where N is the number of PBCH symbols in a NR-SS block



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| | | |
|---|---|---|
| R1-1711140 | SS bock composition and PBCH RE mapping design | Qualcomm Incorporated |
| R1-1710376 | NR-PBCH RE mapping and evaluation | vivo |
| R1-1710628 | NR-PBCH RE mapping and SS block composition | Samsung |
| R1-1710369 | NR-PBCH RE mapping and SS block composition | Spreadtrum Communications |
| R1-1710506 | SS Block Composition | Intel Corporation |
| R1-1710800 | Performance evaluation for RE mapping and SS block composition | MediaTek Inc. |
| R1-1710917 | On NR-PBCH RE Mapping and SS Block Composition | InterDigital, Inc. |
| R1-1709889 | NR-PBCH RE mapping and SS block composition | ZTE |
| R1-1710006 | Discussion and evaluation on NR-PBCH design | Huawei, HiSilicon |
| R1-1710027 | NR PBCH RE mapping in SS Block | CATT |
| R1-1710224 | Discussion and evaluation on SS block composition | Beijing Xinwei Telecom Techn. |
| R1-1710263 | Discussion on NR-PBCH RE mapping and SS block composition | LG Electronics |
| R1-1710859 | Considerations on SS block compositions | Sony |
| R1-1711061 | Discussion on NR-PBCH design and SS block composition | NTT DOCOMO, INC. |
| R1-1711265 | SS block composition | Nokia, Alcatel-Lucent Shanghai Bell |
| R1-1711278 | NR-PBCH RE mapping | Motorola Mobility, Lenovo |
| R1-1711375 | NR-PBCH RE mapping and SS block composition | Ericsson |

#### 5.1.1.2.3 Sequence design of DMRS for NR-PBCH

*Include DMRS sequence generation, sequence to RE mapping, etc.*
*Note that DMRS sequence design and RE mapping need to be finalized in this meeting*

From Wednesday morning offline

Proposed working assumption (from Wednesday morning offline):
- Sequence type: Gold sequence
  - If cross correlation issues are found, other sequences can be considered
- Sequence initialization from cell ID, and 2 or 3 bits from time identification
- Different sequences in the N NR-PBCH symbols
  - Using longer sequence, different mapping, different initialization etc.

Working assumption:
- Sequence type: Gold sequence
  - If cross correlation issues are found, other sequences can be considered
- Sequence initialization from cell ID, and 2 or 3 bits from time identification
- Different sequences in the N NR-PBCH symbols
  - FFS: Using longer sequence, different mapping, different initialization etc.

Conclusion: Discuss further until Thursday and downselect from:
- Alt 1: Equal DMRS density across NR-PBCH with 3 RE/PRB/Symbol
  - Supported by NTT DOCOMO, Huawei, HiSilicon, vivo, ITL, LGE, OPPO, Intel, Mediatek, Ericsson, Fujitsu, ETRI, Samsung
- Alt 2: Equal DMRS density across NR-PBCH with 4 RE/PRB/Symbol
  - Supported by Samsung, ZTE, CATT, LGE
- Alt 3: Unequal DMRS density with 4 RE/PRB/Symbol outside the NR-PSS/SSS bandwidth and 2 RE/PRB/symbol inside the NR-PSS/SSS bandwidth
  - Supported by Qualcomm, Sony, Interdigital, Sierra

**Thursday**
CATT, ZTE (for compromise) also support Alt.1
Nokia can also go to Alt.1 although no evaluations have been performed (only Alt.2 and 3 were evaluated)

Agreement: Equal DMRS density across NR-PBCH with 3 RE/PRB/Symbol

Agreement: DMRS have the same RE position in all NR-PBCH symbols

Continue discussion on further details (Daewon, Intel)
**Friday**
**R1-1711943** **Discussion on DMRS sequence for NR PBCH** **Intel**



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Conclusions:

- Companies are encouraged to provide the following information on NR PBCH DMRS sequence until 28th July in order to finalize the design – Daewon (Intel)
  - Sequence generation related parameters
    - Gold Code LFSR size
    - Gold Code Polynomials
    - initial state configuration
    - output shift offset (e.g. Nc in LTE)
  - Sequence Modulation
  - Sequence mapping to NR PBCH DMRS RE positions
  - Exact NR PBCH DMRS RE positions within the NR PBCH resource
  - Some examples of the information are shown in R1-1711943

Not treated.

| | | |
|---|---|---|
| R1-1709890 | NR-PBCH DMRS design | ZTE |
| R1-1710007 | DMRS for NR-PBCH | Huawei, HiSilicon |
| R1-1710028 | NR PBCH DM RS sequence design and RE mapping | CATT |
| R1-1710225 | Discussion and evaluation on DMRS design for NR-PBCH | Beijing Xinwei Telecom Techn. |
| R1-1710232 | Discussion on DMRS for NR-PBCH | Fujitsu |
| R1-1710264 | Discussion on DMRS design for NR-PBCH | LG Electronics |
| R1-1710507 | DMRS Sequence for NR PBCH | Intel Corporation |
| R1-1710629 | Sequence design of DMRS for NR-PBCH | Samsung |
| R1-1710918 | On DMRS Designs for NR-PBCH | InterDigital, Inc. |
| R1-1711062 | Discussion on sequence design of DMRS for NR-PBCH | NTT DOCOMO, INC. |
| R1-1711141 | DMRS design for NR-PBCH | Qualcomm Incorporated |
| R1-1711266 | NR-PBCH DMRS design | Nokia, Alcatel-Lucent Shanghai Bell |
| R1-1711353 | DMRS sequence design for NR-PBCH | ITL |
| R1-1711376 | NR-PBCH DMRS design | Ericsson |

#### 5.1.1.2.4 Remaining minimum system information delivery

*Include numerology used for RMSI delivery*
*Limit to 1 contribution per 1 company/organization/university*

| | | |
|---|---|---|
| R1-1709891 | RMSI delivery | ZTE |
| R1-1709915 | Discussion on NR RMSI delivery | Huawei, HiSilicon |
| R1-1710029 | RMSI Delivery | CATT |
| R1-1710134 | Discussion on the numerology of the RMSI | Guangdong OPPO Mobile Telecom. |
| R1-1710233 | Discussion on the CORESET for RMSI delivery | Fujitsu |
| R1-1710244 | PRB indexing for RMSI in NR | NEC |
| R1-1710265 | Remaining minimum system information delivery | LG Electronics |
| R1-1710508 | RMSI Delivery Mechanisms | Intel Corporation |
| R1-1710608 | Delivery of remaining minimum system information | ETRI |
| R1-1710630 | Remaining minimum system information delivery | Samsung |
| R1-1710773 | CORESET configuration for RMSI scheduling | CMCC |
| R1-1710801 | Further discussion on Remaining minimum system information delivery | MediaTek Inc. |
| R1-1710841 | Discussion on remaining system information delivery | Beijing Xinwei Telecom Techn. |
| R1-1710919 | On Minimum System Information Delivery | InterDigital, Inc. |
| R1-1711063 | Discussion on remaining minimum system information delivery for NR | NTT DOCOMO, INC. |
| R1-1711142 | Remaining system information delivery consideration | Qualcomm Incorporated |
| R1-1711267 | On Remaining System Information Delivery | Nokia, Alcatel-Lucent Shanghai Bell |
| R1-1711319 | Relation among NR-PBCH, SIBs and subcells | Panasonic |
| R1-1711377 | NR delivery of remaining minimum system information | Ericsson |

#### 5.1.1.2.5 Other system information delivery

*Include how to deliver other system information*
*Limit to 1 contribution per 1 company/organization/university*

| | | |
|---|---|---|
| R1-1709892 | Other SI delivery | ZTE |
| R1-1710030 | Delivery of Other System Information | CATT |
| R1-1710135 | Discussion on the on-demand SI | Guangdong OPPO Mobile Telecom. |
| R1-1710266 | Other system information delivery | LG Electronics |
| R1-1710379 | Identification NSA mode during initial access | vivo |
| R1-1710477 | Discussion on other system information delivery | Huawei, HiSilicon |



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| | | |
|---|---|---|
| R1-1710609 | Delivery of other system information | ETRI |
| R1-1710631 | Other system information delivery | Samsung |
| R1-1710802 | Further discussion on OSI delivery | MediaTek Inc. |
| R1-1711143 | Other system information delivery consideration | Qualcomm Incorporated |
| R1-1711378 | NR delivery of other system information | Ericsson |
| R1-1711391 | On Other System Information Delivery | Nokia, Alcatel-Lucent Shanghai Bell |

#### *5.1.1.3 Paging design*

*Include PO/PF definition, whether/how to multiplex paging DCI and/or message with other signal/channel, spatial QCL assumption with other signal/channel, and paging indication mechanism*
*Limit to 1 contribution per 1 company/organization/university*

| | | |
|---|---|---|
| R1-1709893 | Paging design in NR | ZTE |
| R1-1709916 | Multi-beam Paging for NR | Huawei, HiSilicon |
| R1-1710031 | NR Paging Channel | CATT |
| R1-1710136 | On NR paging design and transmission | Guangdong OPPO Mobile Telecom. |
| R1-1710267 | Paging design in NR | LG Electronics |
| R1-1710509 | NR Paging Design | Intel Corporation |
| R1-1710632 | Paging design | Samsung |
| R1-1710803 | Further discussion on paging design | MediaTek Inc. |
| R1-1711064 | Discussion on paging design for NR | NTT DOCOMO, INC. |
| R1-1711144 | Paging design consideration | Qualcomm Incorporated |
| R1-1711254 | Discussion on Paging Design | III |
| R1-1711271 | Paging in NR | Nokia, Alcatel-Lucent Shanghai Bell |
| R1-1711379 | On NR paging design | Ericsson |

#### *5.1.1.4 Physical random access channel and random access procedure*

##### 5.1.1.4.1 PRACH preamble format details for long/short sequence length

*Include discussion and evaluation based on email discussion [89-16], whether/how to support restricted set, etc.*

From Wednesday morning offline

| | | |
|---|---|---|
| R1-1709894 | NR-PRACH formats for long/short sequences | ZTE |
| R1-1710510 | NR PRACH Preamble design | Intel Corporation |
| R1-1710633 | PRACH preamble format details for long/short sequence length | Samsung |
| R1-1710268 | Discussion on PRACH preamble format details | LG Electronics |
| R1-1711527 | PRACH Preamble Format Design | Cohere Technologies |
| R1-1711547 | Discussion on PRACH designs for short sequence | Sequans Communications |

Agreements:

- Confirm the working assumption on supporting format 3
- For formats with L=839
  - Unrestricted sets are supported
  - For restricted sets
    - 1.25 kHz: Restricted set A supported, Restricted set B is FFS
    - 5 kHz: Restricted set is supported with FFS if Restricted set A, B or both are supported
- For L=127/139 with option 1, formats with 1,2,4,6, and 12 OFDM symbols are supported
  - Discuss further until Friday actual format definitions with CP and GP (LGE)
    - Number of symbols can be adjusted if problems are identified

---

**Thursday**

**R1-1711875 WF on PRACH Preamble Format for Short sequence with Option 1 LG Electronics, NTT DOCOMO**
Also supported by ZTE, Ericsson

Possible agreements:

- For 15kHz subcarrier spacing,
  - Agree at least followings

| Preamble format | # of Sequence | TCP | TSEQ | TGP | Path profile (Ts) | Path profile (us) | Maximum Cell radius (meter) | Use case |
|---|---|---|---|---|---|---|---|---|



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| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| A | 0 | 1 | 144 | 2048 | 0 | 48 | 1.56 | [469] | TA is already known or Very small cell |
| | 1 | 2 | 288 | 4096 | 0 | 96 | 3.13 | [469] | Small cell |
| | 2 | 4 | 576 | 8192 | 0 | 144 | 4.69 | [1,055] | Normal cell |
| | 3 | 6 | 864 | 12288 | 0 | 144 | 4.69 | [1,758] | Normal cell |
| B | 4 | 12 | 936 | 24576 | 792 | 144 | 4.69 | [3,867] | Normal cell |

- Note 1: Unit is Ts, where Ts = 1/30.72MHz
- Note 2: PRACH preamble are aligned with OFDM symbol boundary for data with same numerology
- Note 3: Additional 16Ts for every 0.5ms should be included in $T_{CP}$ when RACH preamble is transmitted across 0.5ms boundary or from 0.5ms boundary
- Note 4: Note that cell radius can be changed later
- Note 5: For format A, GP can be defined within the last RACH preamble among consecutively transmitted RACH preambles

Continue offline discussions until Friday – Hyunsoo (LGE)

**Friday**

Agreements:

- For 15 kHz subcarrier spacing,
  - Agree on following preamble formats A2, A3, B4
  - **Working assumption** on following preamble formats A0, A1, B0, B1, B2, B3, C0, C1

| Preamble format | | # of Sequence | TCP | TSEQ | TGP | Path profile (Ts) | Path profile (us) | Maximum Cell radius (meter) | Use case |
|---|---|---|---|---|---|---|---|---|---|
| A | 0 | 1 | 144 | 2048 | 0 | 48 | 1.56 | 469 | TA is already known or Very small cell |
| | 1 | 2 | 288 | 4096 | 0 | 96 | 3.13 | 938 | Small cell |
| | 2 | 4 | 576 | 8192 | 0 | 144 | 4.69 | 2,109 | Normal cell |
| | 3 | 6 | 864 | 12288 | 0 | 144 | 4.69 | 3,516 | Normal cell |
| B | 0 | 1 | 144 | 2048 | 0 | 48 | 1.56 | 469 | TA is already known or Very small cell |
| | 1 | 2 | 192 | 4096 | 96 | 96 | 3.13 | 469 | Small cell |
| | 2 | 4 | 360 | 8192 | 216 | 144 | 4.69 | 1,055 | Normal cell |
| | 3 | 6 | 504 | 12288 | 360 | 144 | 4.69 | 1,758 | Normal cell |
| | 4 | 12 | 936 | 24576 | 792 | 144 | 4.69 | 3,867 | Normal cell |
| C | 0 | 1 | 1240 | 2048 | 0 | 144 | 4.69 | 5300 | Normal cell |
| | 1 | 2 | 1384 | 4096 | 0 | 144 | 4.69 | 6000 | Normal cell |

  - Note 1: Unit is Ts, where Ts = 1/30.72MHz
  - Note 2: PRACH preamble are aligned with OFDM symbol boundary for data with same numerology
  - Note 3: Additional 16Ts for every 0.5ms should be included in TCP when RACH preamble is transmitted across 0.5ms boundary or from 0.5ms boundary
  - Note 4: For format A, GP can be defined within the last RACH preamble among consecutively transmitted RACH preambles
- For 30/60/120 kHz subcarrier spacing, preamble format can be scaled according to subcarrier spacing.
  - Ts =1/(2*30720) ms for 30 kHz subcarrier spacing
  - Ts =1/(4*30720) ms for 60 kHz subcarrier spacing
  - Ts =1/(8*30720) ms for 120 kHz subcarrier spacing
  - Note that some of the formats may not be applicable to all subcarrier spacings

Not treated.

R1-1711270 [89-16] Email discussion on NR-PRACH preamble formats based on short sequence length ZTE Corporation

R1-1710008 PRACH preamble format details for long/short sequence length Huawei, HiSilicon
R1-1710032 NR RACH Long and Short Preamble Sequence Length CATT
R1-1710229 [89-16] Email discussion on NR-PRACH preamble formats based on short sequence length ZTE Corporation
R1-1710889 NR Physical Random Access Channel Nokia, Alcatel-Lucent Shanghai Bell
R1-1711065 Discussion on PRACH preamble format details for long/short sequence length for NR NTT DOCOMO, INC.
R1-1711145 PRACH preamble format design for long/short sequence length Qualcomm Incorporated
R1-1711270 [89-16] Email discussion on NR-PRACH preamble formats based on short sequence length ZTE Corporation
R1-1711380 NR-RACH preamble format details Ericsson

#### 5.1.1.4.2 PRACH preamble format details for capacity enhancement and beam management

*Include necessity and detailed solution for PRACH capacity enhancement, and PRACH design for beam management/recovery*



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**R1-1711865** **Multiple/Repeated PRACH Preamble Transmission with OCC across Preambles** **Qualcomm, Interdigital, Samsung, AT&T, Verizon**
**R1-1711827** **WF on Capacity Enhancement for option 1 of PRACH preamble** **LGE, ITL**
**R1-1711849** **WF on Preamble sequence for capacity enhancement** **Huawei, HiSilicon**

Possible agreements:
- NR should support PRACH preambles with ZC sequences of length L=127
- NR should support at least 64 PRACH preamble sequences per cell constructed from a single-root ZC sequence with m-sequence cover sequences.
  - The m-sequence cover sequences have length L=127 and are obtained by cyclic-shifts of a single m-sequence generated from the generator polynomial $g(D) = D^7 + D^3 + 1$.

**Friday**
**R1-1711870** **WF on NR PRACH capacity enhancement** **CATT, Huawei, TCL**
- *Support RACH format design for Option 4.*

**Discussion:** Also supported by Nokia.
**Decision:** The document is noted.

**R1-1710890** **NR Physical Random Access Channel Capacity** **Nokia, Alcatel-Lucent Shanghai Bell**
- Proposal 1: RACH sequence capacity should consider the on-demand SI RACH requests.
- Proposal 2: Use the same PRACH preamble format for FDM multiplexed PRACH resources for initial access and PRACH resources for beam recovery requests.
- Proposal 3: In multiplexing resources for beam recovery requests in TDM manner with RACH slots, support SR like resource of PUCCH for beam recovery requests.
- Proposal 4: As capacity need to due handovers depend on network load and deployment, the NR should support flexible PRACH resource allocation both in time and frequency domain.
- Proposal 5: NR to consider dedicated PRACH preamble sequences for paging driven response.
- Proposal 6: RACH sequence capacity should consider paging indicator response.
- Proposal 7: Support 139 sequence length for short PRACH preamble sequence.
- Proposal 8: Consider preamble format 4 as a method to increase the PRACH preamble sequence capacity.
- Proposal 9: RACH configuration supports both option 1 and option 4.

**Decision:** The document is noted.

**R1-1711600** **PRACH preamble sequences and formats for capacity enhancement and beam management** **Huawei, HiSilicon** (Revision of R1-1709917)
- Proposal 1: NR should support PRACH preambles with ZC sequences of length L=127.
- Proposal 2: NR should support at least 64 PRACH preamble sequences per cell constructed from a single-root ZC sequence with m-sequence cover sequences.
  - The m-sequence cover sequences have length L=127 and are obtained by cyclic-shifts of a single m-sequence generated from the generator polynomial $g(D) = D^7 + D^3 + 1$.
- Proposal 3: 2-stage PRACH with proper UE grouping should be supported as an option to reduce detection complexity for the much higher PRACH spectral efficiency in NR.
- Proposal 4: NR supports option 4 for gNB sweeping.

**Decision:** The document is noted.

Not treated.
R1-1709895 NR-PRACH formats: capacity enhancements and other use cases ZTE
R1-1709917 PRACH preamble sequences and formats for capacity enhancement and beam management Huawei, HiSilicon
R1-1710033 NR RACH Preamble Format for capacity enhancement, CATT
R1-1710269 Discussion on PRACH preamble for capacity enhancement LG Electronics
R1-1710511 Discussions on PRACH Capacity Intel Corporation
R1-1710610 NR-PRACH for various use cases ETRI
R1-1710634 PRACH preamble format details for capacity enhancement and beam management Samsung
R1-1710822 On PRACH design to support uplink requests MediaTek Inc.
R1-1710890 NR Physical Random Access Channel Capacity Nokia, Alcatel-Lucent Shanghai Bell
R1-1711066 Discussion on PRACH preamble format details for capacity enhancement and beam management for NR NTT DOCOMO, INC.
R1-1711146 PRACH preamble design for capacity enhancement Qualcomm Incorporated
R1-1711381 NR-RACH preamble format details for capacity enhancement and beam management Ericsson
R1-1711569 PRACH Design TCL Communication Ltd.



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#### 5.1.1.4.3 Power ramping and power control during RA procedure

*Include remaining details on PRACH power ramping and Msg.3 power control mechanism*
*Note that all remaining aspects related to power ramping/control during RA procedure need to be finalized in this meeting*

From Wednesday evening offline
Agreements:

- The UE calculates the PRACH transmit power for the retransmission at least based on the most recent estimate pathloss and power ramping
  - The pathloss is measured at least on the SS block associated with the PRACH resources/preamble subset
- UE behavior when reaching the maximum power
  - If the recalculated power is still at or above the Pc,max
    - The UE can transmit at maximum power even if it changes its TX beam

To be discussed further:

- Is the UE required to select the PRACH resources based on the SS block received with the highest SS block RSRP?
- Is the UE is allowed to change SS block used for the pathloss estimate for retransmission?

**Thursday:** Above questions should not have an impact to RAN4 progress.
Continue discussion until Friday – Nazmul (Qualcomm)
**Friday:** Continue discussions at the next meeting.

**R1-1711861** **WF on RACH Power Control Mechanism for Msg.1 Transmission LGE, NTT DOCOMO**
Also supported by Huawei, HiSilicon

Possible agreements:

- Configure the number of beam switching N for power ramping in Msg.1 (re)transmission, where,
  - when UE conducts beam switching and the number of beam switching is equal to or lower than the number N
    - The counter of power ramping remains unchanged,
  - when UE conducts beam switching and the number of beam switching is N+1
    - If UE doesn't reaches maximum power, the counter of power ramping increases
    - Otherwise, UE reports random access problem to upper layer
  - when the counter of power ramping increases
    - The number of beam switching is reset.
- Configure the maximum count of continuously increasing power ramping in a certain beam, where,
  - when the configured number is exceeded,
    - UE should change its beam for PRACH preamble retransmission.

Not treated.

| | | |
|---|---|---|
| R1-1709896 | Power control during random access procedure | ZTE |
| R1-1709918 | Discussion on power ramping and power control during RA procedure | Huawei, HiSilicon |
| R1-1710034 | RACH power control and power ramping procedure | CATT |
| R1-1710137 | Discussion on Power ramping and power control during RA procedure | Guangdong OPPO Mobile Telecom. |
| R1-1710252 | Discussion on preamble transmitting power | NEC Corporation |
| R1-1710270 | Discussion on Power Control issue for Message 1 and 3 | LG Electronics |
| R1-1710512 | PRACH Power ramping procedure | Intel Corporation |
| R1-1710635 | Power ramping and power control during RA procedure | Samsung |
| R1-1710823 | PRACH Msg1 retransmission | MediaTek Inc. |
| R1-1710870 | Power ramping for Msg1 preamble re-transmission | InterDigital, Inc. |
| R1-1710891 | Preamble Power Ramping and RACH Message 3 Power Control | Nokia, Alcatel-Lucent Shanghai Bell |
| R1-1711067 | Discussion on power ramping and power control during RA procedure for NR | NTT DOCOMO, INC. |
| R1-1711147 | Power ramping and power control for RA procedure | Qualcomm Incorporated |
| R1-1711233 | Remaining issues on power ramping in NR | Sharp |
| R1-1711382 | Power ramping and power control during RA procedure | Ericsson |

#### 5.1.1.4.4 4-step RA procedure

*Include Msg.2/3/4 channel design, RACH configuration, non-contention based random access procedure, etc.*

**R1-1711866** **WF on RACH configuration in RMSI** **Huawei, HiSilicon**

Agreement:

- All random access configuration information is broadcasted in all beams used for RMSI within a cell
  - i.e, RMSI information is common for all beams



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**R1-1711936** **WF on CSI-RS based RACH Configuration** **Samsung, Ericsson, ZTE, Mediatek Mitsubishi, MTI**
Also supported by Nokia, Huawei, HiSilicon

Agreements:

- At least for handover case, a source cell can indicate in the handover command,
  - Association between RACH resources and CSI-RS configuration(s)
  - Association between RACH resources and SS blocks
  - A set of dedicated RACH resources (FFS: time/frequency/sequence)
  - Note that above CSI-RS configuration is UE-specifically configured

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**R1-1711876** **WF on multiple Msg.1 transmission for contention free case** **Samsung, Huawei, Hisilicon, MediaTek, ZTE**

Possible agreements:

- For contention free case, a UE can be configured to transmit multiple Msg.1 over multiple RACH transmission occasions before the end of a monitored RAR window

**Friday**

Agreements:

- For contention free case, a UE can be configured to transmit multiple Msg.1 over dedicated multiple RACH transmission occasions in time domain before the end of a monitored RAR window if the configuration of dedicated multiple RACH transmission occasions in time domain is supported.
  - Note: The time resource used for 'dedicated RACH in time domain' is different from the time resources of contention based random access
  - Note: Multiple Msg1 can be transmitted with same or different UE TX beams

**R1-1711799** **WF on random access association configuration** **ZTE**

Possible agreements:

- The subsets of PRACH resources/indices are defined using the following parameters
  - W: Number of preamble indices per subset of preamble indices
  - X: Number of preamble subsets per PRACH resource
  - Y: Number of associations per preamble subset per PRACH time instance
- The SS blocks are consecutively associated with the subsets of PRACH resources/indices using the following parameter
  - Z: Association time period
    - The number of PRACH time instances after which an association from an SS block occurs again

**Friday**

**R1-1711945** **WF on random access association configuration** **ZTE**

Agreements:

- For contention-based random access, an association between an SS block in the SS burst set and a subset of RACH resources and/or preamble indices is configured by a set of parameters in RMSI.
  - RAN1 strives to use the same set of parameters for different cases, e.g. analog/hybrid/digital beamforming at gNB, level of gNB beam correspondence, number of SS blocks, number of frequency multiplexed PRACH resources, PRACH resource density in time etc.
  - RAN1 strives to minimize the set of parameters.
  - FFS the set of parameters
  - FFS the number of SS blocks (if indicated in RMSI or MIB), e.g. the actually transmitted SS blocks or the maximum number (L).

Not treated.

| | | |
|---|---|---|
| R1-1709897 | 4-step random access procedure | ZTE |
| R1-1710035 | Further details on NR 4-step RA Procedure | CATT |
| R1-1710138 | NR 4-Step Random Access Procedure | Guangdong OPPO Mobile Telecom. |
| R1-1710218 | RACH transmission count | Mitsubishi Electric Co. |
| R1-1710234 | Discussion on 4-step RA procedure | Fujitsu |
| R1-1710271 | RACH Procedure | LG Electronics |
| R1-1710422 | DL Tx beam reporting in msg. 3 | AT&T |
| R1-1710478 | RACH procedures and resource configuration | Huawei, HiSilicon |
| R1-1710513 | 4-step PRACH Procedures | Intel Corporation |
| R1-1710636 | 4-step RACH procedure | Samsung |



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| | | |
|---|---|---|
| R1-1710774 | Discussion on RACH configuration | CMCC |
| R1-1710824 | On 4-step RACH procedure | MediaTek Inc. |
| R1-1710860 | Considerations on 4-step RA procedure | Sony |
| R1-1710871 | Multiple Msg1 transmissions for one monitored RAR window | InterDigital, Inc. |
| R1-1710892 | NR 4-step RACH procedure | Nokia, Alcatel-Lucent Shanghai Bell |
| R1-1711068 | Discussion on 4-step RA procedure for NR | NTT DOCOMO, INC. |
| R1-1711148 | 4-step RACH procedure consideration | Qualcomm Incorporated |
| R1-1711279 | RACH configuration and procedure | Motorola Mobility, Lenovo |
| R1-1711383 | 4-step random access procedure | Ericsson |

#### *5.1.1.5 Mobility procedure*

##### 5.1.1.5.1 Measurement based on SS block

*Include whether/how to handle power offset between NR-SSS and PBCH-DMRS, one or multiple information on periodicity and timing for RRM measurement per carrier, etc.*

**R1-1710977 Discussion on RRM measurement on SS blocks CMCC**

*Alt 1: Network indicates one single shortest periodicity for RRM measurement in the same carrier frequency.*
*Alt 2: Network indicates one single longest periodicity for RRM measurement in the same carrier frequency.*
*Alt 3: Network indicates two periodicities, one for the camping cell and the other for the neighboring cells in the same carrier frequency.*

- Observation 1: For IDLE mode UE RRM measurement, one single indication of the *longest* SS burst set periodicity of all the cells in the same carrier frequency can work, as long as the SS block timing locations within the SS burst set with longer periodicity is a subset of SS block timing locations within the SS burst set with shorter periodicity, i.e., *subset alignment of all SS blocks in the same carrier frequency.*
- Observation 2: From network operating perspective, subset alignment of SS blocks is necessary since it ensures the simple indication of SSBS periodicity for RRM measurement and that UE can also detect cells that are not configured in the neighbor cell list.
- Observation 3: For IDLE mode UE, both Alt 2 and Alt 3 can work.
- Proposal 1: It is slightly preferred that Alt 2, i.e., one periodicities and one information regarding SS block timing locations is indicated to IDLE mode UE for intra-frequency measurement.
- Proposal 2: For CONNECTED mode UE, two SSBS periodicities and two information regarding SS block timing locations are indicated for intra-frequency measurement.
- Proposal 3: Only one SSBS periodicity regarding inter-frequency measurement is preferred to be indicated.

**Decision:** The document is noted.

**R1-1709919 SS Burst Periodicities and timing for UE RRM measurement Huawei, HiSilicon**

- Proposal 1: In addition to NR-SSS, UE may optionally use DMRS for PBCH to derive SS block RSRP as cell level quality for L3 mobility. Whether and how to use DMRS for PBCH is up to UE implementation.
- Proposal 2: NR should support fixed power offset between NR-SSS and PBCH-DMRS to use PBCH-DMRS to derive SS block RSRP for L3 mobility.
- Proposal 3: NR should support to indicate multiple SS burst set periodicities and information regarding measurement timing/duration to connected mode UE.
- Proposal 4: NR should support to indicate one SS burst set periodicity and one information regarding measurement timing/duration for all cells or non-serving cells to idle mode UE.

**Decision:** The document is noted.

**R1-1710637 Measurement based on SS block Samsung**

- Proposal 1: A fixed EPRE power ratio shall be adopted between SSS and PBCH DMRS. The fixed ratio shall be 3.5dB.
- Proposal 2: Only a single SS burst set periodicity value shall be configured per carrier

**Decision:** The document is noted.

**R1-1711761 WF on measurement based on SS block NTT DOCOMO, Ericsson, Huawei, HiSilicon, AT&T**

- Regarding the measurement timing configuration i.e., SS burst set periodicity/timing/duration information for UE RRM measurement per frequency carrier,
  - Only single measurement timing configuration is configured per frequency carrier to UE for IDLE mode measurement.
  - Multiple measurement timing configurations can be configured to UE in CONNECTED mode.
    - Different measurement timing configurations are applied to different group of cells on the frequency carrier
    - FFS maximum number of measurement timing configurations per frequency carrier

**Decision:** The document is noted.



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Agreements:

- Regarding the SS block based RRM measurement timing configuration (SMTC) i.e., measurement window periodicity/duration/offset information for UE RRM measurement per frequency carrier,
  - For intra-frequency CONNECTED mode measurement, up to two measurement window periodicities can be configured
    - UE can be informed of which cell(s) is associated with which measurement window periodicity
      - For cell(s) that is not listed, longer measurement window periodicity is used
    - Single measurement window offset and duration are configured per frequency carrier
  - For IDLE mode measurements, only single SMTC is configured per frequency carrier
  - For inter-frequency CONNECTED mode measurements, only single SMTC is configured at least per frequency carrier
  - RAN1 asks RAN4 if there is any concern for inter-frequency measurement based on single SMTC or multiple SMTCs across different frequency carriers

**R1-1711801 WF on power offset of NR-PBCH DMRS and NR-SSS MediaTek, Huawei, HiSilicon, NTT DOCOMO**

- A fixed power offset defined in the specification shall be adopted between SSS and PBCH DMRS.
  - FFS: 0 dB, 3 dB, or 3.5 dB power offset

**Decision:** The document is noted and the folowing is agreed:

Agreement: A fixed power offset defined in the specification shall be adopted between SSS and PBCH DMRS per frequency band

Not treated.

R1-1711800 WF on SS block repetition ZTE, Sierra Wireless
R1-1709898 RRM measurements on IDLE mode RS ZTE
R1-1710036 IDLE and CONNECTED mode UE mobility based on SS-block measurements CATT
R1-1710139 On RRM measurement based on SS block Guangdong OPPO Mobile Telecom.
R1-1710272 SS block based RRM Measurement LG Electronics
R1-1710377 SS block time index for idle/inactive measurement vivo
R1-1710423 Measurement based on SS block AT&T
R1-1710514 SS Block based RRM Measurements Intel Corporation
R1-1710804 Discussion on measurement based on SS block MediaTek Inc.
R1-1711069 Discussion on NR RRM measurement based on SS block NTT DOCOMO, INC.
R1-1711149 Measurement based on SS block consideration Qualcomm Incorporated
R1-1711268 SS block measurements and procedures Nokia, Alcatel-Lucent Shanghai Bell
R1-1711384 Mobility measurements based on SS block Ericsson

#### 5.1.1.5.2 Measurement based on CSI-RS for L3 mobility

*Include candidate periodicity values, whether/how transmission and/or measurement bandwidth is indicated, numerology of CSI-RS for L3 mobility, spatial QCL assumption, methods to obtain parameters of CSI-RS for L3 mobility, etc.*
*Note that CSI-RS configuration parameters for L3 mobility need to be finalized in this meeting*

**R1-1710273 CSI-RS based RRM Measurement for L3 Mobility LG Electronics**

- Proposal 1: Considering the UE behaviour of L3 mobility, CSI-RS for L3 mobility should be transmitted periodically, and the periodicity of CSI-RS is configured to be at least less than 20ms.
- Proposal 2: Transmission bandwidth of CSI-RS is signalled by UE-dedicated RRC message and how much part is used as measurement bandwidth is an implementation issue.
- Proposal 3: Symbol duration of CSI-RS is based on SCS of data channel and it is configured per frequency through UE-dedicated RRC configuration message. IFDMA is proposed for sub-time unit transmission within an OFDM symbol.
- Proposal 4: A part of spatial information can be exploited from a SS block if the beam width of SS block is super set but limited set of the beam width of CSI-RS.
- Proposal 5: When a UE detects SS block of a cell, which is not in the neighbour cell list or whose CSI-RS configuration is not given to the UE, UE may request CSI-RS configuration for that cell using measurement report.

**Decision:** The document is noted.

**R1-1710805 Discussion on CSI-RS for L3 mobility MediaTek Inc.**

- Proposal 1: Candidate periodicity values of CSI-RS for L3 mobility is 5, 10, 20, 40, 80, 160 ms.
- Proposal 2: CSI-RS for L3 mobility and SS block burst are transmitted in TDM manner.



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- Proposal 3: The CSI-RS for L3 mobility and the measurement gap should be aligned, and the entire CSI-RS for L3 mobility should be contained in the measurement gap.
- Proposal 4: NR supports measurement configuration of CSI-RS for L3 mobility, including
  - measurement bandwidth per carrier frequency
  - numerology
  - QCL assumption
- Observation 1: The numerologies of CSI-RS from different cells could be different, so it is unlikely all configuration parameters are valid for all CSI-RS resources on a carrier frequency (Method 2).
- Proposal 5: As a baseline, configuration parameters of CSI-RS for L3 mobility are valid for one CSI-RS resource. Certain parameters can be cell-specific/frequency-specific, e.g. periodicity.
- Observation 2: If the configuration parameters can be obtained from detected cell-ID (e.g. Method 3 & Method 5), then it is cell-specific configuration, and RAN1 does not see the need to support cell-specific configuration for CSI-RS for RRM measurement.
- Observation 3: Measuring CSI-RS with parameters derived from detected cells will increase UE complexity.

**Decision:** The document is noted.

**R1-1711762 WF on measurement based on CSI-RS NTT DOCOMO, Ericsson, AT&T**

- Following CSI-RS properties for RRM measurement for L3 mobility are supported in NR
  - Configurable periodicity (as already agreed)
    - {5, 10, 20, 40, [80, 160]} ms are supported
  - Configurable transmission bandwidth (as already agreed)
    - FFS candidate values
  - Configurable measurement bandwidth (as already agreed) and frequency location
    - At least minimum carrier bandwidth for each frequency band/range and at least one additional wider bandwidth for each SCS (e.g., maximum UE bandwidth) are supported
      - FFS other candidate values for wider bandwidth for each SCS
    - Measurement of CSI-RS in subband/bandwidth part which may or may not contain SS Blocks is supported
  - Configurable parameters for sequence generation
  - Configurable numerology
    - For each frequency range, subcarrier spacing values applicable to data, CSI-RS for beam management and SS block in the frequency range are supported
  - FFS: Configurable spatial QCL with SS block
    - It is assumed that property of spatial QCL between SS block and CSI-RS for beam management will be reused
  - Configurable CSI-RS time/frequency resource (as already agreed)
    - CSI-RS design including RE mapping and density for beam management is assumed as baseline

**Decision:** The document is noted, modified and agreed as follows:

Agreements:

- Following CSI-RS properties for RRM measurement for L3 mobility are supported in NR
  - Configurable periodicity (as already agreed)
    - {5, 10, 20, 40, [80, 160]} ms are supported
    - This does not mean periodicity will be configured per CSI-RS resource
  - Configurable transmission bandwidth (as already agreed)
    - FFS candidate values
  - Configurable measurement bandwidth (as already agreed) and frequency location
    - At least minimum carrier bandwidth for each frequency band/range and at least one additional wider bandwidth for each SCS (e.g., maximum UE bandwidth) are supported
      - FFS other candidate values for wider bandwidth for each SCS
    - Measurement of CSI-RS in subband/bandwidth part which may or may not contain SS Blocks is supported
  - Configurable parameters for sequence generation
  - Configurable numerology
    - For each frequency range, subcarrier spacing values applicable to data, CSI-RS for beam management and SS block in the frequency range are supported
  - Association between CSI-RS for RRM measurement and SS block
    - It is assumed that property of spatial QCL between SS block and CSI-RS for beam management will be reused
  - Configurable CSI-RS time/frequency resource (as already agreed)
    - CSI-RS design including RE mapping and density for beam management is assumed as baseline
  - Note that above properties are relevant for RAN4 RRM measurement evaluations and not intended to be an exhaustive list of properties



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**R1-1711864** **Measurement window periodicity, duration and offset of CSI-RS for L3 mobility** **Qualcomm**

Possible agreements:

- For DRX operation,
  - For the CSI-RS based RRM measurement timing configuration (i.e., measurement window periodicity/duration/offset information), only a single measurement window periodicity, duration and offset for all CSI-RS resources are configured per frequency carrier
    - This applies to both intra-frequency and inter-frequency measurements

Not treated.

| | | |
|---|---|---|
| R1-1709899 | RRM measurements on CSI-RS for L3 mobility | ZTE |
| R1-1709920 | CSI-RS configuration parameters for L3 mobility | Huawei, HiSilicon |
| R1-1710037 | L3 Mobility based on CSI-RS based measurments | CATT |
| R1-1710378 | CSI-RS configuration for L3 mobility | vivo |
| R1-1710424 | Measurement based on CSI-RS for L3 mobility | AT&T |
| R1-1710515 | CSI-RS based RRM Measurements | Intel Corporation |
| R1-1710638 | Measurement based on CSI-RS for L3 mobility | Samsung |
| R1-1710775 | Discussion on RRM measurement on SS blocks | CMCC |
| R1-1711070 | Discussion on NR RRM measurement based on CSI-RS for L3 mobility | NTT DOCOMO, INC. |
| R1-1711150 | Measurement based on CSI-RS for L3 mobility consideration | Qualcomm Incorporated |
| R1-1711385 | Measurements based on CSI-RS for L3 mobility | Ericsson |
| R1-1711392 | CSI-RS configuration for L3 mobility purposes | Nokia, Alcatel-Lucent Shanghai Bell |

#### 5.1.1.5.3 Radio link monitoring

*Include RS used to derive SINR like metric for RLM*
*Note that RS used for radio link monitoring needs to be finalized in this meeting*

**R1-1711151** **Radio link monitoring consideration** **Qualcomm Incorporated**

- Proposal 1: In Idle/RRC connected inactive/RRC connected active states, cell detection and measurements are based on cell-specific PSS and SSS for both the serving cell and neighboring cells.
- Proposal 2: Choice of RLM RS should consider the following aspects
  - RLM RS should be QCL with NR-PDCCH to reflect the channel experienced by NR-PDCCH
  - UE should be able to estimate the interference level experienced by NR-PDCCH
  - RLM RS should have guaranteed existence with lower enough periodicity, i.e. 10-20ms or DRX cycle if DRX cycle is longer than 10-200ms
  - Consider reuse RLM RS for other purposes to reduce overhead, i.e. beam management, tracking RS, etc.
- Proposal 3: LTE Radio Link Failure triggering procedure can be a starting pointing for NR radio link monitoring design
- Proposal 4: In addition to RLM based IS/OOS, beam failure recovery procedure can provide periodic/aperiodic IS and OOS indications to upper layers for the RLF procedure.

**Decision:** The document is noted.

**R1-1711763** **WF on radio link monitoring** **NTT DOCOMO, Ericsson, AT&T**

- The RS used for RLM should have following properties
  - Periodic transmission with short enough periodicity
  - Wideband transmission relative to bandwidth of active bandwidth part
  - Supporting both single beam and multi-beam operations
  - Representing control channel quality, e.g., by QCL with PDCCH
- CSI-RS can be periodic and can be transmitted in wideband. CSI-RS has enough flexibility not only on periodicity and bandwidth but also on transmission beam/scheme to represent control channel quality and so on. Therefore, at least periodic CSI-RS can be used for RLM. In some case, CSI-RS for RLM and CSI-RS for RRM measurement and/or for beam management may share the same physical resources to reduce RS overhead.
- SS block can be also considered for RLM as SS block is the always-on signal to provide cell coverage. But there may be a case where SS block cannot provide some properties required for RLM, e.g., QCL with PDCCH.

**Decision:** The document is noted, modified as follows:

Agreements:

- The RS used for RLM should have following properties
  - Periodic transmission with short enough periodicity
  - Wideband transmission relative to bandwidth of active bandwidth part
  - Supporting both single beam and multi-beam operations
  - Representing control channel quality
- Both CSI-RS based RLM and SS block based RLM are supported



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- FFS: whether or not only a single type of RS is configured to UE for RLM at a time

**R1-1711806 WF on radio link monitoring in NR Huawei, HiSilicon, Qualcomm, ATT**

- NR should support aperiodic indication from beam failure recovery to assist RLF procedure.
  - Example 1: aperiodic IS indication(s) from beam failure recovery can stop/reset T310
    - RAN2 can decide specific procedure
  - Example 2: aperiodic OOS indication from failure of beam recovery procedure
    - How to use aperiodic OOS indication can be decided in RAN2

**Decision:** The document is noted.

**Thursday**

- NR should strive to provide aperiodic indication based on beam failure recovery procedure to assist RLF procedure if the same RS is used for beam failure recovery and RLM procedure
  - Example 1: aperiodic IS indication(s) from beam failure recovery can stop/reset T310
    - RAN2 can decide specific procedure
  - Example 2: aperiodic OOS indication from failure of beam recovery procedure
    - How to use aperiodic OOS indication can be decided in RAN2

**Friday**

**R1-1711889 WF on Radio Link Monitoring in NR Huawei, HiSilicon, Qualcomm, ATT, DOCOMO, Intel, Vivo, LGE**

Agreements:

- NR should strive to provide aperiodic indication(s) based on beam failure recovery procedure to assist radio link failure (RLF) procedure, if same RS is used for beam failure recovery and RLM procedures.
  - Example 1: aperiodic indication(s) based on beam failure recovery procedure can reset/stop T310
    - RAN2 can decide specific procedure
  - Example 2: aperiodic indication(s) based on failure of beam recovery procedure
    - How to use aperiodic indication can be decided in RAN2
  - FFS: aperiodic indication(s) based on beam failure recovery procedure to assist RLF procedure if different RS is used

**R1-1711850 WF on RLM CATT**

Not treated.

R1-1709900 Radio link monitoring in NR ZTE
R1-1709921 Discussion on remaining issues of radio link monitoring Huawei, HiSilicon
R1-1710038 NR Radio Link Monitoring CATT
R1-1710274 Discussion on Radio Link Monitoring in NR LG Electronics
R1-1710425 Radio link monitoring AT&T
R1-1710516 NR Radio Link Monitoring Intel Corporation
R1-1710639 Radio link monitoring Samsung
R1-1710806 Discussion on Radio Link Monitoring MediaTek Inc.
R1-1711071 Discussion on NR RLM and RLF NTT DOCOMO, INC.
R1-1711269 NR Radio link monitoring Nokia, Alcatel-Lucent Shanghai Bell
R1-1711386 Radio link monitoring Ericsson

#### *5.1.1.6 Other*

R1-1709922 On numerology determination during initial access Huawei, HiSilicon
R1-1710445 Minimum UE bandwidth in NR Huawei, HiSilicon
R1-1710640 Discussion on SS periodicity and PBCH TTI Samsung
R1-1710641 Considerations on PRACH design in high-mobility scenario Samsung
R1-1711387 Consideration of PRACH Configuration in NR Ericsson
R1-1711388 Additional synchronization provision Ericsson

### 5.1.2 MIMO

**R1-1711916 Chairman's notes of AI 5.1.2 MIMO Ad-Hoc chair (Qualcomm)**

The document was presented by Wanshi Chen from Qualcomm.

**Decision:** The document is endorsed and content is incorporated as below, with the add-on regarding the conclusion on beam management details (see 5.1.2.2.1).



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#### *5.1.2.1 Multi-antenna scheme*

*Physical control channel related issues are to be discussed in the agenda item for scheduling/HARQ aspects.*

##### 5.1.2.1.1 Codeword mapping

*Including codeword-to-layer mapping, codeword to resource mapping and interleaving*

**R1-1710642** **Finalizing Layer Mapping** **Samsung**
**R1-1710446** **Codeword to layer mapping in NR** **Huawei, HiSilicon**
**R1-1711007** **Codeword to layer mapping for DL and UL** **Ericsson**
**R1-1711152** **CW to layer mapping and frequency domain interleaving** **Qualcomm Incorporated**
**R1-1710426** **Remaining details of codeword mapping for NR MIMO** **AT&T**
**R1-1710517** **Remaining details on CW to MIMO layer mapping** **Intel Corporation**

Continue discussion offline – Youngwoo (Samsung)/Leiming (Huawei)
**R1-1711935** **Summary of Open Issues on Layer Mapping** **Samsung**

Agreements:

- Companies are encouraged to provide evaluation results especially for URLLC, intra-slot frequency hopping, dynamic TDD and high speed train scenarios
  - Practical simulation assumptions e.g. CBG based HARQ, pre-emption indication, DMRS, interleaver should be considered.
  - For both CP-OFDM and DFT-S waveforms
  - Evaluation should be done considering both slot and mini-slot.

Agreements:

- NR supports higher layer signalling for the maximum number of MCS/RV/NDI in DCI for PDSCH
  - FFS HARQ ID
  - Unless indicated otherwise, UE assumes single MCS/RV/NDI in DCI, i.e. up to four MIMO layers
- NR supports higher layer signalling for the maximum number of CQIs in UCI
  - Unless indicated otherwise, UE assumes single CQI in UCI, i.e. up to four MIMO layers in RI report
    - FFS subband CQI
  - FFS Whether or not the actual number of CQIs is also RI dependent
  - Note: This higher layer signalling can be the other signalling related to RI/PMI reporting (e.g. RI restriction)
  - FFS applicability on single/multi TRP

Not treated.
R1-1711665 WF on MIMO layer to CW correspondence Intel
R1-1709904 Discussion on Remaining Details of Codeword Mapping Beijing Xinwei Telecom Techn.
R1-1710050 On codeword mapping CATT
R1-1710175 Codeword mapping and interleaving ZTE
R1-1710255 Remaining details on DMRS ports and number of layers indication NEC Corporation
R1-1710275 Discussion on codeword mapping LG Electronics
R1-1710594 On codeword to RE mapping scheme Lenovo, Motorola Mobility
R1-1710611 Discussion on codeword mapping ETRI
R1-1710815 codeword mapping in NR MediaTek Inc.
R1-1711072 Discussion on codeword mapping NTT DOCOMO, INC.

##### 5.1.2.1.2 Codebook based transmission for UL

**R1-1710643** **Codebook-Based UL Transmission** **Samsung**
**R1-1710518** **On codebook based UL tansmission** **Intel Corporation**
**R1-1710051** **Considerations on codebook based UL transmission** **CATT**
**R1-1711610** **UL MIMO for codebook based transmission** **Ericsson** (Revision of R1-1711008)
**R1-1711073** **Codebook design for uplink** **NTT DOCOMO, INC.**

Continue discussion offline – Yushu (Intel)
R1-1711674 Summary of Issues and WFs on Codebook based transmission for UL Intel
**R1-1711881** **Summary of Issues and WFs on Codebook based transmission for UL** **Intel**

Conclusion:

- To better understand the tradeoff of uplink cell throughput gain vs. the overhead of control signalling for down-selection, determine the control signalling for frequency-selective precoding after the codebook is defined



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**R1-1711874** **NR UL MIMO Signaling Mechanism** **Ericsson, Nokia, Alcatel-Lucent Shanghai Bell, Qualcomm, CATT, ZTE**
**R1-1711792** **WF on codebook based UL transmission** **MediaTek, Nokia, Shanghai Bell**

Not treated.
R1-1710140 On uplink codebook design Guangdong OPPO Mobile Telecom.
R1-1710176 Codebook based UL transmission ZTE
R1-1710276 Discussion on codebook based transmission for UL LG Electronics
R1-1710447 Codebook based transmission for UL MIMO Huawei, HiSilicon
R1-1710816 Codebook based transmission in UL MediaTek Inc.
R1-1710920 TPMI Indication for Frequency Selective UL Precoding InterDigital, Inc.
R1-1711153 Codebook based UL transmission Qualcomm Incorporated
R1-1711284 Codebook Based Transmission and Codebook Design for UL MIMO Nokia, Alcatel-Lucent Shanghai Bell

#### 5.1.2.1.3 Non-codebook based transmission for UL

**R1-1709923** **Non-codebook based transmission for UL MIMO** **Huawei, HiSilicon**
**R1-1710177** **Non-Codebook based and Hybrid based UL transmission** **ZTE**
**R1-1710644** **Discussion on Non-Codebook-Based UL Transmission** **Samsung**
**R1-1711154** **Non-codebook based UL transmission** **Qualcomm Incorporated**

Continue discussion offline – Jun (Nokia)
**R1-1711884** **Summary of issues on UL non-codebook based transmissions** **Nokia, ASB**
**R1-1711750** **WF on UL non-codebook based transmission** **Huawei, HiSilicon, DOCOMO, Sharp, LGE, Ericsson, China Telecom, Deutsche Telekom, Xinwei, Vodafone, CeWiT, China Unicom, Tejas Networks, CATR, IITH, IITM, Panasonic, ZTE, InterDigital, AT&T, SoftBank, KDDI**
Also supported by Fujitsu, Mitsubishi

Agreements:
- For PUSCH precoder determination in non-codebook-based UL MIMO, support at least one of the followings:
  - Alt.1: Signalling of SRI(s) only, without TPMI indication in the UL grant
  - Alt.2: Signalling of TRI only, without TPMI indication in the UL grant
  - Alt.3: Signalling of TRI and a single SRI, without TPMI indication in the UL grant
  - Alt. 4: signalling of a single TRI, a single CRI without TPMI indication in the UL grant
  - To down-select in the next meeting considering single- vs. multi-panel (companies are encouraged to perform more evaluations)
  - Note: this may depend UE's capability in terms of calibration

R1-1710052 On non-codebook based UL transmission CATT
R1-1710277 Discussion on non-codebook based transmission for UL LG Electronics
R1-1710519 On non-codebook based UL transmission Intel Corporation
R1-1711009 UL MIMO for non-codebook based transmission Ericsson
R1-1711074 Beam determination for non-codebook based transmission for uplink NTT DOCOMO, INC.
R1-1711285 Non-codebook based UL-MIMO transmission Nokia, Alcatel-Lucent Shanghai Bell

#### 5.1.2.1.4 Diversity transmission for UL

**R1-1710427** **UL diversity transmision for NR** **AT&T**
**R1-1710178** **Diversity based uplink transmission schemes** **ZTE**

Continue offline discussion – Cristina (Mitsubishi)
**R1-1711845** **Summary of AI 5.1.2.1.4 Diversity transmission for UL** **Mitsubishi**

Conclusion:
- Companies are strongly encouraged to perform analysis and simulations for diversity transmission for both CP-OFDM and DFT-s-OFDM based UL considering various scenarios
- Aim to conclude in the next meeting

R1-1710921 STBC-based Transmission for Uplink Transmit Diversity InterDigital, Inc.
R1-1711286 UL-MIMO diversity-based transmission Nokia, Alcatel-Lucent Shanghai Bell
R1-1710053 Considerations on transmission diversity scheme in UL CATT



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R1-1710278 Discussion on diversity transmission for UL LG Electronics
R1-1710448 Diversity-based transmission for UL Huawei, HiSilicon
R1-1710520 On diversity based UL transmission Intel Corporation
R1-1710645 Diversity transmission for UL Samsung
R1-1710886 UL diversity transmission for DFTsOFDM Mitsubishi Electric RCE
R1-1711010 Robust Transmission Scheme for PUSCH Ericsson
R1-1711155 On UL diversity transmission scheme Qualcomm Incorporated

#### 5.1.2.1.5 PRB bundling for DL

**R1-1709905 Further Discussion on DL PRB Bundling Beijing Xinwei Telecom Techn.**
**R1-1711287 On details of PRB Bundling Nokia, Alcatel-Lucent Shanghai Bell**
**R1-1711156 Discussion on PRB bundling for DL Qualcomm Incorporated**

Continue offline discussion – Peng (Xinwei)
**R1-1711960 Summary of Issues on DL PRB bundling Xinwei**
**R1-1711990 WF on DL PRB Bundling Xinwei, Huawei, HiSilicon, Qualcomm**

Agreements:
- For DL data transmission:
  - PRB bundling size values include
    - Case 1: one or more values down-selected from the following set
      - {[1], 2, 4, 8 and 16};
      - FFS the relationship with RBG size;
    - Case 2: values equal to consecutively scheduled bandwidth in frequency;
  - For UE-specific PRB bundling size indication, support dynamically indicated PRB bundling size with up to 1 bit overhead;
    - FFS implicit indication to reduce configuration overhead, e.g., based on DMRS configuration etc;
    - FFS the usage of above 1 bit, e.g. whether to switch between Case 1 and Case 2 or between two configured Case 1 values;
    - FFS other aspects related to MU-MIMO pairing and higher-layer signaling

Not treated.
R1-1710521 On PRB bundling for DL Intel Corporation
R1-1709925 PRB bundling size for DL data precoding Huawei, HiSilicon
R1-1710054 PRB bundling for DL transmission CATT
R1-1710179 On PRB Bundling ZTE
R1-1710360 Discussion on PRB bundling size for NR DL Spreadtrum Communications
R1-1710646 PRB bundling for NR DMRS Samsung
R1-1710922 PRG Size Indication in NR InterDigital, Inc.
R1-1711011 PRB bundling Ericsson

#### 5.1.2.1.6 Multi-TRP and Multi-panel transmission

DL
**R1-1711013 DL multi-TRP and multi-panel transmission Ericsson**

Agreements:
- The maximum supported number of unicast and dynamically scheduled NR-PDSCHs a UE can be expected to simultaneously receive is 2 on a per component carrier basis in case of one bandwidth part for the component carrier
  - FFS in case of two or more bandwidth parts for the component carrier
  - FFS the max number of corresponding NR-PDCCHs

**R1-1710180 Multi-TRP Transmission and interference coordination ZTE**

UL
**R1-1710648 Discussions on NR UL multi-panel/multi-TRP Samsung**
**R1-1710522 Discussion on uplink multi-panel and multi-TRP operation Intel Corporation**

**R1-1711667 WF on multiple PDSCH approach of supporting NC-JT Intel**

Agreements:
- Send LS to RAN2 (cc RAN3) to inform about RAN1 agreement from RAN1#89 on the support of multiple PDSCHs transmission to the UE to support NC-JT operation



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- Include in the LS the following content
  - RAN1 agreement from RAN1#89
  - RAN1 is considering different scenarios including TRPs connected with ideal and non-ideal backhaul link, TRPs with same and different cell IDs, etc. to provide an increased throughput for users covered by different TRPs, and greater radio link reliability through dual connectivity-like operation
  - RAN1 thinks that the above agreement may have impact on RAN2 specification
  - Actions: RAN1 asks RAN2 to take into account the above agreement in RAN2's work and provide any information that may be relevant for future RAN1's work on this topic

Draft LS is endorsed in R1-1711820. Final LS is approved in R1-1712000.

Continue discussion offline – Xin (CATT)
**R1-1711857 Summary of views on multi-TRP & multi-panel transmission CATT**

Not treated.
R1-1709924 Multiple NR-PDCCH for Multiple TRP transmission Huawei, HiSilicon
R1-1710055 Considerations on multi-panel/multi-TRP transmission CATT
R1-1710141 Considerations on the multi-TRP/Multi-pannel design to support the reception of multiple PDCCHGuangdong OPPO Mobile Telecom.
R1-1710235 Discussion on multiple NR-PDCCHs in NC-JT scheme Fujitsu
R1-1710279 Discussion on cooperative transmission LG Electronics
R1-1710428 On the details of multi-TRP and multi-panel transmission AT&T
R1-1710451 CSI acquisition details for NCJT Huawei, HiSilicon
R1-1710523 Support of downlink NC-JT in NR Intel Corporation
R1-1710647 Discussions on NR DL network coordination Samsung
R1-1710814 Multi-TRP and panel transmission MediaTek Inc.
R1-1710923 DCI Design for Multi-TRP/Panel Transmission for DL InterDigital, Inc.
R1-1710969 NR-PDCCH for multi-TRP transmission China Telecommunications
R1-1711012 UL multi-panel transmission Ericsson
R1-1711157 On multi-TRP and multi-panel transmission Qualcomm Incorporated
R1-1711288 On the maximum number of PDSCH/PDSCHs to be supported for multi-TRP transmission Nokia, Alcatel-Lucent Shanghai Bell

#### 5.1.2.1.7 Rate matching

**R1-1710649 On PDSCH rate matching for NR Samsung**
**R1-1711014 On rate matching Ericsson**

Agreements:
- A UE is configured with resources for PDSCH rate matching
  - FFS details
- A UE is configured with resources for PUSCH rate matching
  - FFS details

Continue discussion offline – Kunil (LGE)
**R1-1711841 Summary of views on resource for PDSCH and PUSCH rate matching LGE**

Not treated.
R1-1710181 Discussion on rate matching ZTE
R1-1710280 Discussion on rate matching LG Electronics
R1-1709933 Rate matching for data channel Huawei, HiSilicon
R1-1710429 On the need of per RE level PDSCH rate-matching and RE mapping signalling AT&T
R1-1710524 Rate matching for NR Intel Corporation
R1-1711158 On PDSCH and PUSCH RE mapping Qualcomm Incorporated

#### 5.1.2.1.8 Other

**R1-1711159 Transmission scheme for broadcast PDSCH Qualcomm Incorporated**

Agreement: For NR in Rel-15, DL transmission scheme 2 is not explicitly supported for broadcast PDSCH in specification

Not treated.



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R1-1709926 Discussion on transmission parameter sets Huawei, HiSilicon
R1-1710182 On transmission setting ZTE
R1-1710650 Discussion on transmission parameter sets Samsung
R1-1710651 Discussion of number of PDSCHs in NR-CoMP Samsung
R1-1710652 Multi-TA procedures for Multi-TRP Samsung
R1-1711441 On the feedback overhead reduction for multi-subband UL MIMO Huawei, HiSilicon
R1-1711444 Continuous precoding for NR DMRS in time domain Samsung

#### *5.1.2.2 Beam management*

##### 5.1.2.2.1 Beam management details

**R1-1710654 DL beam management for NR Samsung**
**R1-1711160 Beam management for NR Qualcomm Incorporated**
**R1-1710183 DL beam management for NR MIMO ZTE**
**R1-1709928 UL beam management Huawei, HiSilicon**
**R1-1711016 UL beam management details Ericsson**

Continue offline discussion – Sundar (Qualcomm)
**R1-1711965 Beam management offline summary Qualcomm**

Agreements:

- RAN1 to study the relation (if any) between a measurement and/or reporting on a reference signal and a subsequent beam indication for beam management purposes
  - Study the indicator(s) used for PDCCH and PDSCH
  - Study whether there is a relationship between the indicator types e.g. same type of indicator or different types
- Study L1-RSRP reporting of multiple beams considering
  - Differential L1-RSRP for multiple beams
    - Reference RSRP for L1-RSRP differential report,e.g., predefined or configurable
  - Bit-width of reporting,
  - Number of groups/beams per group
  - UCI design of the beam reporting,
  - FFS: Other issues

Agreements:

- RAN1 agrees that the certain number of beam failure recovery request transmissions is NW configurable by using some parameters
  - Parameters used by the NW could be:
    - Number of transmissions
    - Solely based on timer
    - Combination of above
- FFS: whether beam failure recovery procedure is influenced by the RLF event

Agreements:

- In case of unsuccessful recovery from beam failure, UE sends an indication to higher layers, and refrains from further beam failure recovery
  - Relationship between RLF and unsuccessful beam failure recovery indication (if any) e.g. whether beam failure recovery procedure influences or is influenced by the RLF event
  - Send LS to inform RAN2 – to be done next meeting

Proposals:

- Support L1-RSRP reporting of measurements on SS block for beam management procedures
  - Supported by: Qualcomm, Samsung, Ericsson, vivo, NTT DOCOMO, Lenovo, MotM, OPPO, Spreadtrum, LGE, Sharp, Nokia, ASB, MediaTek, ZTE, AT&T, CEWiT, Panasonic
  - Objected by: InterDigital, Intel, Huawei, HiSilicon, CATT

~~Conclusion:~~
No consensus to support L1-RSRP reporting of measurements on SS block for beam management procedures in Rel-15

**Friday:**
Qualcomm: strongly requested to remove the above conclusion – and suggested to leave the topic opened for the next meeting

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Intel: concern with the process of deleting what was already agreed during the MIMO session – RAN1 spent a lot of time to reach and write down that conclusion
InterDigital: similar view as Intel
Samsung/Ericsson/Panasonic: ok to delete it
Qualcomm: Can "in Rel-15" be replaced by "in this meeting"
Ericsson: do not agree – it has a complete different meaning

Final conclusion:

- No consensus at this meeting to support L1-RSRP reporting of measurements on SS block for beam management procedures in Rel-15

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Note: Any company/university/organization is free to contribute to this topic in future meetings

Not treated.

| | | |
|---|---|---|
| R1-1709906 | Discussion on DL Beam Management | Beijing Xinwei Telecom Techn. |
| R1-1710056 | Further consideration on downlink beam management | CATT |
| R1-1710057 | Considerations on UL beam management | CATT |
| R1-1710142 | Discussion on the DL Beam Management | Guangdong OPPO Mobile Telecom. |
| R1-1710143 | Discussion on the UL Beam Management | Guangdong OPPO Mobile Telecom. |
| R1-1710184 | UL beam management for NR MIMO | ZTE |
| R1-1710281 | Discussion on DL beam management | LG Electronics |
| R1-1710282 | Discussion on UL beam management | LG Electronics |
| R1-1710361 | Differential RSRP report for beam management | Spreadtrum Communications |
| R1-1710399 | Beam management and beam reporting | vivo |
| R1-1710430 | DL beam management details | AT&T |
| R1-1710449 | General views on DL beam management | Huawei, HiSilicon |
| R1-1710525 | Details for UL Beam Management | Intel Corporation |
| R1-1710526 | Details for DL Beam Management | Intel Corporation |
| R1-1710595 | Discussion of RS for DL beam management | Lenovo, Motorola Mobility |
| R1-1710653 | UL beam management | Samsung |
| R1-1710776 | Comparisons on Beam Reporting in NR | CMCC |
| R1-1710808 | Discussions on NR DL beam management | MediaTek Inc. |
| R1-1710809 | Efficient UL beam management with imperfect beam correspondence | MediaTek Inc. |
| R1-1710851 | Considerations on DL beam management | Sony |
| R1-1710852 | Considerations on UL beam management | Sony |
| R1-1710924 | On Beam Management for DL Control and Data Channels | InterDigital, Inc. |
| R1-1710925 | On Efficient UL Beam Management | InterDigital, Inc. |
| R1-1711015 | On DL beam indication | Ericsson |
| R1-1711075 | View on Beam Management Details | NTT DOCOMO, INC. |
| R1-1711289 | On the utilization of SS block for beam management | Nokia, Alcatel-Lucent Shanghai Bell |
| R1-1711290 | SRS transmission for beam management | Nokia, Alcatel-Lucent Shanghai Bell |
| R1-1711334 | Considerations on UE Beamforming Management | ASUSTEK COMPUTER (SHANGHAI) |
| R1-1711336 | Discussion on group based beam reporting | China Unicom |
| R1-1711473 | View on Multi-Beam Management | KT Corp. |

#### 5.1.2.2.2 Mechanism to recover from beam failure

| | | |
|---|---|---|
| **R1-1710810** | **Mechanism for flexible beam failure recovery** | **MediaTek Inc.** |
| **R1-1710527** | **Discussion for Mechanism to Recover from Beam Failure** | **Intel Corporation** |
| **R1-1711291** | **Beam Recovery in NR** | **Nokia, Alcatel-Lucent Shanghai Bell** |
| **R1-1710283** | **Discussion on beam failure recovery** | **LG Electronics** |
| **R1-1711076** | **Further views on mechanism to recover from beam failure** | **NTT DOCOMO, INC.** |

Discuss discussion offline – Chia-Hao (MTK)
**R1-1711897 Offline Discussion Summary on Beam Recovery MediaTek**
**R1-1711717 WF on using SS block for beam recovery ZTE, Ericsson, NTT DOCOMO, MediaTek, Spreadtrum, vivo, OPPO, Qualcomm, Xinwei, LG Electronics, AT&T, Lenovo, CMCC, China Unicom, China Telecom, ASTRI, Samsung, Nokia, ASB, III, MTI, Sharp, National Instruments**

Proposals:

- In addition to periodic CSI-RS, SS-block within the serving cell can be used for new candidate beam identification



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- Supported by: ZTE, Ericsson, NTT DOCOMO, MediaTek, Spreadtrum, vivo, OPPO, Qualcomm, Xinwei, LG Electronics, AT&T, Lenovo, CMCC, China Unicom, China Telecom, ASTRI, Samsung, Nokia, ASB, III, MTI, Sharp, National Instruments
- Objected by: IDC, HW, HiSi, Intel

Continue discussion next meeting

Not treated.

| | | |
|---|---|---|
| R1-1709907 | Discussion on Beam Failure Recovery | Beijing Xinwei Telecom Techn. |
| R1-1709929 | General views on beam failure recovery | Huawei, HiSilicon |
| R1-1710058 | Consideration on DL beam failure and recovery | CATT |
| R1-1710144 | On Beam Recovery Mechanism | Guangdong OPPO Mobile Telecom. |
| R1-1710185 | Discussion on beam recovery mechanism | ZTE |
| R1-1710236 | Discussion on beam failure recovery procedure | Fujitsu |
| R1-1710251 | Discussion on beam failure recovery request | NEC Corporation |
| R1-1710364 | Discussion on beam failure recovery | Spreadtrum Communications |
| R1-1710400 | Beam failure recovery procedure | vivo |
| R1-1710431 | Considerations on beam failure recovery mechanism | AT&T |
| R1-1710596 | Discussion of beam recovery procedure | Lenovo, Motorola Mobility |
| R1-1710655 | Beam failure recovery | Samsung |
| R1-1710926 | On Remaining Details of Beam Failure Recovery | InterDigital, Inc. |
| R1-1711017 | Mechanism to recover from beam failure | Ericsson |
| R1-1711161 | Beam recovery procedures | Qualcomm Incorporated |
| R1-1711234 | Discussion on mechanisms for beam failure recovery | Sharp |

#### 5.1.2.2.3 Other

| | | |
|---|---|---|
| **R1-1710186** | **Beam grouping evaluation for beam management** | **ZTE** |
| **R1-1710662** | **On SS-block based beam management** | **Samsung** |
| **R1-1711292** | **BPL definition and Spatial QCL time indication** | **Nokia, Alcatel-Lucent Shanghai Bell** |

Not treated.

| | | |
|---|---|---|
| R1-1709927 | Beam indication for DL control channel | Huawei, HiSilicon |
| R1-1709930 | Procedure details for beam failure recovery | Huawei, HiSilicon |
| R1-1710005 | Considerations on timing advance design in NR | Huawei, HiSilicon |
| R1-1710145 | Beam association relationship between data and control channels | Guangdong OPPO Mobile Telecom. |
| R1-1710228 | Further discussion on channel reciprocity and beam correspondence | MTI |
| R1-1710450 | Multi-beam transmission for DL control channel | Huawei, HiSilicon |
| R1-1710459 | Discussion on UL SRS transmission power | Huawei, HiSilicon |
| R1-1710473 | Network-based mechanism for millimeter-wave link recovery | Huawei, HiSilicon |
| R1-1710528 | On Timing Advance for multi-beam operation | Intel Corporation |
| R1-1710656 | Measurement and reporting for beam management | Samsung |
| R1-1710657 | Discussion on Group based reporting | Samsung |
| R1-1710658 | Discusssion on Tx beam grouping configuration | Samsung |
| R1-1710659 | Discussion on beam indication for PDSCH | Samsung |
| R1-1710660 | L1 RSRP reporting for beam management | Samsung |
| R1-1710661 | L1-RSRP measurement duration | Samsung |
| R1-1710663 | DL beam management configuration | Samsung |
| R1-1710664 | QCL associations for beam management RS | Samsung |
| R1-1710665 | Aperiodic BSI reporting | Samsung |
| R1-1710666 | Beam management for PDCCH | Samsung |
| R1-1711018 | Beam management in C-DRX | Ericsson |
| R1-1711019 | On the use of SS for beam management | Ericsson |
| R1-1711020 | Further results on beam management without beam indication | Ericsson |
| R1-1711021 | Performance of beam grouping | Ericsson |
| R1-1711022 | On beam grouping | Ericsson |
| R1-1711023 | Analysis of beam indication signalling options | Ericsson |
| R1-1711293 | On beam grouping and reporting | Nokia, Alcatel-Lucent Shanghai Bell |
| R1-1711294 | On Multi-beam Downlink Control Channel Operation | Nokia, Alcatel-Lucent Shanghai Bell |
| R1-1711295 | Multi-beam Uplink Control Channel Operation | Nokia, Alcatel-Lucent Shanghai Bell |
| R1-1711401 | Measurement RS for beam management | Huawei, HiSilicon |
| R1-1711402 | Relationship between beam failure recovery and RLF | Huawei, HiSilicon |



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R1-1711403 Robust transmission for UL control channel Huawei, HiSilicon
R1-1711410 Cross-carrier beam management Huawei, HiSilicon
R1-1711445 System level evaluation results for beam management Samsung
R1-1711446 Link level evaluation results for beam management Samsung
R1-1711447 Link level simulation assumptions for beam management Samsung
R1-1711448 System level simulation assumptions for beam management Samsung

#### *5.1.2.3 CSI acquisition*

##### 5.1.2.3.1 CSI framework

*Including beam management framework*

**R1-1709931 Discussion on CSI Framework Design Huawei, HiSilicon**
**R1-1711024 Further details of CSI framework Ericsson**
**R1-1710059 Summary of email discussion [89-17] NR CSI framework CATT**
Offline to come up with overhead numbers based on R1-1710059 – Rakesh (CATT)

Continue offline discussion – Xiaoyi (AT&T)
**R1-1711893 Offline discussion summary on CSI framework AT&T**

Agreements:

- For aperiodic CSI-RS triggering offset X, X is fixed to zero.
- For aperiodic CSI reporting on PUSCH, Y is indicated by DCI.
  - DCI to be used for indicating the timing for PUSCH is also used to indicate Y.
    - This applies to both UCI only and UCI+Data PUSCH
  - The set of values is configured by higher layer
    - The candidate set of values of Y is selected according to restricted conditions inferred from configuration of CSI related settings.
    - The condition include at least;
      - CSI parameter
      - Number of CSI-RS antenna ports if PMI is included
      - CSI-RS location
      - Frequency granularity of CSI
    - FFS: number of simultaneous CSI calculations
    - FFS on mechanisms to relax CSI report timing according to number of simultaneous CSI calculations
    - FFS different or same candidate Y value for the cases of UCI multiplexed with data and UCI only

Not treated.
R1-1711077 Discussion on CSI framework NTT DOCOMO, INC.
R1-1711296 On the CRI definition and usability in NR Nokia, Alcatel-Lucent Shanghai Bell
R1-1709908 Discussion on CSI Framework and Semi-persistent CSI-RS Resources and Reports Activation Beijing Xinwei Telecom Techn.
R1-1710060 Views on CSI framework CATT
R1-1710187 On CSI framework details ZTE
R1-1710284 Discussion on CSI framework LG Electronics
R1-1710432 Discussion on the channels to carry CSI report AT&T
R1-1710529 On NR CSI framework Intel Corporation
R1-1710667 CSI Acquisition and Beam Management Framework Samsung
R1-1710927 On CSI framework for NR InterDigital, Inc.
R1-1711162 Details of CSI framework Qualcomm Incorporated

##### 5.1.2.3.2 Details of CSI acquisition

*Including channel and interference measurement and reporting*

**R1-1710530 On Details of CSI acquisition Intel Corporation**
**R1-1711297 Remaining aspects on interference estimation options and configuration Nokia, Alcatel-Lucent Shanghai Bell**

Continue discussion offline – Yuichi (DCM)
**R1-1711924 Summary of CSI Acquisition Details NTT DoCoMo**



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Not treated.
R1-1709932 Channel and interference measurement for CSI acquisition Huawei, HiSilicon
R1-1711025 On CSI acquisition and reporting Ericsson
R1-1710061 Discussion on details of CSI acquisition CATT
R1-1710188 Details of CSI acquisition ZTE
R1-1710285 Discussion on interference measurement LG Electronics
R1-1710433 On the details of CSI acquisition AT&T
R1-1710668 Discussions on CSI measurements and reporting for NR Samsung
R1-1710854 Considerations on interference measurement Sony
R1-1710928 On CSI acquisition for NR InterDigital, Inc.
R1-1711078 On CSI measurement for NR NTT DOCOMO, INC.
R1-1711163 Details of CSI acquisition Qualcomm Incorporated

#### 5.1.2.3.3 CSI acquisition for reciprocity based operation

**R1-1710669 CSI Reporting for Reciprocity Operation Samsung**
**R1-1711298 On the channel reciprocity support for CSI acquisition Nokia, Alcatel-Lucent Shanghai Bell**

Continue offline discussion – Ruyue (ZTE)
**R1-1711725 Summary of CSI acquisition for reciprocity based operation ZTE**

Not treated.
R1-1710189 On reciprocity based CSI acquisition ZTE
R1-1711026 Further discussion on CSI acquisition for reciprocity-based operation Ericsson
R1-1710062 Views on reciprocity based CSI acquisition CATT
R1-1710286 Discussion on CSI acquisition for reciprocity based operation LG Electronics
R1-1710812 CSI acquisition for reciprocity based operation MediaTek Inc.
R1-1711164 CSI acquisition for reciprocity based operation Qualcomm Incorporated
R1-1711404 Discussion on reciprocity based CSI acquisition mechanism Huawei, HiSilicon

#### 5.1.2.3.4 CSI feedback

*Including type I/II codebook based scheme and other potential use cases, e.g., semi-open-loop*

**R1-1710190 CSI feedback mechanism on PUCCH ZTE**
**R1-1710672 CSI parameters and multiplexing Samsung**

Continue discussion offline – Mark (Ericsson)
**R1-1711904 Summary of views on CSI feedback for Type I and Type II Ericsson**

Agreement:
- Periodic CSI reporting is carried at least on
  - Short PUCCH
  - Long PUCCH
  - FFS whether in single-slot only or in multiple slots

Agreements:
- Type I CSI feedback is supported for P/SP/A-CSI and can be carried on either one of PUCCH and PUSCH
- Type I subband CSI can be carried on either one of PUSCH and long PUCCH
- Type II CSI is carried at least on PUSCH
  - FFS CSI on PUCCH

CSF for TS2
**R1-1711300 CSI feedback in support of semi-open loop transmission Nokia, Alcatel-Lucent Shanghai Bell**
**R1-1711405 CSI acquisition for DL robust transmission Huawei, HiSilicon**

Continue discussion offline – Mark (Ericsson)

**R1-1711905 Summary of CSI Feedback for Open-loop/Semi-open-loop Ericsson**

Not treated.
R1-1711029 Type I & II CSI reporting Ericsson



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| | | |
|---|---|---|
| R1-1711079 | CSI Feedback Design for NR MIMO | NTT DOCOMO, INC. |
| R1-1710063 | Discussion on periodic and aperiodic CSI feedback | CATT |
| R1-1710191 | CSI feedback mechanism on PUSCH | ZTE |
| R1-1710192 | Overhead reduction for Type II CSI | ZTE |
| R1-1710287 | Discussion on overhead reduction for Type II codebook | LG Electronics |
| R1-1710288 | Discussions on CSI reporting contents | LG Electronics |
| R1-1710289 | CSI feedback for OL and semi-OL MIMO | LG Electronics |
| R1-1710290 | UL channel utilization for CSI reporting | LG Electronics |
| R1-1710434 | CSI feedback for closed loop and semi open loop transmission schemes | AT&T |
| R1-1710452 | CSI acquisition details for hybrid CSI | Huawei, HiSilicon |
| R1-1710453 | The remaining issues for Type I codebook | Huawei, HiSilicon |
| R1-1710454 | The remaining issues for Type II codebook | Huawei, HiSilicon |
| R1-1710670 | Remaining details of Type I and Type II CSI codebooks | Samsung |
| R1-1710671 | CSI support for transparent precoder cycling | Samsung |
| R1-1710673 | Differential reporting of Type II CSI | Samsung |
| R1-1710674 | On higher rank (3 and 4) Type II CSI | Samsung |
| R1-1710813 | Remaining issues in NR CSI feedback | MediaTek Inc. |
| R1-1711027 | CSI feedback and Transparent PDSCH TxD | Ericsson |
| R1-1711028 | Codebook subset restriction | Ericsson |
| R1-1711030 | Encoding and mapping of CSI parameters | Ericsson |
| R1-1711031 | CSI feedback for multi-TRP | Ericsson |
| R1-1711080 | Feedback Design for CSI Type I | NTT DOCOMO, INC. |
| R1-1711081 | Feedback Design for CSI Type II | NTT DOCOMO, INC. |
| R1-1711165 | On Type I and Type II CSI feedback using PUCCH | Qualcomm Incorporated |
| R1-1711166 | On CSI feedback for open- or semi-open-loop transmission | Qualcomm Incorporated |
| R1-1711299 | Feedback transmission of type II codebook | Nokia, Alcatel-Lucent Shanghai Bell |
| R1-1711407 | Multiple-panel codebook | Huawei, HiSilicon |
| R1-1711408 | Category 2 codebook design for type II codebook | Huawei, HiSilicon |
| R1-1711409 | Codebook design for beamformed CSI-RS | Huawei, HiSilicon |
| R1-1711566 | On semi-persistent CSI reporting on PUSCH | Ericsson |

#### 5.1.2.3.5 Other

| | | |
|---|---|---|
| R1-1710675 | Discussion on CSI-RS Resource Activation | Samsung |
| R1-1710676 | Discussions on channel and interference measurements for NR | Samsung |
| R1-1710677 | Discussions on CSI Feedback Signalling Overhead Reduction | Samsung |
| R1-1711032 | On Dynamic Triggering for CSI Reports and CSI-RS | Ericsson |
| R1-1711033 | A comparison of CSI-RS activation schemes based on MAC CE and DCI | Ericsson |
| R1-1711034 | Identifying bounds on parameters in CSI framework | Ericsson |
| R1-1711035 | Frequency parametrization for Type II CSI codebook | Ericsson |
| R1-1711036 | Further details of measurement restriction configuration | Ericsson |
| R1-1711037 | Performance impact of inactive antenna ports | Ericsson |
| R1-1711038 | On partial bands and CSI acquistion | Ericsson |
| R1-1711039 | NR CSI Computation Capability | Ericsson |
| R1-1711301 | On the CSI timing relationhips | Nokia, Alcatel-Lucent Shanghai Bell |
| R1-1711406 | Other remaining issues for CSI framework | Huawei, HiSilicon |
| R1-1711449 | Discussions on service specific CSI for NR | Samsung |

### *5.1.2.4 Reference signals and QCL*

#### 5.1.2.4.1 Multiplexing of different types of RSs

*Including multiplexing and RE mapping of RSs*

| | | |
|---|---|---|
| **R1-1710193** | **Discussion on multiplexing of different RSs** | **ZTE** |
| **R1-1710064** | **Discussion on RS multiplexing** | **CATT** |
| **R1-1710435** | **Multiplexing of CSI-RS with PDSCH in mixed numerology scenarios** | **AT&T** |

Agreement:

- In NR, for a given BWP, support the case where CSI-RS for CSI acquisition and beam management is always transmitted with the same numerology as the PDSCH of the UE if PDSCH is present
  - FFS the case when PDSCH is not present

| | | |
|---|---|---|
| **R1-1710678** | **Discussions on multiplexing of different types of RSs for DL** | **Samsung** |



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Discuss further offline – Leiming (Huawei)
**R1-1711974** **Summary of views on multiplexing of different types of RS Huawei, HiSilicon**

Not treated.
R1-1710009 Multiplexing different types of DL RS Huawei, HiSilicon
R1-1710010 Multiplexing different types of UL RS Huawei, HiSilicon
R1-1710291 On collision avoidance for PTRS and other RSs LG Electronics
R1-1710531 On multiplexing of different RS types Intel Corporation
R1-1710679 Discussions on multiplexing of different types of RSs for UL Samsung
R1-1711040 On Multiplexing of RS types for downlink Ericsson
R1-1711167 On multiplexing of different types of RSs Qualcomm Incorporated
R1-1711302 On multiplexing of different RS types Nokia, Alcatel-Lucent Shanghai Bell
R1-1711558 Multiplexing of different types of RS for uplink Ericsson

#### 5.1.2.4.2 CSI-RS

**R1-1711041** **On CSI-RS for CSI-acquisition Ericsson**
**R1-1711759** **Summary of offline discussion on CSI-RS Samsung**

Agreements:
- At least for CSI acquisition, for N=4 OFDM symbols,
  - Support two pairs of adjacent OFDM symbols for one CSI-RS resource where the two pairs can be adjacent or non-adjacent
    - For each pair, support a uniform RE mapping pattern in the time domain wherein the same sub-carriers are occupied in the two adjacent OFDM symbols
    - Note: CDM pattern will be discussed separately

Agreements:
- Support for CSI-RS sequence design:
  - (Working assumption) PN sequence at least for CSI-RS for CSI acquisition
  - UE specifically configured CSI-RS sequence seed
  - FFS, sequence design, e.g. PN sequence, ZC sequence, M sequence, etc., for other use cases such as beam management and fine time/frequency tracking

Agreements:
- For beam management, CSI-RS with sub-time units smaller than an OFDM symbol in a reference numerology is not supported in Rel-15

Continue discussion offline – Lu (Huawei)

**R1-1711922** **WF on CSI-RS for BM Intel, Ericsson, CATT, Samsung, MediaTek, AT&T, NTT Docomo, KT**
Also supported by Spreadtrum, Qualcomm
**R1-1711923** **WF on CSI-RS for BM Samsung, Intel, AT&T, NTT DOCOMO, ZTE**

**R1-1711787** **WF on CSI-RS Samsung, Ericsson, NTT DOCOMO, CATT, LGE**

Agreements:
- Regarding CSI-RS RE Patterns for CSI Acquisition, support at least the following CSI-RS RE patterns for CSI acquisition for OCC based CDM

| X | Density [RE/RB/port] | N | (Y,Z) | CDM | Remark |
|---|---|---|---|---|---|
| 1 | >1, 1 | 1 | N.A. | No CDM | |
| 2 | 1 | 1 | (2,1) | FD-CDM2 | |
| 4 | 1 | 2 | (2,2) | FD-CDM2, CDM4(FD2,TD2) | |
| 8 | 1 | 2 | (2,2) | FD-CDM2, CDM4(FD2,TD2) | |
| 16 | 1 | 2 | (2,2) | FD-CDM2, CDM4(FD2,TD2) | |
| 32 | 1, 1/2 | 4 | (2,2) | FD-CDM2, CDM4(FD2,TD2) | FFS, CDM8 details |



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- Note: The RE pattern for an X-port CSI-RS resource spans N ≥ 1 OFDM symbols in the same slot and is comprised of one or multiple component CSI-RS RE patterns, where a component CSI-RS RE pattern is defined within a single PRB as Y adjacent REs in the frequency domain and Z adjacent REs in the time domain (agreements in RAN1#88)
- Note: Density 1/2 is based on a PRB-level comb with the same comb offset value for all ports.
- Note: REs for CDM2 and CDM4(FD2,TD2) comprise adjacent REs
- Note: RAN1 will continue discussing adding more entries to the above table

Agreement:
- For partial-band CSI-RS, partial-band can be the same as bandwidth part
  - FFS whether or not to have small values than the bandwidth of bandwidth part

Agreements:
- Confirm the WA with the following revision
  - Support PN sequence for CSI-RS for CSI acquisition and beam management
- FFS detailed sequence generation and initialization methods
  - E.g. function of slot number, OFDM symbol number, CP length, UE ID, cell ID, virtual cell ID, function of PRB position of configured CSI-RS resource, etc.

Agreement:
- Down-select among the following two options in the next meeting
  - Option 1-1: From a UE perspective, CSI-RS is not multiplexed on SS block OFDM symbol(s)
  - Option 1-2: From a UE perspective, CSI-RS can be multiplexed on SS block symbol(s)

Agreements:
- Down-select among the following two options in the next meeting:
  - Option 2-1: From a UE perspective, CSI-RS is not multiplexed on PDCCH OFDM symbol(s) for a slot
  - Option 2-2: From a UE perspective, CSI-RS can be multiplexed on PDCCH OFDM symbol(s) for a slot
    - Note: PDCCH decoding behavior at UE side will not be changed by Option 2-2.
  - Note: up to each company to define PDCCH OFDM symbols based on the max possible number of symbols or the configured PDCCH OFDM symbols for the slot

**R1-1711804** **WF on CDM-8 in CSI-RS for CSI acquisition** **LG Electronics, Samsung, CATT, NTT DOCOMO**

Agreements:
- For CDM-8 in CSI-RS for CSI acquisition, support at least one of the following:
  - Alt 1: Distributed across multiple of the component CSI-RS RE patterns
  - Alt 2: Fully contained within one component CSI-RS RE pattern
- For CDM-4, study further whether to support the ports being distributed across multiple of the component CSI-RS RE patterns

**R1-1711803** **WF on configuration of CSI-RS for CSI acquisition** **LGE, Samsung**

Agreements:
- For CSI acquisition, at least the following parameters associated with a CSI-RS resource can be indicated to be a UE based on higher-layer configuration:
  - Number of CSI-RS ports
  - Density (RE/PRB/port)
    - For density = 1/2, comb offset
  - CDM (Length, Type)
  - Locations of the component RE patterns for the corresponding CSI-RS resource
    - FFS on signaling details
  - Scrambling ID
- Note: the detailed approach for the above signaling is FFS

**R1-1711976** **WF on CSI-RS for beam management** **NTT DoCoMo, Ericsson, Samsung**
R1-1711973 WF on CSI-RS for BM Intel, Ericsson, Spreadtrum, MediaTek, Samsung, Verizon

Agreements:
- CSI-RS resource with 1-port and 2-port for one OFDM symbol can be used for beam management
  - Value of D>=1 represents RE/RB/port within a OFDM symbol.
  - For the case of 1-port
    - No CDM



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- Subcarrier spacing within a PRB for D>1
  - Even spacing
- Constant subcarrier spacing across PRB(s)
- Constant subcarrier spacing within a BWP
- FFS the values of D

- For the case of 2-port:
  - Reuse the same pattern as that of for CSI acquisition at least for D=1 (if supported)

- FFS: the potential number of CSI-RS OFDM symbols for beam management
- FFS: other values of X and D for beam management
- In the LS to RAN4, add "RAN1 are discussing the respective possible limited set values of D for 1-port and 2-port CSI-RS resource, e.g., taking from {1, 2, 3, 4, 6}. RAN4 is also welcome to provide inputs to select the values of D for 1-port and 2-port CSI-RS resources, respectively"

LS to be prepared in **R1-1712003** (Yuichi, DCM)
Email approval for the LS in R1-1712003 until 7/7 (Yuichi, DoCoMo)

| | | |
|---|---|---|
| R1-1709946 | CSI-RS design in NR | Huawei, HiSilicon |
| R1-1709947 | CSI-RS design for beam management | Huawei, HiSilicon |
| R1-1710065 | Design of CSI-RS for CSI acquisition | CATT |
| R1-1710066 | Design of CSI-RS for beam management | CATT |
| R1-1710146 | Disussion on CSI-RS design for beam management | Guangdong OPPO Mobile Telecom. |
| R1-1710194 | On CSI-RS for beam management | ZTE |
| R1-1710195 | On CSI-RS for CSI acquisition | ZTE |
| R1-1710256 | CSI-RS design for beam management and interference measurement | NEC Corporation |
| R1-1710292 | On CSI-RS design for beam management | LG Electronics |
| R1-1710293 | On CSI-RS design for CSI acquisition | LG Electronics |
| R1-1710365 | Discussion on CSI-RS design for CSI acquisition | Spreadtrum Communications |
| R1-1710401 | On CSI-RS design for beam management | vivo |
| R1-1710436 | Remaining details of CSI-RS | AT&T |
| **R1-1710532** | **On CSI-RS for beam management** | **Intel Corporation** |
| R1-1710533 | On CSI-RS for CSI acquisition | Intel Corporation |
| R1-1710680 | Discussions on CSI-RS design for NR MIMO | Samsung |
| R1-1710681 | CSI-RS for beam management | Samsung |
| **R1-1710811** | **IFDMA Based Beam Management CSI-RS for Flexible TX/RX Beam Sweeping** | **MediaTek Inc.** |
| R1-1710833 | On CSI-RS configuration for fine time and frequency tracking support | MediaTek Inc. |
| **R1-1710931** | **CSI-RS Design for Beam Management** | **InterDigital, Inc.** |
| R1-1710974 | Discussion on using sub-time unit for CSI-RS of beam management | ITRI |
| **R1-1711042** | **On CSI-RS for beam management** | **Ericsson** |
| R1-1711082 | CSI-RS for beam managmenent | NTT DOCOMO, INC. |
| R1-1711083 | CSI-RS for CSI acquisition | NTT DOCOMO, INC. |
| R1-1711168 | Discussion on CSI-RS design | Qualcomm Incorporated |
| R1-1711303 | On the CSI-RS configurations for NR CSI acquisition | Nokia, Alcatel-Lucent Shanghai Bell |
| R1-1711304 | On CSI-RS Design for DL Beam Management | Nokia, Alcatel-Lucent Shanghai Bell |
| R1-1711339 | Consideration on the CSI-RS design for NR | CATR |
| R1-1711468 | On CSI-RS design for DL beam management | KT Corp. |

#### 5.1.2.4.3 DMRS

*Limit to maximum 2 contributions (one for discussion, another for evaluation) per 1 company/organization/university for DL and UL, independently*

| | | |
|---|---|---|
| **R1-1709909** | **Further Evaluation and Discussion on DMRS Design Details** | **Beijing Xinwei Telecom Techn.** |
| **R1-1710196** | **Discussion on downlink DMRS design** | **ZTE** |
| **R1-1711043** | **On DL DMRS design** | **Ericsson** |
| **R1-1710831** | **On downlink DMRS design** | **MediaTek Inc.** |

Continue discussion offline – Alex (Qualcomm)
**R1-1711778** **Remaining issues on NR DM-RS Qualcomm**
**R1-1711797** **WF on DMRS sequence, Samsung, Ericsson, Qualcomm Incorporated, CATT, Nokia, Alcatel-Lucent Shanghai Bell, Intel, AT&T, NTT DOCOMO, INC., LG Electronics, KT Corp., MediaTek Inc., Mitsubishi Electric Co., Spreadtrum, Fujitsu, Xinwei, KDDI, Panasonic, ITL**
Also supported SONY, KRRI



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Agreement: Both in DL and UL DMRS for CP-OFDM, only PN sequence is supported

**R1-1711784 WF on DMRS design MediaTek, Huawei, HiSilicon, China Telecom, ZTE, ASUSTek, CeWiT, Spreadtrum, Tejas Networks, CATR, Deutsche Telekom, IITH, Xinwei, MTI, CHTTL, China Unicom, IITM, ITRI**

Agreements:

- The working assumption made in RAN1#89 for DM-RS is updated and agreed as follows for CP-OFDM:
  - A UE is configured by higher layers with DMRS pattern either from the front-loaded DMRS Configuration type 1 or from the front-loaded DMRS Configuration type 2 for DL/UL:
    - Configuration type 1:
      - One symbol:
        - Comb 2 + 2 CS, up to 4 ports
      - Two symbols:
        - Comb 2 + 2 CS + TD-OCC ({1 1} and {1 -1}), up to 8 ports
          - Note: It should be possible to schedule up to 4 ports without using both {1,1} and {1,-1}.
    - Configuration type 2:
      - One symbol:
        - 2-FD-OCC across adjacent REs in the frequency domain, up to 6 ports
      - Two symbols:
        - 2-FD-OCC across adjacent REs in the frequency domain + TD-OCC (both {1,1} and {1,-1}) up to 12 ports
          - Note: It should be possible to schedule up to 6 ports without using both {1,1} and {1,-1}.
    - From UE perspective, frequency domain CDMed DMRS ports are QCLed.
    - FFS: Whether the front-load DMRS configuration type for a UE for UL and DL can be different or not.
    - Note: If there are significant complexity/performance issues involved in the above agreements, down-selection can still be discussed

**R1-1711813 WF on DM-RS NTT DOCOMO, Ericsson, Nokia, ASB, ZTE, KT Corp, Sharp, Qualcomm**

Proposals:

- In configuration 1 for DL, at least for SU-MIMO,
  - For 1-symbol, DM-RS N<=2 layer reception are multiplexed without any CDM in frequency for a UE
  - For 2-symbol, DM-RS N<=4 layer reception are multiplexed without any CDM in frequency for a UE
- FFS the case of UL MU-MIMO

Discuss till next meeting

**R1-1711783 WF on UL DMRS pattern for DFT-S-OFDM LG Electronics, ZTE, Ericsson, NEC, NTT DOCOMO**

Agreements:

- For DFT-S-OFDM based PUSCH DMRS
  - DMRS are mapped to resource elements using a comb structure (IFDMA).
    - DMRS and associated PUSCH are multiplexed in time domain
    - At least the following (repetition factor, CS) combinations is supported
      - (2, 2)
  - Front load DMRS is allocated to 1 or 2 OFDM symbols
    - When 2 OFDM symbols are allocated, TD-OCC ({1 1} and {1 -1}) are supported for orthogonal DMRS port multiplexing.
    - FFS the detailed applicability of 1 vs. 2 OFDM symbols
    - FFS the location of the DMRS symbol(s)

**R1-1711816 WF on front-loaded DMRS design for slot aggregation vivo, Huawei, HiSilicon**

Further discussion till next meeting

**R1-1711770 WF on DL DMRS for broadcast/multicast PDSCH LG Electronics, Qualcomm**

Agreements:

- For broadcast/multicast PDSCH (other than PBCH), the PDSCH is transmitted with a single DMRS port:
  - Support using only one front-load DMRS Configuration from Configuration 1 and Configuration 2. To down-select from:
    - Alt 1: Configuration 1 (FFS 1 or 2 symbols)



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- Alt 2: Configuration 2 with 2 symbols
- Support additional DM-RS. To down-select from:
  - Alt 1: Additional DMRS is always present
  - Alt 2: Additional DMRS is configurable
  - FFS the number of additional DMRS symbol(s)

**R1-1711722** **WF on multiplexing between DMRS and data** **ZTE, Qualcomm, KT Corp., DOCOMO**

Agreements:
- Study further aspects related to DMRS and data multiplexing in DL and UL considering 14 and 7 symbol slots/mini-slots, 1 vs. 2 front loaded DM-RS symbols, additional DM-RS, etc.
- Study further aspects related to possibly power boosting DM-RS (performance, complexity, spec impact)

**R1-1711714** **WF on DMRS multiplexing scheme in time domain** **ZTE, Xinwei, ASTRI, Spreadtrum**

**R1-1711666** **WF on SS block and DM-RS collision handling** **Intel**

Agreements:
- Study further how to handle DM-RS and SS block collision (if any)
  - E.g., changing DM-RS symbol(s) position in time domain, no PDSCH transmission on the collided PRBs, dropping the DM-RS symbol in collision, etc.

**R1-1711771** **WF on signalling DMRS configuration** **LG Electronics, ZTE**

Agreements:
- The number of front-load DMRS symbols can be 1 or 2 when the number of DMRS ports allocated to UE is equal or less than N
  - N is 4 for Configuration 1 and 6 for Configuration 2.
  - FFS the details to determine 1 or 2 symbols

Not treated.

| | | |
|---|---|---|
| R1-1709941 | Design of DL DMRS for data transmission | Huawei, HiSilicon |
| R1-1709942 | Evaluation results of DMRS design for DL data channel | Huawei, HiSilicon |
| R1-1709943 | UL DMRS design for data transmission | Huawei, HiSilicon |
| R1-1709944 | Evaluation results of DMRS design for UL data channel | Huawei, HiSilicon |
| R1-1710067 | On DMRS design for DL | CATT |
| R1-1710068 | On DMRS design for UL | CATT |
| R1-1710197 | Evaluation results on DL DMRS | ZTE |
| R1-1710198 | Discussion on uplink DMRS design | ZTE |
| R1-1710257 | Considerations on the design of DMRS | NEC Corporation |
| R1-1710294 | On DL DMRS design | LG Electronics |
| R1-1710295 | On UL DMRS design | LG Electronics |
| R1-1710362 | DMRS configurations for CP-OFDM. | Spreadtrum Communications |
| R1-1710402 | On DL DMRS design | vivo |
| R1-1710410 | Evaluation of DL DMRS designs | Mitsubishi Electric Co. |
| R1-1710411 | Views on DL DMRS designs | Mitsubishi Electric Co. |
| R1-1710534 | On the remaining details of DM-RS design | Intel Corporation |
| R1-1710607 | On DM-RS for NR | Intel Corporation |
| R1-1710612 | Discussion on downlink DMRS design | ETRI |
| R1-1710613 | Discussion on uplink DMRS design | ETRI |
| R1-1710682 | Discussion on DL DMRS design for NR | Samsung |
| R1-1710683 | Evaluation results on DL DMRS for NR | Samsung |
| R1-1710684 | Discussion on UL DMRS design for NR | Samsung |
| R1-1710685 | Evaluation results on UL DMRS for NR | Samsung |
| R1-1710933 | On DM-RS design for NR | InterDigital, Inc. |
| R1-1710970 | On front-load DMRS design | China Telecommunications |
| R1-1711044 | On DL DMRS evaluations | Ericsson |
| R1-1711045 | On UL DMRS design | Ericsson |
| R1-1711046 | On UL DMRS evaluations | Ericsson |
| R1-1711084 | Evaluation results of DM-RS | NTT DOCOMO, INC. |



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| | | |
|---|---|---|
| R1-1711085 | Discussion on DM-RS design | NTT DOCOMO, INC. |
| R1-1711169 | Discussion on UL DMRS design | Qualcomm Incorporated |
| R1-1711170 | Discussion on DL DMRS design | Qualcomm Incorporated |
| R1-1711171 | Evaluation of UL DMRS design | Qualcomm Incorporated |
| R1-1711172 | Evaluation of DL DMRS design | Qualcomm Incorporated |
| R1-1711305 | On design of DL DM-RS for NR physical data channels | Nokia, Alcatel-Lucent Shanghai Bell |
| R1-1711306 | DL DM-RS patterns link performance evaluation | Nokia, Alcatel-Lucent Shanghai Bell |
| R1-1711307 | On design of UL DM-RS for NR physical data channels | Nokia, Alcatel-Lucent Shanghai Bell |
| R1-1711340 | Consideration on the font loaded DM RS design for NR | CATR |
| R1-1711350 | DMRS pattern configuration for NR | ITL |

#### 5.1.2.4.4 PT-RS

| | | |
|---|---|---|
| **R1-1710296** | **On DL PT-RS design** | **LG Electronics** |
| **R1-1709940** | **PTRS for DFT-s-OFDM** | **Huawei, HiSilicon** |
| **R1-1710936** | **Remaining Issues on PTRS for NR** | **InterDigital, Inc.** |

Continue offline discussion – Mattias (Ericsson)

| | | |
|---|---|---|
| **R1-1711914** | **Overview of WFs on PTRS** | **Ericsson** |
| **R1-1711815** | **WF on PT-RS for DFT-S-OFDM** | **NTT DOCOMO, Mitsubishi Electric, Huawei, HiSilicon, Nokia, ASB** |

Agreements:

- For PT-RS insertion for UL DFT-S-OFDM
  - Companies are encouraged to perform simulations with realistic simulation assumptions comparing pre-DFT vs. post-DFT PT-RS insertion
    - For pre-DFT, companies are encouraged to compare chunk-based distribution vs. non-chunk based distribution

Agreements:

- Support at least full symbol-level time density for time-domain PT-RS for DFT-S-OFDM (every PUSCH carrying symbol)
  - FFS: whether to support configurable symbol-level time density for time-domain PT-RS density reduction for DFT-S-OFDM
    - Note: If supported, the configuration can be implicit (associated with scheduled MCS and/or BW and/or DM-RS port(s)/position) or explicit, which is to be decided in next meeting

| | | |
|---|---|---|
| **R1-1711891** | **WF on PT-RS for DFT-S-OFDM** | **Samsung, Intel, CATT** |
| **R1-1711814** | **WF on PT-RS for CP-OFDM** | **NTT DOCOMO, Ericsson, Nokia, ASB, Panasonic, Spreadtrum, ZTE** |

Agreements:

- If one DL PT-RS port is configured for a DL DM-RS port group, the DL PT-RS port and one DL DM-RS port in the DL DM-RS port group are associated for phase tracking, the association is determined in the specification
  - FFS details for the association
- If one DL PT-RS port is configured for a DL DM-RS port group, the DL PT-RS port is associated with:
  - Alt 1: the lowest DL DM-RS port in the DL DM-RS port group.
  - Alt 2: one DL DM-RS port in the DL DM-RS port group in a RB, where the one DL DM-RS port may vary across RBs
  - Other alternatives are not precluded
  - To conclude with one alternative next meeting
- FFS the case of two codewords

| | | |
|---|---|---|
| R1-1711688 | Way Forward on PTRS | Intel, Huawei, HiSilicon, National Instruments, MediaTek |
| **R1-1711941** | **Way Forward on PTRS** | **Intel, Huawei, HiSilicon, National Instruments, MediaTek** |

Agreements:

- Study further whether or not to support power boosting for PT-RS considering different or same number of ports compared with DM-RS
- Down-selection among the following for CP-OFDM DL & UL for PTRS:
  - Opt-1: a single association table pair per subcarrier spacing
  - Opt-2: UE recommends the preferred thresholds in tables and/or gNB to update/confirm



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- Opt-3: multiple association tables for each subcarrier spacing, to reflect different phase noise models resulting from different carrier frequencies, subcarrier spacings, UE implementations
- Opt-4: a single association table pair per subcarrier spacing based on UE capability

**R1-1711895** **WF on Remaining Issues on PTRS for CP-OFDM – Part II Huawei, HiSilicon, InterDigital, Xinwei, Intel, NI, Panasonic, Spreadtrum**
**R1-1711932** **WF on PT-RS pattern in frequency domain LG Electronics**

Agreements:
- For PTRS for CP-OFDM, study further how to handle mapping PTRS in case of non-consecutive scheduling
  - Alt 1: based on PRBs
  - Alt 2: based on VRBs
  - Other alternatives are not precluded
  - Note: consecutive scheduling can be considered as a special case
- For PTRS for CP-OFDM, study further whether or not there is need for interference randomization for PT-RS and if so, how
  - Companies are encouraged to provide simulation results
- To continue study to finalize the PT-RS density tables w.r.t. to MCS and scheduled bandwidth

**R1-1711773** **WF on PT-RS collision avoidance LG Electronics, Huawei, CATT, ZTE**

Agreement: Study further how to handle PT-RS collision with CSI-RS

**R1-1711894** **WF on Remaining Issues on PTRS for CP-OFDM – Part I Huawei, HiSilicon, InterDigital, Xinwei, NI, Panasonic**

Agreements:
- For PTRS for CP-OFDM, NR supports
  - Information related to UE to facilitate PTRS port configuration
    - FFS details, e.g., UE to report information (if so, details), or re-using UE information available for other purposes

Not treated.
R1-1709939 PTRS for CP-OFDM Huawei, HiSilicon
R1-1710069 Considerations on RS for phase tracking CATT
R1-1710199 Discussion on RS for phase tracking ZTE
R1-1710227 Further Discussion on PTRS Design Details Beijing Xinwei Telecom Techn.
**R1-1710230** **UL PTRS for DFTsOFDM waveform Mitsubishi Electric RCE**
R1-1710297 On UL PT-RS design LG Electronics
R1-1710359 PT-RS design Panasonic Corporation
R1-1710363 Considerations on PT-RS for CP-OFDM Spreadtrum Communications
R1-1710403 On PT-RS design for CP-OFDM vivo
**R1-1710535** **On PT-RS for CP-OFDM Intel Corporation**
**R1-1710536** **On PT-RS for DFT-s-OFDM Intel Corporation**
R1-1710686 On DL PTRS design Samsung
R1-1710687 On UL PTRS for DFT-s-OFDM Samsung
R1-1710777 Discussion on PT-RS design CMCC
R1-1711047 On PTRS DL design Ericsson
R1-1711048 On PTRS UL design Ericsson
R1-1711086 Discussion on PT-RS design NTT DOCOMO, INC.
R1-1711173 Phase and frequency tracking reference signal considerations Qualcomm Incorporated
R1-1711308 Discussion on PT-RS design for CP-OFDM Nokia, Alcatel-Lucent Shanghai Bell
R1-1711309 On Details of the PT-RS Design for DFT-s-OFDM Nokia, Alcatel-Lucent Shanghai Bell

#### 5.1.2.4.5 SRS

**R1-1710855** **Considerations on SRS design Sony**
**R1-1711049** **On SRS design Ericsson**
**R1-1711087** **Discussions on NR SRS Design NTT DOCOMO, INC.**
**R1-1711174** **Discussion on SRS design Qualcomm Incorporated**



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Agreement: For NR SRS, support sounding bandwidth in multiple of 4 PRBs
- FFS the detailed set of SRS sounding bandwidths to be supported
- At least 4 PRBs as SRS sounding bandwidth is supported

Continue offline discussion – Takano (SONY)
R1-1711951 **Open issues on SRS design** **SONY**
R1-1711791 **Way Forward on SRS Switching** **Huawei, HiSilicon, Softbank, CMCC, Deutsche Telekom, CATR, Tejas Networks, OPPO, Qualcomm, CeWiT, Sony, ZTE, Xinwei, IITM, China Unicom, IITH, Ericsson, InterDigital, China Telecom, MediaTek**

Agreement**:** Support antenna switching for SRS transmission within a carrier:
- FFS: Support at least [2Tx, 4Tx] switching

R1-1711869 **WF_config_collision_SRS_PUCCH_L** **Mitsubishi Electric, AT&T, Panasonic, Samsung, Huawei, HiSilicon, ZTE**

Agreements:
- From a UE perspective, NR supports one or both of the following options on a given carrier:
  - Option 1 : Support only one of the following options for avoiding collisions between NR-SRS and short PUCCH
    - Option 1-1 : symbol level TDM
    - Option 1-2 : FDM
    - Option 1-3 : both symbol level TDM and FDM
    - FFS : details
    - Note : other options are not precluded
  - Option 2: Prioritize SRS or short PUCCH transmission, i.e., drop SRS or short PUCCH in case of collision
    - FFS whether to have one prioritization rule, or configurable prioritization

R1-1711852 **WF on SRS Sequence Design** **Ericsson, Huawei, HiSilicon, Nokia, ASB, Panasonic, NTT DOCOMO**
R1-1711668 **WF on SRS sequence for NR** **Intel, Samsung, Qualcomm**
Also supported by LGE, KT, CATT
R1-1711767 **WF on SRS sequence generation for partial overlapping** **LG Electronics, Intel Corporation, ZTE**

Agreements:
- NR supports at least the following SRS sequences
  - LTE SRS sequences
- Study further whether or not to additionally support the following for NR SRS sequence design:
  - Opt-1: Truncated ZC design
    - Set of [60] long ZC sequences designed for each of [5] different reference carrier bandwidths where the sequence length exceeds the carrier bandwidth before truncation
      - The portion of the truncated sequence corresponds to the SRS PRB location assigned to the UE
    - Ports on the same comb are separated by cyclic shifts which are repeated every n SRS REs, e.g. n=[8,12]
  - Opt-2: block-wise concatenation based ZC sequence generation.
    - The number of blocks (e.g. 1, 2, …) and/or block length (e.g. 4RBs, 8RBs, …) per each block is informed to UE
      - Alt1. the number of blocks and/or block length are configured by network. If 1 block is configured, SRS sequence for NR is the same as LTE SRS sequence
      - Alt2. Implicit signaling e.g. the number of blocks and block length are dependent on waveform. When DFT-S-OFDM is configured to UE, the number of block is one and the block length is equal to SRS BW; When CP-OFDM is configured, the number of blocks can be larger than 1.
  - Opt-3: Same LTE SRS sequence generation mechanism with additional roots
- To conclude during the next meeting
  - Evaluations to consider at least CM/PAPR and sequence cross-correlation for the case of fully and partially overlapping SRS allocations
  - Evaluations to further consider CM/PAPR for carrier bandwidths different than the reference ones

R1-1711920 **WF on SRS design in NR** **LG Electronics, CATT, Intel Corp., KT Corp., Qualcomm**



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**R1-1711930** **WF on SRS Configuration** **Huawei, HiSilicon, OPPO**

Agreement: Support gNB to configure one or more groups where each group contains one or more SRS resource(s) to UE
- Note: different groups may be for different purposes, e.g., one or more groups for beam management, one for DL CSI acquisition, one for UL CSI acquisition, etc.

Not treated.

| | | |
|---|---|---|
| R1-1709936 | UL SRS design for beam management and CSI acquisition | Huawei, HiSilicon |
| R1-1710070 | Further considerations on SRS design | CATT |
| R1-1710147 | On SRS design for NR | Guangdong OPPO Mobile Telecom. |
| R1-1710200 | Discussion on SRS design for NR | ZTE |
| R1-1710298 | On SRS design and related operations | LG Electronics |
| R1-1710409 | Views on SRS designs | Mitsubishi Electric Co. |
| R1-1710537 | Discussion on SRS for NR | Intel Corporation |
| R1-1710688 | SRS design for NR | Samsung |
| R1-1710817 | SRS design in NR | MediaTek Inc. |
| R1-1710929 | Discussion on SRS sequence generation for NR | Panasonic Corporation |
| R1-1710938 | On SRS for NR | InterDigital, Inc. |
| R1-1711310 | UL SRS design considerations in NR | Nokia, Alcatel-Lucent Shanghai Bell |

#### 5.1.2.4.6 TRS

**R1-1709934** **Reference signal for fine time and frequency tracking** **Huawei, HiSilicon**
**R1-1710832** **On TRS design requirement** **MediaTek Inc.**
**R1-1711175** **Further analysis on fine time/frequency tracking RS design** **Qualcomm Incorporated**

Further discussion offline, especially to narrow-down (possibly selecting) the possible range/set of values for the following parameters for TRS:
- **X**: the length of TRS burst in terms of number of slots
- **Y**: the TRS burst periodicity in terms of number of slots
- $\mathbf{S_f}$: TRS subcarrier spacing
- $\mathbf{S_t}$: TRS symbol spacing within a slot
- **N**: Number of OFDM symbols per TRS within a slot
- **B**: TRS bandwidth in terms of number of RBs

Revisit later this week – Chiao-yao (MTK) (including possible other aspects for TRS)

**R1-1711765** **Summary of views on TRS** **MediaTek**
**R1-1711766** **WF on TRS** **MediaTek, Huawei, HiSilicon, Ericsson, Qualcomm**

Agreements:
- Slide 3 and slide 4 in R1-1711766 are agreed with the following updates:
  - N: add value of 1
  - B: 50 RBs assuming SCS=15KHz (FFS, for other SCS values)

Agreements:
- TRS is UE-specifically managed
- NR supports TRS for multi-TRP transmission
  - Details FFS
- FFS how to handle the case of initial access and idle mode (e.g., the necessity of TRS or not, default value if TRS is necessary, etc)
- FFS how to handle multi-beam transmission
- FFS: whether the tracking performance enhancement is needed for long DRX

Not treated.

| | | |
|---|---|---|
| R1-1710201 | Discussion on fine time/frequency tracking of channel | ZTE |
| R1-1710299 | Discussion on fine time/frequency tracking of channel | LG Electronics |
| R1-1710538 | Discussion on TRS | Intel Corporation |
| R1-1710689 | Discussions on fine time/frequency tracking for NR | Samsung |
| R1-1710853 | Considerations on fine time/frequency tracking | Sony |
| R1-1711050 | On time and frequency tracking of the channel | Ericsson |
| R1-1711311 | Views on the fTFT-RS in NR | Nokia, Alcatel-Lucent Shanghai Bell |



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#### 5.1.2.4.7 QCL

**R1-1710202 QCL design for UL and DL MIMO ZTE**
**R1-1710539 On QCL for different BW parts and other QCL details Intel Corporation**
**R1-1711176 Discussion on QCL Qualcomm Incorporated**
**R1-1711312 On QCL Framework and Configurations in NR Nokia, Alcatel-Lucent Shanghai Bell**

Agreements:

- For QCL, NR supports:
  - At least one or two DM-RS antenna port groups per PDSCH
    - FFS other number of groups
  - QCL assumption across carriers and bandwidth parts for DL
    - FFS details for indication, the applicable RS(s), the applicable QCL parameters, and configurability
    - FFS whether or not to have UE assisted management

Continue offline discussion – Mihai (Nokia)

Not treated.

R1-1709935 Details of QCL assumptions and related RS design considerations Huawei, HiSilicon
R1-1710071 On QCL for NR CATT
R1-1710300 Discussion on QCL for NR LG Electronics
R1-1710690 On QCL for NR Samsung
R1-1710941 On QCL for NR InterDigital, Inc.
R1-1711051 The QCL framework in NR Ericsson

#### 5.1.2.4.8 Other

R1-1709937 UL SRS sequence design in NR Huawei, HiSilicon
R1-1709945 Common UL/DL DMRS design Huawei, HiSilicon
R1-1710455 Signaling of DMRS ports for SU/MU-MIMO Huawei, HiSilicon
R1-1710456 DMRS design for URLLC Huawei, HiSilicon
R1-1710457 Considerations on UE-specific RS Sequence Design Huawei, HiSilicon
R1-1710458 Discussion on UL DMRS power boosting Huawei, HiSilicon
R1-1711052 On the number of antenna ports for CSI-RS Ericsson
R1-1711053 On the collision between DMRS and DC subcarrier Ericsson
R1-1711246 Discussion on Bursty Interference Measurement Resources Qualcomm Incorporated

### *5.1.2.5 Other*

*Including MIMO calibration*

R1-1709938 SRS antenna switching Huawei, HiSilicon

R1-1709910 NR MIMO System Level Phase 3 Calibration Results Beijing Xinwei Telecom Techn.
R1-1710072 System level calibration results for NR MIMO CATT
R1-1710073 Link level calibration results for NR MIMO CATT
R1-1710203 Calibration results for Phase 1 NR MIMO link level calibration ZTE
R1-1710204 Calibration results for Phase 1 NR MIMO system level calibration ZTE
R1-1710205 Calibration results for Phase 2 NR MIMO link level calibration ZTE
R1-1710206 Calibration results for Phase 2 NR MIMO system level calibration ZTE
R1-1710207 Calibration results for Phase 3 NR MIMO calibration ZTE
R1-1710208 Further clarification on Phase 3 NR MIMO calibration ZTE
R1-1710301 Phase 3 SLS Calibration Results for NR MIMO LG Electronics
R1-1710302 Phase 2 LLS Calibration Results for NR MIMO LG Electronics
R1-1710540 Calibration results for Phase 2 NR MIMO system level calibration Intel Corporation
R1-1711393 Calibration results for Phase 1 NR MIMO system level calibration MOTOROLA MOBILITY LLC
R1-1711450 MIMO Phase-2 SLS calibration results on 30GHz frequency band Samsung
R1-1711451 MIMO Phase-2 LLS calibration results on 30GHz frequency band Samsung
R1-1711452 Evaluation results for dense urban on 30GHz frequency band Samsung

### 5.1.3 Scheduling/HARQ aspects

The document was presented by … from ...
**Discussion:** .
**Decision:** The document is noted.



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#### *5.1.3.1 Physical downlink control channel*

R1-1711567 Summary of e-mail discussion on DCI content Ericsson LM

R1-1711910 [DRAFT] Reply LS on PDCCH design Ericsson
**R1-1711972 [DRAFT] Reply LS on PDCCH design Ericsson, CATT**
**R1-1711992 [DRAFT] Reply LS on PDCCH design Ericsson, CATT**
**Decision:** The document is noted and final LS is approved in R1-1712005 by deleting a sentence **"**RAN1 may downselect between 7 and 14 symbols in the future." and capture past agreements related to it in RAN1 #86bis (in Lisbon) as it is in Section 1.

##### 5.1.3.1.1 PDCCH structure

R1-1711961 WF on PDCCH CRC Panasonic

**R1-1712006** WF on UE behaviour for reserved resource Samsung

###### 5.1.3.1.1.1 CCE-to-REG mapping and PDCCH-to-CCE mapping

*Including REG bundle size/structure.*

**R1-1711411 Evaluation on REG bundle sizes for 1-symbol CORESET duration Huawei, HiSilicon**

Observation 1: For 1-symbol CORESET configured with REG-to-CCE mapping without interleaving, same precoder across multiple CCEs, i.e., higher REG bundling size such as 12 REGs, will improve PDCCH performance.
Observation 2: for 1-symbol CORESET configured with REG-to-CCE mapping with interleaving,

- using smaller REG bundling size hence finer cycling granularity, precoder cycling can obtain more diversity gain, i.e., the performance curve of BLER vs SNR will have a steeper slope, especially for the case of low Delay spread(hence low frequency selectivity)and in high SNR region, where channel estimation performance can be ensured with smaller REG bundling size, e.g.,2;
- using larger REG bundling size such as 3 or 6, channel estimation performance can be improved, especially for the case of high Delay spread(hence high frequency selectivity)and in low SNR region, where PDCCH performance will be ensured by high PDCCH aggregation level;
- higher PDCCH aggregation level will benefit from larger bundling size;

Proposal: Configurable REG bundling size should be supported for 1-symbol CORESE configured with REG-to-CCE mapping with interleaving, and bundle size 2, 3 or 6 can be configured.

**Decision:** The document is noted.

**R1-1711412 Evaluation on REG bundle sizes for more than 1 symbol CORESET duration Huawei, HiSilicon**

Observation 1: for 2- or 3-symbol CORESET configured with REG-to-CCE mapping without interleaving, same precoder across multiple CCEs, i.e., higher REG bundling size such as 12 REGs, will improve PDCCH performance.
Observation 2: for 2- or 3-symbol CORESET configured with REG-to-CCE mapping with interleaving:

- using lower REG bundling size (REG bundle pattern 0) have finer cycling granularity, precoder cycling can obtain more diversity gain, especially for the case high SNR region;
- using higher REG bundling size (REG bundle pattern 1), channel estimation performance can be improved, especially for the case of low SNR region;
- higher PDCCH aggregation level will benefit from larger bundling size;

Proposal: For Option2 in 2 and 3 OFDM symbol CORESET, the following REG bundle patterns can be configured:

- 1 symbol in time domain and {3,6} consecutive REGs in frequency domain;
- 1 symbol in time domain and {2,6} consecutive REGs in frequency domain;
- 2 symbols in time domain and 1 REG per symbol in frequency domain;
- 2 symbols in time domain and 3 consecutive REGs per symbol in frequency domain; Or
- 3 symbols in time domain and 1 REG per symbol in frequency domain;
- 3 symbols in time domain and 2 consecutive REGs per symbol in frequency domain.

**Decision:** The document is noted.

**R1-1710541 NR PDCCH physical structure Intel Corporation**

- Observation 1: In case of CORESET of 1 OS and 48 RBs, REGBs of 3 and 6 REGs exhibit similar performance. While REGB of 6 REGs shows slightly better performance than REGB of 3 REGs for high AL NR-PDCCH in low SNR, the performance of REGB of 3 REGs is slightly better than that of REGB of 6 REGs for low AL NR-PDCCH in high SNR.
- Observation 2: In case of CORESET of 2(3) OS and 24(16) RBs, REGBs of 2(3) and 6 REGs exhibit similar performance. Specifically REGB of 6 REGs shows slightly better performance than REGB of 2(3) REGs for high AL NR-PDCCH in low SNR.



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- Proposal 1: For non-interleaved REG-to-CCE mapping in 1-symbol CORESET, UE assumption of same precoding over multiple REG bundles can be configured by the gNB.
- Proposal 2: For interleaved REG-to-CCE mapping in 1-symbol CORESET, REG bundle size is 3REGs and UE assumption of same precoding over multiple REG bundles can be configured by the gNB.
- Proposal 3: For non-interleaved REG-to-CCE mapping in CORESET of more than 1 symbol with time-first mapping of REG-to-CCE, UE assumption of same precoding over multiple REG bundles can be configured by the gNB.
- Proposal 4: For interleaved REG-to-CCE mapping in CORESET of more than 1-symbol with time-first mapping of REG-to-CCE, REG bundle size is 2 REGs and 3 REGs for 2-symbol and 3-symbol CORESETs respectively, and UE assumption of same precoding over multiple REG bundles can be configured by the gNB.
- Proposal 5: At least for interleaved REG-to-CCE mapping in 1-symbol and multi-symbol CORESETs with time-first mapping, when configured, the same precoding may be assumed across no more than [2] REG bundles.
- Proposal 6: For multi-symbol PDCCH CORESET, adopt the following additional REG-to-CCE mapping option:
  - (Option 2) Support of frequency-first mapping such that:
    - REG-to-CCE mapping is exactly same as the case where a CORESET with 1 symbol
    - A PDCCH candidate can be mapped across OFDM symbols.

**Decision:** The document is noted.

**R1-1711708 WF on REG bundle size in a CORESET with interleaving LG Electronics, ETRI, NTT DOCOMO, Ericsson, InterDigital**

- The REG bundle size in a CORESET with interleaving is
  - [2 or 3] for 1-symbol CORESET
  - 2 for 2-symbol CORESET when time-first REG-to-CCE mapping is applied
  - 3 for 3-symbol CORESET when time-first REG-to-CCE mapping is applied

**Decision:** The document is noted.

Proposed agreement

- The REG bundle size in a CORESET with interleaving is
  - Configurable between 2 and 6 for 1-symbol CORESET
  - Configurable between 2 and 6 for 2-symbol CORESET when time-first REG-to-CCE mapping is applied
  - Configurable between 3 and 6 for 3-symbol CORESET when time-first REG-to-CCE mapping is applied

For 2 and 3 symbols CORESET

- Option 1 REG bundle size = CORESET length
  - Supported by Sansung, LGE, Panasonic, NTT DOCOMO, Ericsson, ETRI, OPPO, ZTE, InterDigital
- Option 2 REG bundle size = 6
  - Nokia, ASB, Qualcomm

Agreements:

For a 1-symbol CORESET with interleaving,

- At least REG bundle size = 2 is supported
- Working assumption:
  - REG bundle size = 6 is also supported
  - FFS whether configuration between 2 and 6 is explicit or implicit
  - Precoder granularity in frequency domain is equal to the REG bundle size in the frequency domain

For a 2 or 3 symbol CORESET with interleaving,

- At least REG bundle size = CORESET length is supported
- Working assumption:
  - REG bundle size = 6 is also supported
  - FFS whether configuration between CORESET length and 6 is explicit or implicit
  - Precoder granularity in frequency domain is equal to the REG bundle size in the frequency domain

(Note: REG bundle size = REGs in frequency domain x symbols in time domain)

The document was presented by … from ...
**Discussion:** .
**Decision:** The document is noted.



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R1-1710011 Overview of PDCCH-CCE-REG mapping and REG bundling Huawei, HiSilicon
R1-1710074 NR-PDCCH mapping structure CATT
R1-1710104 CCE mapping with REG bundling ZTE
R1-1710148 NR-PDCCH CCE-to-REG mapping with REG bundling Guangdong OPPO Mobile Telecom.
R1-1710303 Discussion on NR-PDCCH structure LG Electronics
R1-1710366 Discussion on NR-REG to NR-CCE time-/frequency mapping Spreadtrum Communications
R1-1710390 Discussion on REG bundling size/structure vivo
R1-1710614 NR-PDCCH mapping structure and REG bundle size ETRI
R1-1710691 Resource Mapping for PDCCH Samsung
R1-1710788 Discussions on NR-PDCCH Structure MediaTek Inc.
R1-1710903 PDCCH structure for NR NEC
R1-1710944 On the impact of multi-beam operation on PDCCH structure InterDigital, Inc.
R1-1710973 Discussion on REG bundle size ITRI
R1-1710978 On the PDCCH construction for NR Nokia, Alcatel-Lucent Shanghai Bell
R1-1711088 Views on remaining issues of resource mapping for NR-PDCCH NTT DOCOMO, INC.
R1-1711177 PDCCH structure Qualcomm Incorporated
R1-1711235 REG bundling for NR PDCCH Sharp
R1-1711273 Design of resource mapping and NR-PDCCH HTC Corporation
R1-1711280 On CCE and PDCCH mapping Motorola Mobility, Lenovo
R1-1711327 The relation among REG, CCE, and CORESET Panasonic
R1-1711475 Views on CCE-to-REG mapping KT Corp.
R1-1711477 On NR-PDCCH Structure Ericsson

#### 5.1.3.1.1.2 RS structure/mapping

*Including possible wideband RS.*

DMRS mapping

- Option 1: DMRS is mapped on all REGs on all the OFDM symbols of a given PDCCH candidate
  - Supported by Ericsson, Nokia, ASB, ITRI, Huawei, HiSilicon, OPPO, Intel, ETRI, KT, Lenovo, MotM, Panasonic, NTT DOCOMO, CATT, MediaTek, CMCC, Sony, Spectrum
- Option 2 DMRS is mapped on all REGs on the first OFDM symbol of a given PDCCH candidate
  - Samsung, ZTE, Huawei, HiSilicon, vivo, InterDigital, LGE, Qualcomm, Sharp, Intel, NEC, Panasonic
- Option 3 DMRS is mapped on all REGs on the first and last OFDM symbols of a given PDCCH candidate
  - DOCOMO, CATT, MediaTek, CMCC, vivo, Sony, Spectrum

Agreement

- DMRS is mapped on all REGs on all the OFDM symbols of a given PDCCH candidate
  - The DMRS density is the same on all REGs

R1-1709950 DMRS for NR-PDCCH Huawei, HiSilicon
R1-1710075 Further details of NR-PDCCH RS structure CATT
R1-1710105 Issues regarding DMRS structure and mapping ZTE
R1-1710149 On NR PDCCH RS design Guangdong OPPO Mobile Telecom.
R1-1710304 Discussion on reference signal for NR-PDCCH LG Electronics
R1-1710389 DMRS design for NR-PDCCH vivo
R1-1710542 On DM-RS design for NR PDCCH Intel Corporation
R1-1710615 DMRS design for NR-PDCCH ETRI
R1-1710692 DMRS Structure for PDCCH Samsung
R1-1710778 On DMRS Design for NR-PDCCH CMCC
R1-1710789 RS structures for NR-PDCCH MediaTek Inc.
R1-1710945 On REG bundling and associated DMRS InterDigital, Inc.
R1-1710979 On the remaining details of PDCCH reference signal structure Nokia, Alcatel-Lucent Shanghai Bell
R1-1711089 Views on DM-RS design for NR-PDCCH NTT DOCOMO, INC.
R1-1711178 RS for DL control channel Qualcomm Incorporated
R1-1711328 RS mapping of NR-PDCCH Panasonic
R1-1711478 On DM-RS for NR-PDCCH Ericsson

#### 5.1.3.1.2 Search space

#### 5.1.3.1.2.1 CORESET configuration

*Including relationship between CORESET and search space.*



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From offline discussion…

Agreements:

- For a CORESET which is configured by UE-specific higher-layer signalling, at least following are configured.
  - Frequency-domain resources, which may or may not be contiguous
    - Each contiguous part of a CORESET is equal to or more than the size of REG-bundle in frequency
      - FFS: exact size and number of contiguous parts for a CORESET
  - Starting OFDM symbol
  - Time duration
  - REG bundle size if the configuration is explicit
  - Transmission type (i.e., interleaved or non-interleaved)
  - More parameters may be added if agreed
- For a CORESET which is configured by UE-specific higher-layer signalling, at least following is configured.
  - Monitoring periodicity
    - FFS: it is a configuration per CORESET or per one or a set of PDCCH candidates
    - FFS: relation with DRX
    - FFS: default/fallback value

| | | |
|---|---|---|
| R1-1709951 | Configuration of control resource set | Huawei, HiSilicon |
| R1-1710076 | Configuration aspects of the NR-PDCCH | CATT |
| R1-1710106 | NR-PDCCH CORESET configuration | ZTE |
| R1-1710150 | PDCCH CORESET configuration and UE procedure on NR-PDCCH monitoring | Guangdong OPPO Mobile Telecom. |
| R1-1710305 | Discussion on CORESET configuration | LG Electronics |
| R1-1710543 | CORESETs for NR PDCCH | Intel Corporation |
| R1-1710693 | CORESET Configurations | Samsung |
| R1-1710779 | Discussion on CORESET duration | CMCC |
| R1-1710790 | Discussions on CORESET configurations | MediaTek Inc. |
| R1-1710872 | CORESET Monitoring Under Dynamic Change of BWP | InterDigital, Inc. |
| R1-1710980 | On the PDCCH control resource set and its connection to the search space for NR | Nokia, Alcatel-Lucent Shanghai Bell |
| R1-1711090 | Views on control resource set configuration for NR-PDCCH | NTT DOCOMO, INC. |
| R1-1711179 | Control resource set and search space | Qualcomm Incorporated |
| R1-1711272 | Configuration for control resource sets and search spaces | HTC Corporation |
| R1-1711329 | Configuration of CORESET | Panasonic |
| R1-1711368 | Discussion on the search space design | Xiaomi technology |
| R1-1711479 | On Configuration of Control Resource Sets | Ericsson |

#### 5.1.3.1.2.2 Search space design

*Including possible nested search space. Both common search space and UE-specific search space should be considered.*

**R1-1711754 WF on NR PDCCH Blind decodes vivo, Samsung**

Agreements:

- For PDCCH blind decoding, at least for the non-initial access, at least the following can be configured:
  - Number of PDCCH candidates per CCE aggregation level, per DCI format size that the UE monitors
  - Set of aggregation levels
    - FFS explicit or implicit configuration
  - Set of DCI format sizes
    - FFS explicit or implicit configuration
  - FFS: per CORESET not used for initial access or search space
  - FFS: Signalling details
  - Note that the number of candidates can be zero
- UE blind decoding capability is known by NW
  - FFS: How the capability is derived

**Possible proposals from offline:**

- FFS: UE PDCCH blind decoding capability is defined in NR
  - FFS: The capability can be defined as the maximum number of blind decodes that a UE can support within a time unit.
  - FFS: the value of the time unit



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R1-1710306 Discussion on hierarchical search space structure LG Electronics
R1-1710544 NR PDCCH: Search spaces and monitoring behavior Intel Corporation

R1-1709952 Search space design Huawei, HiSilicon
R1-1710077 Search space design for NR-PDCCH CATT
R1-1710107 Search space design for NR-PDCCH ZTE
R1-1710151 NR PDCCH search space design with nested structure Guangdong OPPO Mobile Telecom.
R1-1710393 Discussion on search space design supporting dynamic DCI size vivo
R1-1710694 Search Space Design Samsung
R1-1710780 Discussion on NR-PDCCH search space design CMCC
R1-1710946 Search space design for eMBB-URLLC Multiplexing InterDigital, Inc.
R1-1710981 On the search space design and UE blind detection Nokia, Alcatel-Lucent Shanghai Bell
R1-1711091 Views on search space design for NR-PDCCH NTT DOCOMO, INC.
R1-1711180 Nested search space design Qualcomm Incorporated
R1-1711321 PDCCH BD reduction Panasonic
R1-1711330 Search space design Panasonic
R1-1711480 On Search Space and Blind Decoding Design Ericsson

#### 5.1.3.1.2.3 Multi-beam operation for PDCCH

R1-1710012 Multi-beam operation for PDCCH Huawei, HiSilicon
R1-1710078 Discussion on multi-beam operation for NR-PDCCH CATT
R1-1710108 Supporting Multi-beam in NR-PDCCH ZTE
R1-1710152 Search space design consideration for NR PDCCH with BF Guangdong OPPO Mobile Telecom.
R1-1710307 Discussion on multi-beam operation for NR-PDCCH LG Electronics
R1-1710437 Control channel configuration for multi-TRP and multi-panel transmission AT&T
R1-1710545 Multi-beam operation for NR PDCCH Intel Corporation
R1-1710616 NR-PDCCH for broadcast information delivery ETRI
R1-1710695 Multibeam Transmission for PDCCH Samsung
R1-1710982 PDCCH support for multi-beam system Nokia, Alcatel-Lucent Shanghai Bell
R1-1711092 Views on multi-beam based NR-PDCCH NTT DOCOMO, INC.
R1-1711181 Multi-beam control operation Qualcomm Incorporated
R1-1711395 Discussion on Multi-beam Operation for PDCCH Convida Wireless LLC
R1-1711481 On Multi-beam and Multi-TRP Operation for PDCCH Ericsson

#### 5.1.3.1.3 Resource sharing between PDCCH and PDSCH

**R1-1711921 WF on PDCCH /PDSCH resource sharing ZTE, Nokia, Ericsson, LG, Panasonic, Qualcomm, Sharp**

- The following is supported for dynamic resource reuse for PDSCH
  - RRC signaling to indicate the time and frequency resources for which the dynamic signaling below indicates resources for which PDSCH may or may not be mapped
    - FFS whether the time and frequency resources can correspond to resources used for purposes other than CORESETs configured for monitoring PDCCH by the UE or by other UEs
  - Dynamic signaling that
    - Indicates which of the time and frequency resources configured by the RRC signaling can be mapped to PDSCH (Details FFS) and
    - Can additionally indicate which of the time and frequency resources not indicated by the above RRC signaling and that are part of the CORESETS configured to the UE for PDCCH monitoring are mapped to PDSCH (Details FFS)
    - Note: Dynamic signaling overhead will limit the number of resources that can be dynamically indicated for reuse of resources. FFS the limit on the overhead.
  - UE can assume that the reused resources shall be within the frequency domain spanned by the resources allocated for the PDSCH
  - UE assumes that resources used for reception of PDCCH scheduling PDSCH are not reused
    - FFS: Reuse of resources used for other control signaling, e.g., common search space, group common PDCCH, broadcast PDCCH, UL grant

**Decision:** The document is noted.

R1-1711482 On Data Transmission in Control Resource Sets Ericsson
R1-1710546 Dynamic resource sharing between control and data Intel Corporation
R1-1709956 Resource multiplexing of downlink control and data Huawei, HiSilicon
R1-1710079 Flexible reuse of DL control resources for data transmission CATT



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| | | |
|---|---|---|
| R1-1710109 | Resource sharing between PDCCH and PDSCH | ZTE |
| R1-1710153 | On resource sharing between PDCCH and PDSCH | Guangdong OPPO Mobile Telecom. |
| R1-1710308 | Discussion on multiplexing between control and data | LG Electronics |
| R1-1710617 | Discussion on dynamic indication of PDSCH start symbol | ETRI |
| R1-1710696 | Multiplexing NR-PDCCH and PDSCH | Samsung |
| R1-1710791 | Resource sharing between PDCCH and PDSCH | MediaTek Inc. |
| R1-1710873 | PDSCH starting position in NR | InterDigital, Inc. |
| R1-1710983 | Resource sharing between PDCCH and PDSCH in NR | Nokia, Alcatel-Lucent Shanghai Bell |
| R1-1711093 | Resource sharing between data and control channels | NTT DOCOMO, INC. |
| R1-1711182 | Resource reuse for data in DL control region | Qualcomm Incorporated |
| R1-1711236 | Indication of PDSCH starting position for NR | Sharp |
| R1-1711320 | Resource sharing between PDCCH and PDSCH | Panasonic |
| R1-1711354 | PDSCH starting position indication for NR | WILUS Inc. |

#### 5.1.3.1.4 Group-common PDCCH

| | | |
|---|---|---|
| R1-1710968 | Summary of [89-20] email discussion on Group-common PDCCH for NR | CATT |

Agreements:
- In 'Slot format related information', 'Empty' is not indicated explicitly.
- Note: RAN1 specification ensures that UE(s) is/are aware of which resources can be for 'gap for DL-UL switching' and/or 'gap'
- Note: RAN1 specification ensures that UE(s) is/are aware of which resources are for 'CSI/interference measurement'.

Agreements:
- UE is configured with a CORESET to monitor group-common PDCCH.
- When configured, the group-common PDCCH follows the same CORESET configuration (e.g., REG-to-CCE mapping) of the CORESET.
  - A group-common PDCCH is formed by an integer number of CCEs.
- The CORESET for the monitored group-common PDCCH carrying SFI can be the same or different from the CORESET for the monitored PDCCH for other types of control signalling.

**Friday**

| | | |
|---|---|---|
| **R1-1711991** | **WF on contents of the group-common PDCCH** | **CATT, NEC** |

Agreement: Prioritize discussion of SFI functionality of a group-common PDCCH.
- Further work will be on group-common PDCCH carrying the SFI at least in August meeting.

##### 5.1.3.1.4.1 Structure of group-common PDCCH

*Limit to 1 contributions per 1 company/organization/university*

| | | |
|---|---|---|
| R1-1709954 | Structure of group-common PDCCH | Huawei, HiSilicon |
| R1-1710080 | Channel structure for group-common PDCCH | CATT |
| R1-1710309 | Discussion on the structure of group common PDCCH | LG Electronics |
| R1-1710438 | Group common PDCCH Structure for NR | AT&T |
| R1-1710547 | Group-common PDCCH: Physical structure | Intel Corporation |
| R1-1710697 | UE-Group Common PDCCH Structure | Samsung |
| R1-1710792 | Structure of group-common PDCCH | MediaTek Inc. |
| R1-1710857 | On structure of group-common PDCCH | Sony |
| R1-1710947 | Group-common PDCCH design considerations | InterDigital, Inc. |
| R1-1710984 | On the structure of group common PDCCH in NR | Nokia, Alcatel-Lucent Shanghai Bell |
| R1-1711094 | Views on structure of group-common PDCCH | NTT DOCOMO, INC. |
| R1-1711183 | Structure of group common PDCCH | Qualcomm Incorporated |
| R1-1711237 | Group common PDCCH structure for NR | Sharp |
| R1-1711331 | Discussion on structure of group common PDCCH | Panasonic |
| R1-1711355 | Discussion on structure for group-common PDCCH for NR | WILUS Inc. |
| R1-1711370 | Discussion on the search space design | Xiaomi Technology |
| R1-1711390 | Discussion on the structure of group common PDCCH | Xiaomi Technology |
| R1-1711483 | On Group-Common PDCCH Structure and Configuration | Ericsson |

##### 5.1.3.1.4.2 Contents of group-common PDCCH



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*Limit to 1 contributions per 1 company/organization/university*

| | | |
|---|---|---|
| R1-1709953 | Contents of group-common PDCCH | Huawei, HiSilicon |
| R1-1710081 | Contents of the group-common PDCCH | CATT |
| R1-1710110 | Group-common PDCCH design consideration | ZTE |
| R1-1710310 | Discussion on the contents of group common PDCCH | LG Electronics |
| R1-1710391 | Discussion on group common PDCCH and BD | vivo |
| R1-1710439 | On the contents of group common PDCCH | AT&T |
| R1-1710548 | Group-common PDCCH: Contents | Intel Corporation |
| R1-1710698 | Functionalities of UE-Common PDCCH | Samsung |
| R1-1710793 | Contents of group-common PDCCH | MediaTek Inc. |
| R1-1710856 | On contents of group-common PDCCH | Sony |
| R1-1710907 | Control indicator in group-common PDCCH for UE power saving | Apple Inc. |
| R1-1710985 | On the contents of group common PDCCH in NR | Nokia, Alcatel-Lucent Shanghai Bell |
| R1-1711095 | Views on contents of group-common PDCCH | NTT DOCOMO, INC. |
| R1-1711184 | Contents of group common PDCCH | Qualcomm Incorporated |
| R1-1711238 | Group common PDCCH contents for NR | Sharp |
| R1-1711281 | NR Group-common PDCCH contents and structure | Motorola Mobility, Lenovo |
| R1-1711332 | Discussion on contents of group common PDCCH | Panasonic |
| R1-1711356 | Discussion on contents for group-common PDCCH for NR | WILUS Inc. |
| R1-1711369 | Discussion on the content of group common PDCCH | Xiaomi technology |
| R1-1711484 | On the Content of Group-Common PDCCH | Ericsson |

#### 5.1.3.1.4.3 UE behaviour related to group-common PDCCH

*Limit to 1 contributions per 1 company/organization/university*

| | | |
|---|---|---|
| R1-1710082 | Configuration and monitoring of the group-common PDCCH | CATT |
| R1-1710154 | Impact on common channel reception to PDCCH design | Guangdong OPPO Mobile Telecom. |
| R1-1710311 | Discussion on UE behavior for the group common PDCCH | LG Electronics |
| R1-1710368 | The relation among UE-specific DCI, GC-PDCCH, and semi-static signaling | Spreadtrum Communications |
| R1-1710440 | UE behaviour for group common PDCCH | AT&T |
| R1-1710476 | UE behavior related to group-common PDCCH | Huawei, HiSilicon |
| R1-1710549 | Group-common PDCCH: UE behavior | Intel Corporation |
| R1-1710699 | UE Behavior for UE-Group Common PDCCH Detection | Samsung |
| R1-1710781 | UE behaviour related to dynamic and semi-static configured resources | CMCC |
| R1-1710794 | UE behaviour for group-common PDCCH | MediaTek Inc. |
| R1-1710906 | UE behavior on UL/DL transmission direction determination in NR TDD | Apple Inc. |
| R1-1710948 | UE behaviour related to CORESET(s) configured by PBCH | InterDigital, Inc. |
| R1-1710986 | On the UE behaviour related to group common PDCCH in NR | Nokia, Alcatel-Lucent Shanghai Bell |
| R1-1711096 | Views on UE behavior for group-common PDCCH | NTT DOCOMO, INC. |
| R1-1711185 | UE behaviour related to group common PDCCH | Qualcomm Incorporated |
| R1-1711239 | Group common PDCCH monitoring for NR | Sharp |
| R1-1711333 | Discussion on DL/UL transmission direction | Panasonic |
| R1-1711357 | Discussion on UE behavior for group-common PDCCH for NR | WILUS Inc. |
| R1-1711485 | On UE Procedures Related to Group-Common PDCCH | Ericsson |

#### 5.1.3.1.5 Ultra-reliable part of URLLC for DL control

*Identify necessary techniques for physical downlink control channel to meet the URLLC requirements set forth by TR38.913.*

| | | |
|---|---|---|
| R1-1709993 | UE procedure of PDCCH monitoring for URLLC | Huawei, HiSilicon |
| R1-1710111 | NR-PDCCH for supporting URLLC | ZTE |
| R1-1710155 | DL control channel design for URLLC | Guangdong OPPO Mobile Telecom. |
| R1-1710312 | Discussion on DL control with ultra-reliability | LG Electronics |
| R1-1710550 | Satisfying ultra-reliability targets for NR PDCCH | Intel Corporation |
| R1-1710700 | PDCCH Design for URLLC | Samsung |
| R1-1710862 | Reliable PDCCH operation for URLLC | Sony |
| R1-1710874 | Considerations for ultra-reliable DCI transmission | InterDigital, Inc. |
| R1-1710949 | On Ultra-reliable and low-latency PDCCH | InterDigital, Inc. |
| R1-1710987 | On the URLLC specific aspects for DL control channel | Nokia, Alcatel-Lucent Shanghai Bell |
| R1-1711097 | DL control channel design for URLLC | NTT DOCOMO, INC. |
| R1-1711338 | Consideration on physical downlink control channel for URLLC | CATR |
| R1-1711486 | On PDCCH for Ultra-Reliable Transmission | Ericsson |
| R1-1711487 | On the Performance Evaluation of PDCCH for Ultra-Reliable Transmission | Ericsson |
| R1-1711552 | Management of URLLC DL control channel efficiency and reliability | Qualcomm Incorporated |



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#### 5.1.3.1.6 Other

The document was presented by … from ...
**Discussion:** .
**Decision:** The document is noted.

| | | |
|---|---|---|
| R1-1710395 | DCI content size and compression | vivo |
| R1-1709955 | UE-specific DCI contents in NR | Huawei, HiSilicon |
| R1-1709957 | Dynamic and semi-static DL/UL resource partition | Huawei, HiSilicon |
| R1-1709986 | PDCCH reliability for URLLC | Huawei, HiSilicon |
| R1-1710460 | Resource sharing between NR-PDCCH and data | Huawei, HiSilicon |
| R1-1710467 | DCI design for URLLC | Huawei, HiSilicon |
| R1-1710701 | Transmit Diversity for PDCCH | Samsung |
| R1-1710702 | Bandwidth Part Hopping for CORESETS | Samsung |
| R1-1710988 | On the usage of PDCCH DMRS as a complementary synchronization signal in DL | Nokia, Alcatel-Lucent Shanghai Bell |
| R1-1711186 | Common control resource set signaling in MIB | Qualcomm Incorporated |
| R1-1711187 | Advanced Grant Indication for UE Power Saving | Qualcomm Incorporated |
| R1-1711413 | CCE-to-REG mapping | Huawei, HiSilicon |
| R1-1711414 | PDCCH-to-CCE mapping | Huawei, HiSilicon |
| R1-1711415 | NR DL control capacity and blocking probability | Huawei, HiSilicon |
| R1-1711423 | PDCCH monitoring for slot-aggregation and cross-slot scheduling | Huawei, HiSilicon |
| R1-1711431 | HARQ feedback indication design for UL grant-free transmission | Huawei, HiSilicon |
| R1-1711433 | Discussion on remaining frequency resources on symbol carrying CORESET | Huawei, HiSilicon |
| R1-1711453 | DL and UL Assignment for NR TDD | Samsung |
| R1-1711454 | Slot Reconfiguration for Low Latency in TDD | Samsung |
| R1-1711455 | Indication of Reserved Resources | Samsung |

### *5.1.3.2 Physical uplink control channel*

#### 5.1.3.2.1 PUCCH in short-duration

**Wednesday offline summary:**

Discussions:
- Companies supporting option 4 (sequence selection)
  - Qualcomm, Ericsson, MediaTek, ZTE, LG, Interdigital, Motorola mobility, Lenovo, DOCOMO
  - For SR only case: Intel, ZTE
- Companies supporting option 1 (FDM RS and UCI)
  - Option 1-1: FDM two sequences, one sequence is modulated with UCI
  - Option 1-2: based on single sequence, modulate even tone of a single sequence.
  - Modulate can be BPSK or QPSK
  - Samsung(Option 1-1), ZTE (option 1-2), Huawei, HiSilicon (Option 1-2), intel(option 1-1), Nokia (option 1-1), CATT (?)
- Advantages of option 4 (sequence selection)
  - Lower PAPR than option 1
  - With 2 bits payload, better link level performance for 1 UE
    - For 3 UEs, one company provided link level simulation showing option 4 has better performance than option 1. (R1-1711649)
  - MUX capacity is 6 UEs for 1 bit UCI, MUX capacity 3 UEs for 2 bits UCI
  - If multiplex with DMRS other UEs short PUCCH, can achieve flexible PUCCH allocation and higher multiplexing capacity.
  - Better MUX capacity for SR than 1-2.
- Advantages of option 1 (FDM RS and UCI)
  - Lower PAPR than LTE is only for option 1-2, but with worse cross-correlation than LTE.
  - MUX capacity of 6 UEs for 1 bit
  - Potential MUX capacity of 6 UEs for 2 bits

Qualcomm and Ericsson comment maximizing UE MUX capacity is not main design target for short PUCCH. Single UE performance is more important.

**Thursday**
Agreements:
- Working assumption:
  - For short-PUCCH with UCI of up to 2 bits (with/without SR), option 4 is supported.



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- No more short-PUCCH format is supported for short-PUCCH in the WID scope.

#### 5.1.3.2.1.1 Short-PUCCH for UCI of up to 2 bits

R1-1709958 Short PUCCH for up to 2 UCI bits Huawei, HiSilicon
R1-1710083 Short PUCCH for small UCI payloads CATT
R1-1710112 On short PUCCH for up to 2 bits UCI ZTE
R1-1710156 Discussion on short PUCCH for up to 2 UCI bits Guangdong OPPO Mobile Telecom.
R1-1710313 Design of short NR-PUCCH for up to 2 UCI bits LG Electronics
R1-1710386 Discussion on short-PUCCH up to 2-bit vivo
R1-1710551 Performance of short PUCCH format for 1~2 bits HARQ-ACK Intel Corporation
R1-1710588 Results for short PUCCH for UCI of up to 2 bits IITH
R1-1710618 Short-PUCCH for UCI of up to 2 bits ETRI
R1-1710703 Short PUCCH for UCI of 1 or 2 Bits Samsung
R1-1710819 Performance evaluation on channel structure of short PUCCH for 1 or 2 bits UCI MediaTek Inc.
R1-1710893 On the short PUCCH design for small UCI payloads Nokia, Alcatel-Lucent Shanghai Bell
R1-1710930 Discussion on 1-symbol NR-PUCCH for UCI of up to 2 bits Panasonic Corporation
R1-1710950 Evaluations of 1-symbol short-PUCCH with 1 or 2 bit(s) InterDigital, Inc.
R1-1711098 Sequence-based PUCCH for UCI of up to 2 bits NTT DOCOMO, INC.
R1-1711188 Channelization of 1-symbol short PUCCH with 1 or 2 bits payload Qualcomm Incorporated
R1-1711242 Short PUCCH structure for UCI of up to 2 bits Sharp
R1-1711282 Short PUCCH for up to 2 bit UCI Motorola Mobility, Lenovo
R1-1711358 Short PUCCH structure for UCI of up to 2 bits WILUS Inc.
R1-1711488 On the Design of Short PUCCH for 1-2 UCI bits Ericsson

#### 5.1.3.2.1.2 Short-PUCCH for UCI of more than 2 bits

R1-1709959 Short PUCCH with more than 2 UCI bits Huawei, HiSilicon
R1-1710084 Short PUCCH for moderate and large UCI payloads CATT
R1-1710113 On short-PUCCH for more than 2 bits ZTE
R1-1710157 Discussion on short PUCCH for more than 2 UCI bitsGuangdong OPPO Mobile Telecom.
R1-1710226 Discussion on 2-symbol Short PUCCH with More Than 2 Bits Beijing Xinwei Telecom Techn.
R1-1710253 Discussion on extending of scheduling request NEC Corporation
R1-1710314 Design of short NR-PUCCH for more than 2 UCI bitsLG Electronics
R1-1710367 Discussion on 1-symbol PUCCH design Spreadtrum Communications
R1-1710387 Discussion on short-PUCCH more than 2-bitvivo
R1-1710408 On pre-DFT RS/UCI multiplexing for PUCCH in short duration Mitsubishi Electric RCE
R1-1710552 2-symbol NR PUCCH Intel Corporation
R1-1710589 Further discussion on pre-DFT multiplexing for short PUCCH IITH
R1-1710619 Short-PUCCH for UCI of more than 2 bits ETRI
R1-1710704 Short PUCCH for UCI of more than 2 Bits Samsung
R1-1710894 Short PUCCH design for UCI of more than 2 bits Nokia, Alcatel-Lucent Shanghai Bell
R1-1711099 FDM-based PUCCH for UCI of more than 2 bits NTT DOCOMO, INC.
R1-1711189 Channelization of 1-symbol short PUCCH with more than 2 bits payload Qualcomm Incorporated
R1-1711243 Short PUCCH structure for UCI of more than 2 bits Sharp
R1-1711489 On the Design of Short PUCCH for more than 2 UCI bits Ericsson

#### 5.1.3.2.2 PUCCH in long-duration

**R1-1711677 Summary of the E-mail Discussion [89-21]: On Long PUCCH for NR Ericsson**

**R1-1711834 WF on Long PUCCH Format with 1-2 UCI bits Ericsson, Huawei, HiSilicon, LG, ZTE, MediaTek, Panasonic, WILUS Inc., Intel, Vivo,Cohere Technologies, ETRI, Motorola mobility, Lenovo, CATT**

Possible agreements:

- For a long PUCCH with up to 2 bits UCI:
  - For location of DMRS select from one of the following alternative in the next meeting:
    - Alt 1: DMRS always occurs in even [or odd] symbols in the long PUCCH
    - Alt 2: DMRS always occurs in even [or odd] symbols in the slot
    - Alt 3: DMRS occurs in one or more sets of consecutive symbols within the long PUCCH. The occasion of DMRS symbols depends on the duration of long PUCCH.
    - Alt 4: DMRS occurs in one or more sets of consecutive symbols within the long PUCCH. The occasion of DMRS symbols depends on the duration of long PUCCH but fixed within the slot

Possible agreements:

- For a long PUCCH with up to 2 bits UCI:
  - The DM-RS symbol(s) are formed as follows:



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- DMRS for a PUCCH is a cyclic shift of a base sequence (e.g. a CAZAC or computer generated sequence) in frequency domain with Orthogonal Cover Code (OCC) in time.
- The data symbols are formed as the following:
  - The modulated UCI bit(s) is multiplied with a cyclic shift of a base sequence (e.g. a CAZAC or computer generated sequence) in frequency domain with Orthogonal Cover Code (OCC) in time.
    - Note: BPSK and QPSK modulations for 1 and 2 UCI bits, respectively.

**Thursday (offline)**

**R1-1711912 WF on Long PUCCH Format with 1-2 UCI bits Ericsson, Huawei, HiSilicon, LG, ZTE, MediaTek, Panasonic, WILUS Inc., Intel, Vivo,Cohere Technologies, ETRI, Motorola mobility, Lenovo, CATT, Qualcomm**

Agreements:

- For a long PUCCH with up to 2 bits UCI:
  - Working assumption:
    - DMRS always occurs in every other symbols in the long PUCCH
      - FFS: even or odd symbols
    - The working assumption can be revisited if an issue is found in terms of transient period.

Agreements:

  - The DMRS symbol(s) are formed as follows:
    - DMRS for a PUCCH is a sequence (e.g. a cyclic shift of a CAZAC or computer generated sequence) in frequency domain with Orthogonal Cover Code (OCC) in time.
  - Note: The data symbols are formed as the following:
    - The modulated UCI bit(s) is multiplied with a sequence (e.g. a cyclic shift of a CAZAC or computer generated sequence) in frequency domain with Orthogonal Cover Code (OCC) in time.
      - BPSK and QPSK modulations for 1 and 2 UCI bits, respectively.
  - Note: The usage of OCC for DMRS and UCI symbols is effectively disabled for differentiation of the users that are assigned with the same OCC.

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**R1-1711835 WF on Frequency Hopping for Long PUCCH Ericsson, MediaTek, Qualcomm, Panasonic, Intel, LG, NTT DOCOMO, Cohere Technologies, WILUS Inc., Huawei, HiSilicon, Samsung**

Possible agreements:

- For a long PUCCH with N symbols in a slot
  - At most one hop within a slot is supported.
    - FFS on how to enable or disable frequency hopping
  - In case of frequency hopping, the hop occurs at the end of the X-th symbol where
    - FFS between X=floor(N/2) or ceil(N/2)

**Friday offline**

Agreements:

- For a PUCCH format for UCI with large payload with no multiplexing capacity within a slot:
  - The DMRS and UCI are mapped to different symbols.
  - For intra-slot frequency-hopping, one or two DMRS symbol(s) is/are mapped on each frequency-hop of the long-PUCCH.
    - Opt.1: one DMRS per frequency-hop
      - The location is around the middle of the frequency-hop
    - Opt.2: one or two DMRS per frequency-hop
      - FFS: the location of the DMRS symbol(s)
  - The DMRS symbol(s) are formed as follows:
    - DMRS for a PUCCH is a sequence (e.g. a cyclic shift of a CAZAC or computer generated sequence) in frequency domain.
  - **Working assumption:**
    - The symbols carrying UCI are formed as follows:
      - The UCI bits are encoded and scrambled, QPSK modulated and DFT pre-coded and mapped to the REs for the symbols carrying UCI of the long PUCCH

Friday: IITH commented during offline"Pi/2 BPSK modulation should be used for long duration PUCCH ", not captured due to concern from others

R1-1711996 WF on Long PUCCH Format for more than 2 UCI bits with Multi-user Multiplexing Ericsson

R1-1709960 Overview of long PUCCH design Huawei, HiSilicon



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R1-1710590 Views on long-duration PUCCH IITH
R1-1711201 Uplink Resource for SR Qualcomm Incorporated

#### 5.1.3.2.2.1 Long-PUCCH for UCI of up to 2 bits

*Focus on long-PUCCH within a slot.*

R1-1709961 Long PUCCH structure for up to 2 bits with high multiplexing capacity Huawei, HiSilicon
R1-1710085 Long PUCCH for small UCI payloads CATT
R1-1710114 On long-PUCCH for up to 2 bits ZTE
R1-1710158 Discussion on long PUCCH for up to 2 UCI bits Guangdong OPPO Mobile Telecom.
R1-1710315 Design of long NR-PUCCH for up to 2 UCI bits LG Electronics
R1-1710553 Structure of 1~2 bits HARQ-ACK long PUCCH with TDM DMRS Intel Corporation
R1-1710598 Long PUCCH design for UCI of up to 2 bits Lenovo, Motorola Mobility
R1-1710705 Long PUCCH for UCI of 1 or 2 Bits Samsung
R1-1710895 On long PUCCH design for small payloads Nokia, Alcatel-Lucent Shanghai Bell
R1-1710932 Discussion on channel structure of long-duration NR-PUCCH for UCI of up to 2 bits Panasonic Corporation
R1-1711100 Long-PUCCH for UCI of up to 2 bits NTT DOCOMO, INC.
R1-1711190 Long PUCCH design with 1 or 2 bits UCI payload Qualcomm Incorporated
R1-1711490 On the Design of Long PUCCH for 1-2 UCI bits Ericsson

#### 5.1.3.2.2.2 Long-PUCCH for UCI of more than 2 bits

*Focus on long-PUCCH within a slot.*

R1-1709962 Long PUCCH structure for moderate payload with some multiplexing capacity Huawei, HiSilicon
R1-1710086 Long PUCCH for moderate and large UCI payloads CATT
R1-1710115 On long-PUCCH for more than 2 bits ZTE
R1-1710316 Design of long NR-PUCCH for more than 2 UCI bits LG Electronics
R1-1710554 Long PUCCH for moderate and large payload Intel Corporation
R1-1710599 Long PUCCH design for UCI of more than 2 bits Lenovo, Motorola Mobility
R1-1710706 Long PUCCH for UCI of more than 2 Bits Samsung
R1-1710896 Long PUCCH design for UCI more than 2 bits Nokia, Alcatel-Lucent Shanghai Bell
R1-1710934 Discussion on channel design of long-duration NR-PUCCH for UCI of more than 2 bits Panasonic Corporation
R1-1711101 Long-PUCCH for UCI of more than 2 bits NTT DOCOMO, INC.
R1-1711191 Long PUCCH design with more than 2 bits UCI payload Qualcomm Incorporated
R1-1711240 Slot structure of NR long PUCCH for more than 2 bits Sharp
R1-1711251 Design of Long-PUCCH for UCI of more than 2 bits Cohere Technologies
R1-1711491 On the Design of Long PUCCH for more than 2 UCI bits Ericsson

#### 5.1.3.2.2.3 Support of long-PUCCH over multiple slots

R1-1710013 Support of long-PUCCH over multiple slots Huawei, HiSilicon
R1-1710087 Design of multi-slot PUCCH transmission CATT
R1-1710116 Consideration on long-PUCCH over slots ZTE
R1-1710159 Slot aggregation and configuration for NR long PUCCH Guangdong OPPO Mobile Telecom.
R1-1710317 Support of long NR-PUCCH over multiple slots LG Electronics
R1-1710555 Long PUCCH over multiple slots Intel Corporation
R1-1710600 Long PUCCH over multiple slots Lenovo, Motorola Mobility
R1-1710620 Long-PUCCH over multiple slots ETRI
R1-1710707 Multi-Slot Long PUCCH Transmission Samsung
R1-1710935 Discussion on support of long-duration NR-PUCCH over multiple slots Panasonic Corporation
R1-1710976 NR Long PUCCH Requirements CMCC
R1-1711102 Long-PUCCH for more than one slot NTT DOCOMO, INC.
R1-1711192 Long PUCCH over multiple slots Qualcomm Incorporated
R1-1711241 Structure of NR long PUCCH over multiple slots Sharp
R1-1711252 Support of long-PUCCH over multiple slots Cohere Technologies
R1-1711492 On support of Long PUCCH over multiple slots Ericsson

#### 5.1.3.2.3 Transmit diversity for PUCCH

R1-1710160 Design of NR PUCCH with long duration Guangdong OPPO Mobile Telecom.
R1-1710222 Transmit diversity for DFTsOFDM-based PUCCH in long duration Mitsubishi Electric RCE
R1-1710254 Discussion on beam sweeping or beam changing of SR NEC Corporation



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R1-1710318 Consideration on transmit diversity for NR-PUCCH LG Electronics
R1-1710441 Transmit diversity for PUCCH AT&T
R1-1710463 Transmit diversity for PUCCH Huawei, HiSilicon
R1-1710556 Transmit diversity for PUCCH Intel Corporation
R1-1710708 Transmit Diversity for PUCCH Samsung
R1-1710897 Transmit Diversity for PUCCH Nokia, Alcatel-Lucent Shanghai Bell
R1-1710951 On transmit diversity for Long PUCCH InterDigital, Inc.
R1-1711193 Transmit diversity for PUCCH Qualcomm Incorporated
R1-1711493 On Transmit Diversity Schemes for PUCCH Ericsson

#### 5.1.3.2.4 Resource allocation for PUCCH

R1-1710088 Further discussion on PUCCH resource allocation CATT
R1-1710117 NR PUCCH resource allocation ZTE
R1-1710161 Resource indication for UL control channel Guangdong OPPO Mobile Telecom.
R1-1710237 PUCCH resource allocation Fujitsu
R1-1710319 Consideration on resource allocation for NR-PUCCH LG Electronics
R1-1710388 Discussion of PUCCH resource indication vivo
R1-1710461 PUCCH resource allocation for HARQ-ACK and SR Huawei, HiSilicon
R1-1710557 Resource allocation for PUCCH during initial access Intel Corporation
R1-1710709 Resource Allocation for PUCCH with HARQ-ACK Samsung
R1-1710782 Discussion on subband-based PUCCH resource allocation and indication CMCC
R1-1710898 On the resource allocation for PUCCH Nokia, Alcatel-Lucent Shanghai Bell
R1-1710937 Discussion on resource allocation for uplink control channel Panasonic Corporation
R1-1711103 PUCCH resource allocation NTT DOCOMO, INC.
R1-1711194 Resource allocation for PUCCH Qualcomm Incorporated
R1-1711283 PUCCH resource allocation for HARQ-ACK feedback to Msg4 Motorola Mobility, Lenovo
R1-1711494 On Resource Allocation for PUCCH and Multiplexing PUCCH Formats Ericsson

#### 5.1.3.2.5 UCI multiplexing

R1-1709989 Discussion on UCI feedback for URLLC Huawei, HiSilicon

##### 5.1.3.2.5.1 UCI piggyback on PUSCH

*For both PUSCH with CP-OFDM waveform and PUSCH with DFT-s-OFDM waveform*

R1-1709963 UCI piggyback on PUSCH Huawei, HiSilicon
R1-1710089 Multiplexing of UCI and UL data on PUSCH CATT
R1-1710118 UCI multiplexing on PUSCH ZTE
R1-1710162 On UCI and data multiplexing in PUSCH Guangdong OPPO Mobile Telecom.
R1-1710320 Support of UCI piggyback on PUSCH for NR LG Electronics
R1-1710558 UCI multiplexing onto PUSCH Intel Corporation
R1-1710710 On UCI Multiplexing in PUSCH Samsung
R1-1710820 Discussion on UCI on PUSCH MediaTek Inc.
R1-1710899 UCI multiplexing on PUSCH Nokia, Alcatel-Lucent Shanghai Bell
R1-1710939 Discussion on UCI on PUSCH Panasonic Corporation
R1-1710952 Considerations on UCI transmission on PUSCH InterDigital, Inc.
R1-1711104 UCI on PUSCH NTT DOCOMO, INC.
R1-1711195 UCI piggyback on PUSCH Qualcomm Incorporated
R1-1711359 Discussion on UCI piggyback on PUSCH WILUS Inc.
R1-1711495 On UCI on PUSCH Ericsson

##### 5.1.3.2.5.2 PUCCH-PUSCH multiplexing

R1-1710090 Simultaneous PUCCH-PUSCH transmission in NR CATT
R1-1710119 Multiplexing of PUSCH and short PUCCH ZTE
R1-1710163 Multiplexing of short PUCCH and long PUCCH Guangdong OPPO Mobile Telecom.
R1-1710321 Support of uplink channel multiplexing for NR LG Electronics
R1-1710464 Multiplexing of PUCCH and PUSCH Huawei, HiSilicon
R1-1710559 PUCCH-PUSCH multiplexing Intel Corporation
R1-1710711 On Simultaneous PUSCH and PUCCH Transmissions Samsung
R1-1710821 Discussion on PUCCH and PUSCH multiplexing MediaTek Inc.
R1-1710900 On the multiplexing between PUCCHs and PUSCH Nokia, Alcatel-Lucent Shanghai Bell
R1-1710940 Discussion on UCI and data multiplexing Panasonic Corporation
R1-1711105 Multiplexing of PUCCH and PUSCH NTT DOCOMO, INC.



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|---|---|---|
| R1-1711196 | Multiplexing of PUCCH and PUSCH | Qualcomm Incorporated |
| R1-1711244 | PUCCH and PUSCH multiplexing methods | Sharp |
| R1-1711360 | Simultaneous transmission for long-PUCCH and PUSCH | WILUS Inc. |
| R1-1711496 | On Simultaneous Transmission of PUSCH and PUCCH | Ericsson |

#### 5.1.3.2.6 Ultra-reliable part of URLLC for UL control

*Identify necessary techniques for physical uplink control channel to meet the URLLC requirements set forth by TR38.913.*

| | | |
|---|---|---|
| R1-1710120 | Analysis of URLLC reliability for uplink control channel | ZTE |
| R1-1710322 | Discussion on UL control with ultra-reliability | LG Electronics |
| R1-1710560 | On UL control channel design aspects for URLLC | Intel Corporation |
| R1-1710597 | Enhanced SR carried in UL control channel | Lenovo, Motorola Mobility |
| R1-1710712 | PUCCH Design for URLLC | Samsung |
| R1-1710875 | Considerations for ultra-reliable UCI transmission | InterDigital, Inc. |
| R1-1710901 | On URLLC UCI transmission | Nokia, Alcatel-Lucent Shanghai Bell |
| R1-1710942 | Discussion on SR for URLLC and multiplexing with HARQ-ACK | Panasonic Corporation |
| R1-1711106 | UL control channel design for URLLC | NTT DOCOMO, INC. |
| R1-1711497 | On PUCCH for Ultra-Reliable Transmission | Ericsson |
| R1-1711498 | On the Performance Evaluation of PUCCH for Ultra-Reliable Transmission | Ericsson |
| R1-1711548 | Resource allocation for PUCCH to support URLLC | Sequans Communications |
| R1-1711553 | The necessity of reliable SR design for GF/GB UL URLLC transmission | Qualcomm Incorporated |

#### 5.1.3.2.7 Other

| | | |
|---|---|---|
| R1-1710561 | Configurations of various long PUCCH lengths | Intel Corporation |
| R1-1710562 | Short PUCCH formats for 1~2 bits UCI | Intel Corporation |
| R1-1710563 | Cyclic shift assignment and CM for FDM DMRS and UCI | Intel Corporation |
| R1-1710564 | Short UL control channel early in a slot | Intel Corporation |
| R1-1710713 | Performance Results for Long PUCCH | Samsung |
| R1-1710714 | Performance Results for UCI and Data Multiplexing | Samsung |
| R1-1710715 | UE-Group CSI Reporting | Samsung |
| R1-1710716 | Multiplexing PUSCH with Short PUCCH or SRS | Samsung |
| R1-1710717 | BSI/CSI Transmission on PUCCH | Samsung |
| R1-1710902 | CP-OFDM waveform for NR long PUCCH | Nokia, Alcatel-Lucent Shanghai Bell |
| R1-1711416 | Performance evaluations on 1-symbol PUCCH for up to 2 UCI bits | Huawei, HiSilicon |
| R1-1711417 | Long PUCCH structure for large payload with no multiplexing capacity | Huawei, HiSilicon |
| R1-1711418 | On CSI feedback in NR | Huawei, HiSilicon |
| R1-1711419 | Transmit diversity for short duration PUCCH | Huawei, HiSilicon |
| R1-1711420 | Multiplexing between PUCCHs | Huawei, HiSilicon |
| R1-1711421 | Multiplexing of UL control channel and SRS in NR | Huawei, HiSilicon |

### *5.1.3.3 DL/UL data scheduling and HARQ procedure*

From Thursday offline…

Agreements:

- RAN1 advises based on the current understanding that RAN2 can make progress without taking into account the progress of CBG retransmissions and pre-emption indication.
- RAN1 will strive for making CBG retransmissions and pre-emption indication being not be visible in the MAC spec.

Agreements:

- For HARQ,
  - The retransmissions can occupy a different frequency allocation than the initial transmission (Note, this is supported in LTE)
  - For downlink, the transmission durations for a given TB may not be the same in some cases.
    - Among initial transmission and retransmissions for a data having fixed DMRS position relative to the start of the slot
    - Among initial transmission and retransmissions for a data having fixed DMRS position relative to the start of the data
    - FFS: other cases
  - For uplink at least scheduled by a UL grant, the transmission durations for a given TB may not be the same in some cases.

Agreements:

- One TB is mapped to one DL/UL carrier.



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- Re-transmission of a TB cannot take place on different carrier than the initial transmission.
- **Working assumption:**
  - Re-transmission of a TB cannot take place on different numerology than the initial transmission in Rel. 15.
- When uplink CBG-based (re)transmission is configured, the UL grant indicates which CBG(s) of a TB is/are retransmitted

Email approval of the LS capturing the above agreements/WA until 6th of July – Karri (Nokia)

#### 5.1.3.3.1 DL/UL resource allocation

R1-1711322 Frequency/time resource assignment of the operation modes Panasonic

From Wednesday offline…

Agreements:

- For downlink, UE can be informed about the first DMRS position of the PDSCH between the following:
  - Fixed on the 3rd or 4th symbol of the slot (for, a.k.a, slot-based scheduling)
  - 1st symbol of the scheduled data (for a.k.a non-slot-based scheduling)
    - FFS: if special handling is needed for the case where some of the PRBs of the symbol of the scheduled data is overlapped with the other signals/channels
- FFS: When the UE is configured both slot-based scheduling and non-slot-based scheduling, the first DMRS position of the PDSCH can be changed between the 3rd or 4th symbol of the slot and 1st symbol of the scheduled data

Agreements:

- For uplink, the first DMRS position of the PUSCH is fixed relative to the start of the scheduled data.
  - FFS: Additional possibility of the another fixed position relative to the start of slot
  - The exact fixed position can be changed depending on the duration of the scheduled data

Conclusion:

- For both downlink and uplink, the second or later or additional DMRS is up to MIMO discussion.

##### 5.1.3.3.1.1 Frequency-domain resource allocation

*Including resource allocation for PDSCH/PUSCH with CP-OFDM waveform and PUSCH with DFT-s-OFDM waveform.*

R1-1710164 Bandwidth part configuration and frequency resource allocation Guangdong OPPO Mobile Telecom.

**R1-1711689 Outputs of offline discussion on RBG size/number determination OPPO**

RBG size/number determination, following options are discussed:

- Option 1:
  - Semi-statically configure a size of Type0 RA bitmap in DCI.
  - Then determine the number and size of RBGs for a RA based on size of BWP and the size of the bitmap.
- Option 2:
  - RBG size can be semi-statically configured per BWP.
    - FFS: Dynamic switching of RBG size.
  - Then number of RBGs in the BWP is determined by size of the BWP and the configured/indicated RBG size.
- Option 3:
  - RBG size is determined by the BW of the BWP and/or PDCCH monitoring periodicity
    - FFS: Necessity of signaling

**Friday**

**R1-1711843 Outputs of offline discussion on RBG size/number determination OPPO, Nokia, LGE, Samsung, vivo, ZTE, CATR**

Agreements:

- For PDSCH/PUSCH, the RBG size/number can be changed along with the change of the BWP used for resource allocation.
- FFS: If one or multiple of following option(s) is/are also used for RBG size/number determination:
  - Opt. 1: Semi-statically configured size of Type0 RA bitmap.
    - Number and size of RBGs for a RA is determined based on size of BWP and the size of the bitmap.
  - Opt. 2: Semi-statically configured RBG size(s) per BWP for deriving number of RBGs.
    - Number of RBGs in the BWP is determined by size of the BWP and the configured/indicated RBG size(s).
    - FFS: Dynamic switching of RBG size(s).
  - Opt. 3: DCI format/DCI format size (e.g. a compact DCI may be with a larger RBG size than a normal DCI).



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- Opt. 4: Transmission durations (e.g. a shorter-duration transmission may be with a larger RBG size than a longer one).
- Opt. 5: RBG size is determined depending on the size of the BWP.
- Other options are not precluded.

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**R1-1711753 WF on UL Resource Allocation for PUSCH with DFT-s-OFDM waveform in NR NEC, NTT DOCOMO, Panasonic, OPPO, Ericsson, Nokia, ASB**

Agreements:

- In frequency-domain, for PUSCH with DFT-s-OFDM waveform in NR, contiguous resource allocation scheme based on LTE UL RA Type 0 is adopted in Rel. 15.
  - FFS:
    - A coarser granularity (i.e. more than 1RB) of resource assignment in order to reduce the overhead further
    - BW parts
- In frequency-domain, for PDSCH in NR, a resource allocation scheme based on LTE DL RA Type 2 is supported in Rel. 15.
  - FFS:
    - A coarser granularity (i.e. more than 1RB) of resource assignment in order to reduce the overhead further
    - BW parts
- In frequency-domain, for PUSCH with CP-OFDM waveform in NR, contiguous resource allocation scheme based on LTE UL RA Type 0 is supported in Rel. 15
  - FFS:
    - A coarser granularity (i.e. more than 1RB) of resource assignment in order to reduce the overhead further
    - BW parts
- A DCI format with resource allocation based on LTE DL RA type 0 (i.e., bit-map) is supported for PDSCH.
- A DCI format with resource allocation based on LTE DL RA type 0 (i.e., bit-map) is supported for PUSCH with CP-OFDM waveform.
- A DCI format with resource allocation based on LTE DL RA type 2 is supported for PDSCH.
- A DCI format with resource allocation based on LTE UL RA type 0 is supported for PUSCH with CP-OFDM waveform and with DFT-s-OFDM waveform.
- FFS: some or all of the above DCI formats have the same DCI payload size.

Proposals from offline

- FFS: for PUSCH transmission, the waveform is either dynamically indicated by the scheduling DCI or is semi-statically configured by higher-layer signalling.
  - This will be discussed in scheduling/HARQ agenda.
- FFS: whether to conform the following working assumption
  - In frequency-domain, for PUSCH with DFT-s-OFDM waveform, only contiguous resource allocation is supported in Rel. 15.

Not treated

| | | |
|---|---|---|
| R1-1709974 | Scheduling and resource allocation mechanism for active bandwidth parts | Huawei, HiSilicon |
| R1-1710091 | NR DL/UL frequency domain resource allocation | CATT |
| R1-1710121 | Resource allocation in frequency domain | ZTE |
| R1-1710164 | Bandwidth part configuration and frequency resource allocation | Guangdong OPPO Mobile Telecom. |
| R1-1710245 | Frequency-domain resource allocation schemes for NR | NEC |
| R1-1710323 | Discussion on frequency-domain resource allocation | LG Electronics |
| R1-1710392 | Discussion on downlink RA | vivo |
| R1-1710413 | Further details on forward compatible resources in NR | AT&T |
| R1-1710565 | DL/UL data frequency-domain resource allocation | Intel Corporation |
| R1-1710718 | DL/UL Frequency Resource Allocation | Samsung |
| R1-1710787 | On default bandwidth part | PANASONIC |
| R1-1710953 | On frequency-domain resource allocation for NR | InterDigital, Inc. |
| R1-1710989 | On resource allocation in frequency domain for PDSCH and PUSCH in NR | Nokia, Alcatel-Lucent Shanghai Bell |
| R1-1711107 | Frequency-domain resource allocation | NTT DOCOMO, INC. |



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R1-1711197 MPR issue with distributed RB allocation in UL Qualcomm Incorporated
R1-1711198 Short PUSCH transmission in UL short duration Qualcomm Incorporated
R1-1711363 Two-step resource allocation for data channel in NR ASUSTEK COMPUTER (SHANGHAI)
R1-1711499 On Resource Allocation in the Frequency Domain Ericsson

#### 5.1.3.3.1.2 Time-domain resource allocation

*Timing/duration determination for symbol-level/slot-level/multi-slot-level scheduling.*
*Limit to 1 contributions per 1 company/organization/university*
R1-1709994 Discussion on data transmission duration Huawei, HiSilicon
R1-1710092 NR DL/UL time domain resource allocation CATT
R1-1710165 Time-domain resource allocation for NR Guangdong OPPO Mobile Telecom.
R1-1710238 Discussion on time domain resource allocation Fujitsu
R1-1710246 Time-domain resource allocation schemes for NR NEC
R1-1710324 Discussion on time-domain resource allocation LG Electronics
R1-1710397 Discussion on flexible length scheduling vivo
R1-1710414 Transmission duration indication for symbol-level/slot-level/multi-slot-level scheduling AT&T
R1-1710566 Time-domain resource allocation for DL and UL data Intel Corporation
R1-1710719 DL/UL Time Resource Allocation Samsung
R1-1710838 Cross-slot scheduling for UE power saving MediaTek Inc.
R1-1710990 Time-domain resource allocation for NR Nokia, Alcatel-Lucent Shanghai Bell
R1-1711108 Time-domain resource allocation NTT DOCOMO, INC.
R1-1711471 Discussions on Transmission Duration KT Corp.
R1-1711500 On Resource Allocation in the Time Domain Ericsson

#### 5.1.3.3.1.3 Transport block size determination

*Limit to 1 contributions per 1 company/organization/university*
R1-1709978 TB mapping and TB size determination Huawei, HiSilicon
R1-1710325 Discussion on TB size determination for NR LG Electronics
R1-1710720 Transport Block Size Determination Samsung
R1-1710991 Transport block size determination and the support of slot aggregation in NR Nokia, Alcatel-Lucent Shanghai Bell
R1-1711109 Transport block size determination NTT DOCOMO, INC.
R1-1711199 Discussion TB size determination Qualcomm Incorporated
R1-1711501 On MCS/transport Block Size Determination Ericsson

#### 5.1.3.3.2 UL data transmission procedure with grant

*Including details for single/multiple SR configurations.*

R1-1710021 Advantages of Underlay Scheduling Request method over PUCCH-based SR Idaho National Laboratory
R1-1710093 Further details of grant-based UL transmission CATT
R1-1710122 On scheduling request in NR ZTE
R1-1710166 Discussion on the UL waveform indication Guangdong OPPO Mobile Telecom.
R1-1710247 Frequency hopping for NR UL PUSCH NEC
R1-1710326 Discussion on scheduling request for UL transmission with grant LG Electronics
R1-1710465 On uplink data scheduling Huawei, HiSilicon
R1-1710567 SR configuration and UL data scheduling Intel Corporation
R1-1710721 SR Transmission for Multiple Configurations Samsung
R1-1710722 Procedures for Grant-Based UL Transmissions Samsung
R1-1710834 On support of Grant-free and Grant-based transmission for UL URLLC MediaTek Inc.
R1-1710992 Discussion on multiple SR configuration Nokia, Alcatel-Lucent Shanghai Bell
R1-1711110 Scheduling request design in NR system NTT DOCOMO, INC.
R1-1711200 Simultaneous UL SR channel Qualcomm Incorporated
R1-1711502 On UL Data Scheduling Grant in NR Ericsson
R1-1711503 On Scheduling Request Enhancements Ericsson
R1-1711836 WF on scheduling request for NR Idaho National Laboratory, KDDI, Lenovo, Motorola Mobility, IITH, CEWIT, IITM, Tejas Networks, Qualcomm

#### 5.1.3.3.3 UL data transmission procedure without grant

*Including HARQ/re-transmission, UE identification, relation b/w UL grant-free and UL SPS, etc.*

R1-1710328 Summary of [89-22] Email discussion about UL data transmission without UL grant LG Electronics



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Agreements:

- In addition to the RS parameters, time and frequency resource are configured in a UE-specific manner.
  - Note: it is common understanding that the time and frequency resources configured for a UE may or may not collide with those for another UE (to be captured in the LS).
- WA: Both DFT-S-OFDM and CP-OFDM are supported for UL transmission without grant.
- NR supports more than 1 HARQ process for UL transmission without grant

**Offline summary (on-going):**
**R1-1711829 Offline discussions on UL data transmission without grant NTT DOCOMO**

- Function of L1 signalling
  - At least following functionality of the L1 signalling is supported
    - Activation/Deactivation
    - Modification of parameters configured by RRC
      - For example at least following parameters are common in the RRC configuration and L1 signaling
        - One physical resource including following
          - Time domain resource allocation for one transmission
          - Frequency domain resource allocation in terms of RB(s) or RBG(s)
          - UE-specific DMRS configuration
      - MCS/TBS
  - Switch to grant-based re-transmission for the same TB
    - Companies are encouraged to provide detailed methods to determine the grant is for the same TB
  - Companies are encouraged to provide analysis to prove the benefits of supporting an acknowledgement/indication of successful receiving of that TB from gNB in next meeting
- Formats of L1 signalling
  - Select from following two options to achieve each of the L1 signalling functionalities in next meeting
    - Option 1: UE-specific DCI (UL grant)
    - Option 2: Group common DCI
  - FFS the monitoring occasions for the L1 signalling
- RRC configurations
  - At least for UL transmission without UL grant and without L1 activation/deactivation signalling, the RRC (re-)configuration for a set of resource and parameters includes at least the following
  - Transmission interval, where the minimum value can be one slot or one mini-slot
  - One physical resource including following
    - Time domain resource allocation for one transmission
    - Frequency domain resource allocation in terms of RB(s) or RBG(s)
    - UE-specific DMRS configuration
  - At least one physical resource can be configured for one UE within the transmission interval
  - FFS multiple physical resources can be configured for one UE within the transmission interval
  - Note:
    - At least repetition can be performed on the same physical resource defined above
    - FFS multiple physical resources can be configured for the K repetitions, where K>1
  - Other transmission related parameters:
    - An MCS/TBS value
    - Number of repetitions K
    - Power control related parameters
    - FFS: HARQ process related parameters
    - FFS: Possible RVs related parameters for repetitions
    - FFS: Possible hopping related parameters including enable/disable configurability
    - FFS: Possible ACK feedback related parameters
    - FFS other parameters
  - Multiple sets of resource and parameters can be (re-)configured for each UE

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**Friday**

Agreements:

- The same TA adjustment procedure/mechanism (including expiration of TA timer) is applied to UL transmission with and without UL grant
- For UL transmission without UL grant,
  - Open-loop power control based on pathloss estimate is supported.
  - FFS: Closed-loop power control is supported, which is based on NW signaling.



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- A UE shall not transmit anything on configured resources for UL transmission without UL grant when there is no transport block to transmit.
- FFS: UCI piggybacking with transport block is supported for UL transmission without UL grant.

Agreement: RAN1 considers that UE transmitting UL transmission without UL grant can be identified based on time/frequency resources and RS parameter(s).

**R1-1711969 Offline discussions on UL data transmission without grant NTT DOCOMO**

Agreements:

- Type of UL data transmission without grant
  - Type 1: UL data transmission without grant is only based on RRC (re)configuration without any L1 signalling
  - Type 2: UL data transmission without grant is based on both RRC configuration and L1 signalling to activation/deactivation for UL data transmission without grant
    - Note: functionality of modification is achieved the L1 signalling by activation
  - Type 3: UL data transmission without grant is based on RRC configuration, and allows L1 signalling to modify some parameters configured by RRC but no L1 signalling for activation
- For UL data transmission without grant, type 1 and type 2 have already been agreed, FFS type 3.
- FFS the reliability issues for L1 signalling.
- For Type 1 UL transmission without UL grant, the RRC (re-)configuration includes at least the following
  - Periodicity and offset of a resource with respect to SFN=0
  - Time domain resource allocation
  - Frequency domain resource allocation
  - UE-specific DMRS configuration
  - Note:
    - one TB is mapped to a resource at least consisting of time/frequency-domain resource
    - RAN1 will not introduce specific resource allocation and DMRS configuration for UL data transmission without grant separate from UL data transmission with UL grant within the Rel.15 WI
  - An MCS/TBS value
  - Number of repetitions K
  - Power control related parameters
  - FFS HARQ related parameters
  - FFS if multiple resources can be configured
- For Type 2 UL transmission without UL grant
  - The RRC (re-) configuration for resource and parameters includes at least the following
    - Periodicity of a resource
    - Power control related parameters
  - At least the following additional parameters for the resource are given by L1 signalling
    - Offset associated with the periodicity with respect to a timing reference indicated by L1 signalling for activation
      - FFS: the timing reference
    - Time domain resource allocation
    - Frequency domain resource allocation
    - UE-specific DMRS configuration
    - An MCS/TBS value
    - Note:
      - one TB is mapped to one resource
      - RAN1 will not introduce specific resource allocation and DMRS configuration for UL data transmission without grant separate from UL data transmission with UL grant within the Rel.15 WI
  - FFS multiple resources can be configured
  - FFS HARQ related parameters
  - FFS whether number of repetitions K is configured by RRC signalling and/or indicated by L1 signalling

Email approval of the LS to RAN2 until 6th of July to explain RAN1 understandings based on above agreements – Lihui (NTT DOCOMO)

Not treated.

R1-1709991 Resource configuration on UL transmission without grant Huawei, HiSilicon
R1-1709992 UE identification and HARQ combining for grant-free transmissions Huawei, HiSilicon



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| | | |
|---|---|---|
| R1-1710014 | Evaluation of UE identification for UL transmission without grant | ZTE |
| R1-1710015 | Considerations on the procedures of UL data transmission without grant | ZTE |
| R1-1710094 | Grant-free UL transmission procedure | CATT |
| R1-1710167 | HARQ for uplink grant-free transmission | Guangdong OPPO Mobile Telecom. |
| R1-1710239 | Discussions on HARQ for grant-free transmission | Fujitsu |
| R1-1710248 | UL data transmission without grant | NEC |
| R1-1710327 | Discussion on UL transmission without grant | LG Electronics |
| R1-1710328 | Summary of [89-22] Email discussion about UL data transmission without UL grant | LG Electronics |
| R1-1710380 | Discussion on UL grant-free transmission | vivo |
| R1-1710568 | UL grant-free transmissions: Resource configuration | Intel Corporation |
| R1-1710601 | UL grant-free transmission for URLLC | Lenovo, Motorola Mobility |
| R1-1710621 | Resource allocation and transmission scheme for URLLC grant-free transmission | ETRI |
| R1-1710723 | Procedures for Grant-Free UL Transmissions | Samsung |
| R1-1710724 | Grant-Free and Grant-Based UL Transmissions | Samsung |
| R1-1710835 | Grant-free Scheduling and retransmission schemes for UL URLLC | MediaTek Inc. |
| R1-1710836 | On use of scrambling for UL Grant-free URLLC transmission | MediaTek Inc. |
| R1-1710861 | Pre-emption in UL grant free resource | Sony |
| R1-1710863 | Discussion on the retransmission of UL transmission without grant | Sony |
| R1-1710887 | UL grant-free transmissions: Physical layer procedures | Intel Corporation |
| R1-1710963 | On network resources and UE transmission configurations for grant-free access | NEC |
| R1-1710971 | UL grant-free transmission for URLLC | China Telecommunications |
| R1-1710993 | Unified framework for UL grant-free and UL SPS | Nokia, Alcatel-Lucent Shanghai Bell |
| R1-1710994 | UE identification and HARQ for URLLC UL grant-free | Nokia, Alcatel-Lucent Shanghai Bell |
| R1-1711006 | Issues and Control Design for UL Grant-free URLLC | III |
| R1-1711111 | Overall solutions for UL grant free transmission | NTT DOCOMO, INC. |
| R1-1711253 | Resource configuration for UL transmission without grant | NICT |
| R1-1711323 | UL data transmission without grant | Panasonic |
| R1-1711504 | On SPS/Grant-Free Transmission | Ericsson |
| R1-1711505 | On HARQ Retransmission for SPS/Grant-free | Ericsson |

#### 5.1.3.3.4 CBG-based (re)transmission

**R1-1711883** **WF on CBG retransmission** **Samsung**

Possible proposal from offline:

- CBG formation remains the same in retransmission as initial transmission

Possible agreement:

- Each CBG is the same set of CB(s) between initial transmission and retransmission

**Friday**

**R1-1711958** **WF on CBG retransmission** **Samsung, ZTE**

Working assumption: For initial transmission and retransmission, each CBG of a TB has the same set of CB(s).

Agreement: For CBG-based (re)transmission, the DCI scheduling CBG-based (re)transmission carries single RV field for the transport block.

Email approval until July 13th for downselection between the fhe followings – Jeongho (Samsung)

- For the indicated number of CBGs per TB where "indicated" is realized by RRC, MAC, L1 signalling, the following options are considered for down-selection in RAN1#90.
  - Option 1. RRC signaling (for bit-field size)
  - Option 2. L1 signaling (for indication the number of CBGs per TB) + RRC signaling (for bit-field size)
  - Option 3. both Option 1 and Option 2
- To determine the number of CBG HARQ-ACK bits per TB, the following options are considered for down-selection in RAN1#90.
  - Option 1. A UE transmits HARQ-ACK bits only for scheduled CBGs.
    - "scheduled CBGs" means the CBGs scheduled in a (re)transmission
  - Option 2. A UE transmits HARQ-ACK bits for indicated CBGs.
    - FFS: "indicated" is realized by RRC, MAC, L1 signalling
  - Option 3. both Option 1 and Option 2 by configuration
- For DL CBG-based (re)transmission, when information on which CBG(s) is/are (re)transmitted is configured to be included in the DCI, the following options are considered for down-selection in RAN#90.
  - Option 1. TB-level NDI is jointly encoded with the information on which CBG(s) is/are (re)transmitted



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- Option 2. There is separate 1-bit bit-field for TB-level NDI.

- When CBG-based retransmission is configured, TB-level HARQ-A/N is supported and at least following options can be considered for down-selection in RAN1#90.
  - Option 1. Add 1 bit upon CBG-level HARQ-ACK bits
  - Option 2. Use all NACK of CBG-level HARQ-ACK bits
  - Option 3. Use different PUCCH format or PUCCH resource
- For HARQ-ACK codebook for CBG-based retransmission, the following options are considered for down-selection in RAN1#90.
  - Option 1. Dynamic codebook determination for multiple PDSCHs
  - Option 2. Semi-static codebook determination for multiple PDSCHs
  - Option 3. both Option 1 and Option 2 by configuration

#### 5.1.3.3.4.1 CBG construction

*Limit to 1 contribution per 1 company/organization/university*

R1-1709968 Discussion on CBG construction Huawei, HiSilicon
R1-1710017 CBG construction ZTE
R1-1710095 Details of CBG construction CATT
R1-1710329 Consideration on CBG construction for NR HARQ LG Electronics
R1-1710396 Discussion on CB grouping vivo
R1-1710442 On CBG construction for NR PDSCH and PUSCH AT&T
R1-1710569 On CBG construction Intel Corporation
R1-1710593 Discussion on CBG grouping Guangdong OPPO Mobile Telecom.
R1-1710602 CBG construction for CBG-based retransmission Lenovo, Motorola Mobility
R1-1710725 CBG Construction Samsung
R1-1710830 Discussion on CBG construction for CBG-based (re)transmission MediaTek Inc.
R1-1710876 CBG based HARQ for NR InterDigital, Inc.
R1-1710995 Mapping code blocks to code block groups Nokia, Alcatel-Lucent Shanghai Bell
R1-1711112 CBG construction NTT DOCOMO, INC.
R1-1711202 CBG Construction Principles for CBG-based Transmission with Multi-Bit HARQ feedback Qualcomm Incorporated
R1-1711506 On Code Block Group Formation and CRC Attachment Ericsson

#### 5.1.3.3.4.2 DL control signalling for CBG-based (re)transmission

*Including CBG information by the DCI.*

*Limit to 1 contribution per 1 company/organization/university*

R1-1709967 Scheduling mechanisms for CBG-based re-transmission Huawei, HiSilicon
R1-1710018 DL control for CBG ZTE
R1-1710096 DL control signaling design for CBG-based operation CATT
R1-1710168 Discussion on CBG indication in DCI Guangdong OPPO Mobile Telecom.
R1-1710240 Discussion on DL control signaling related to CBG based (re)-transmission Fujitsu
R1-1710330 Consideration on DCI signaling for CBG based HARQ LG Electronics
R1-1710443 DCI design for CBG based re transmision AT&T
R1-1710570 DCI design and scheduling of CBG-based (re)transmissions Intel Corporation
R1-1710603 DL control signalling for CBG-based retransmission Lenovo, Motorola Mobility
R1-1710726 Scheduling for CBG Retransmissions Samsung
R1-1710864 Discussion on the CBG index indication by DCI Sony
R1-1710908 DL control signal for CBG-based transmission Apple Inc.
R1-1710972 Control signalling for CBG-based (re)transmission China Telecommunications
R1-1710996 DL control signalling for CBG-based transmissions Nokia, Alcatel-Lucent Shanghai Bell
R1-1711113 DL control signalling for CBG-based (re)transmission NTT DOCOMO, INC.
R1-1711203 DCI considerations for CBG-based (re)-Transmissions Qualcomm Incorporated
R1-1711245 Pardon the Interruption: Downlink Control Signaling to Enable Preemption and CBG-based (Re) Transmission Sharp
R1-1711257 Discussion on DL control signalling for CBG-based retransmission HTC Corporation
R1-1711316 DL control signaling for CBG-based (re)transmission Shenzhen Coolpad Technologies
R1-1711324 DL control signalling for CBG-based (re)transmission Panasonic
R1-1711341 Discussions on the indication for CBG CATR
R1-1711507 On Retransmission Decoder Throughput Issues and CBG-based Retransmission Control Ericsson
R1-1711531 CBG based retransmission Sequans Communications

#### 5.1.3.3.4.3 UL control signalling for CBG-based (re)transmission

*Including CBG-level HARQ-ACK feedback.*



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*Limit to 1 contribution per 1 company/organization/university*

| | | |
|---|---|---|
| R1-1709969 | Discussion on CBG-based feedback | Huawei, HiSilicon |
| R1-1710019 | UL control for CBG | ZTE |
| R1-1710097 | UL control signaling design for CBG-based operation | CATT |
| R1-1710169 | Discussion on HARQ-ACK feedback for CBG-based transmission | Guangdong OPPO Mobile Telecom. |
| R1-1710241 | Discussion on CBG based HARQ-ACK Design | Fujitsu |
| R1-1710331 | Consideration on UCI signaling for CBG based HARQ | LG Electronics |
| R1-1710444 | Uplink control channel design for CBG based re transmission | AT&T |
| R1-1710571 | HARQ-ACK feedback for CBG-based (re)transmissions | Intel Corporation |
| R1-1710604 | UL HARQ-ACK feedback for CBG-based retransmission | Lenovo, Motorola Mobility |
| R1-1710727 | HARQ-ACK Feedback for CBG-Based Retransmissions | Samsung |
| R1-1710954 | HARQ feedback design considerations for CBG based transmission | InterDigital, Inc. |
| R1-1710997 | HARQ-ACK feedback for CBG-based (re-)transmission in NR | Nokia, Alcatel-Lucent Shanghai Bell |
| R1-1711114 | UL control signalling for CBG-based (re)transmission | NTT DOCOMO, INC. |
| R1-1711204 | UCI considerations for CBG-based (re)-Transmissions | Qualcomm Incorporated |
| R1-1711258 | Discussion on UL control signalling for CBG-based retransmission | HTC Corporation |
| R1-1711361 | Discussion on UL HARQ-ACK feedback for CBG-based retransmission | WILUS Inc. |
| R1-1711472 | Considerations on TB-CRC Failure | KT Corp. |
| R1-1711508 | On Design of CBG HARQ-ACK Feedback Schemes | Ericsson |
| R1-1711530 | CBG based HARQ-Ack/Nack | Sequans Communications |

#### 5.1.3.3.5 HARQ-ACK feedback

##### 5.1.3.3.5.1 HARQ-ACK feedback timing

*Limit to 1 contributions per 1 company/organization/university*

| | | |
|---|---|---|
| R1-1709970 | HARQ feedback timing for NR | Huawei, HiSilicon |
| R1-1710332 | Consideration on HARQ-ACK feedback timing for NR | LG Electronics |
| R1-1710418 | HARQ-ACK feedback timing for FDD, semi-static TDD and mini-slot based transmissions | AT&T |
| R1-1710728 | HARQ-ACK Feedback Timing | Samsung |
| R1-1710783 | Discussion on timing design for semi-static DL/UL assignment | CMCC |
| R1-1710795 | Timing of HARQ-ACK for PDSCH | MediaTek Inc. |
| R1-1710877 | DL HARQ Feedback suppression | InterDigital, Inc. |
| R1-1710888 | HARQ-ACK feedback: Timing considerations | Intel Corporation |
| R1-1710998 | Timing aspects for HARQ-ACK feedback | Nokia, Alcatel-Lucent Shanghai Bell |
| R1-1711115 | HARQ-ACK timing | NTT DOCOMO, INC. |
| R1-1711205 | Low latency impact analysis on user plane and control plane | Qualcomm Incorporated |
| R1-1711509 | On HARQ Feedback Timing | Ericsson |

##### 5.1.3.3.5.2 HARQ-ACK multiplexing/bundling

*Including solutions to address single/multiple TBs/CBGs over single/multiple carriers/TTIs.*

| | | |
|---|---|---|
| R1-1710098 | NR HARQ-ACK multiplexing | CATT |
| R1-1710242 | Discussion on HARQ-ACK codebook | Fujitsu |
| R1-1710333 | Support of HARQ-ACK multiplexing/bundling for NR | LG Electronics |
| R1-1710462 | On HARQ-ACK multiplexing and/or bundling | Huawei, HiSilicon |
| R1-1710572 | HARQ-ACK multiplexing and bundling | Intel Corporation |
| R1-1710605 | HARQ-ACK codebook design for CBG-based transmission | Lenovo, Motorola Mobility |
| R1-1710729 | HARQ-ACK Codeword Determination | Samsung |
| R1-1710999 | On HARQ feedback determination | Nokia, Alcatel-Lucent Shanghai Bell |
| R1-1711116 | HARQ-ACK multiplexing | NTT DOCOMO, INC. |
| R1-1711259 | Discussion on CBG-based HARQ feedback multiplexing | HTC Corporation |
| R1-1711510 | On HARQ Codebook | Ericsson |

#### 5.1.3.3.6 Processing time and HARQ process number

**R1-1711185 6 WF on Processing Time Requirements Qualcomm, ZTE, Deutsche Telekom, Vodafone, Panasonic, Ericsson**

Agreements:

- For NR, RAN1 should consider the UE processing time(s) in terms of symbols (N1, N2) together with absolute time (in us), instead of slots (K)
  - N1: the number of OFDM symbols required for UE processing from the end of NR-PDSCH reception to the earliest possible start of the corresponding ACK/NACK transmission from UE perspective.



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- N2: the number of OFDM symbols required for UE processing from the end of NR-PDCCH containing the UL grant reception to the earliest possible start of the corresponding NR-PUSCH transmission from UE perspective.
- Note the timing advance is not included in N1 and N2
  - FFS whether other aspects, e.g. UE UL/DL switching time, etc. are included in N1 and N2
- FFS between the following for each combination defined in the next slide
  - Opt 1: UE reports N1 and N2 as UE capability
  - Opt 2: Fixed values of N1 and N2
- UE is not expected transmit anything in uplink if the network set the values of K1 and/or K2 without leaving sufficient time for UE processing

**Friday**
**R1-1711957 WF on Processing Time Requirements Qualcomm**

Conclusions:
- Email discussion about followings – Joseph (Qualcomm)
  - Step 1: identify the candidate factors for processing time (until 4th Aug.)
  - Step 2: identify the table (until 4th Aug.)
- Based on the proponents' input for step 1 and step 2, following work will be done:
  - Step 3: fill-in the table
  - Targeting finishing step 3 until September meeting.
    - Note: companies are encouraged to bring up initial numbers for the table to the August meeting
  - Note: fill-in the table does not necessarily results in defining some UE capabilities or exact values of K1 and K2 in the specification.

#### 5.1.3.3.6.1 Number of HARQ processes and HARQ RTT

| | | |
|---|---|---|
| R1-1709965 | Number of HARQ processes and HARQ RTT | Huawei, HiSilicon |
| R1-1710099 | Discussion on number of HARQ processes and HARQ RTT | CATT |
| R1-1710334 | Discussion on HARQ process number for NR | LG Electronics |
| R1-1710394 | Discussion on NR UE supporting self-contained operation | vivo |
| R1-1710415 | Remaining details on the number of HARQ processes in NR | AT&T |
| R1-1710573 | On HARQ processes and HARQ RTT | Intel Corporation |
| R1-1710730 | On Number of HARQ Processes and HARQ RTT | Samsung |
| R1-1710967 | Number of HARQ processes for co-existence with TD-LTE | NEC Corporation |
| R1-1711000 | On the number of HARQ processes | Nokia, Alcatel-Lucent Shanghai Bell |
| R1-1711117 | Processing time and HARQ process number for NR | NTT DOCOMO, INC. |
| R1-1711206 | UE processing time | Qualcomm Incorporated |
| R1-1711511 | On Minimum Processing Time and Number of HARQ Processes in NR | Ericsson |

#### 5.1.3.3.6.2 Soft-buffer management

| | | |
|---|---|---|
| R1-1709966 | Soft buffer handling | Huawei, HiSilicon |
| R1-1710020 | Consideration about CBG soft-buffer management | ZTE |
| R1-1710100 | Soft buffer management for NR | CATT |
| R1-1710335 | Discussion on soft buffer management for NR | LG Electronics |
| R1-1710574 | Soft-buffer requirements in NR | Intel Corporation |
| R1-1710731 | Soft Buffer Partitioning | Samsung |
| R1-1711001 | On the HARQ soft buffer handling | Nokia, Alcatel-Lucent Shanghai Bell |
| R1-1711118 | Soft-buffer size and management | NTT DOCOMO, INC. |
| R1-1711207 | Considerations for soft buffer management | Qualcomm Incorporated |
| R1-1711325 | UE category modelling and soft buffer | Panasonic |
| R1-1711512 | On HARQ and Soft Buffer Handling | Ericsson |

### 5.1.3.3.7 Multiplexing data with different transmission durations

#### 5.1.3.3.7.1 Pre-emption indication for downlink

*Including signalling details and UE behaviour when it is indicated.*

| | | |
|---|---|---|
| R1-1711342 | Discussion on the granularity of preemption indication | CATR |

**Offline summary (on-going):**
**R1-1711823 WF on pre-emption indication Huawei, HiSilicon, MediaTek, Sequans, NTT DOCOMO, Sony, vivo, ZTE, InterDigital, III**



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Proposals:
- For downlink preemption indication
  - It is transmitted using a group common DCI in PDCCH
    - Working Assumption: This group common DCI is separate from group common PDCCH for SFI
    - Group common DCI addresses a time duration and frequency band
  - Whether a UE needs to monitor preemption indication is configured by RRC signaling
  - The granularity of preemption indication in time domain can be configured
  - The granularity of preemption indication in frequency domain will be down selected from
    - Option 1: RBG(s) in a common frequency band addressed by group common DCI with a given numerology
    - Option 2: 1/N of a common frequency band addressed by group common DCI with a given numerology
      - FFS: the value of N.
  - Details of group common DCI for pre-emption indication
    - FFS CORESET configuration and monitoring interval for the group common DCI
    - FFS details of contents for the group common DCI (E.g. the time/freq of pre-emption, number of pre-emption)

**Friday**
**R1-1711911 WF on pre-emption indication Huawei, HiSilicon, MediaTek, Sequans, NTT DOCOMO, Sony, vivo, ZTE, InterDigital, III, Intel, LGE, Samsung**

Agreements:
- For downlink preemption indication
  - It is transmitted using a group common DCI in PDCCH
    - FFS: This group common DCI is transmitted separately from SFI
    - Whether a UE needs to monitor preemption indication is configured by RRC signaling
    - The granularity of preemption indication in time domain can be configured
      - Details of granularity are FFS

R1-1711981 WF on group common pre-emption indication Huawei, HiSilicon, Sharp, ZTE, LGE, Sony, Panasonic, MediaTek, InterDigital

Not treated.
R1-1709984 On pre-emption indication for DL multiplexing of URLLC and eMBB Huawei, HiSilicon
R1-1710101 Further design considerations for DL pre-emption indication CATT
R1-1710123 DL pre-emption indicationZTE
R1-1710170 Symbol-level resource allocation and pre-emption indication Guangdong OPPO Mobile Telecom.
R1-1710336 Discussion on pre-emption indication for downlink LG Electronics
R1-1710382 Discussion on pre-emption indication for downlink vivo
R1-1710575 Remaining details of DL pre-emption indication Intel Corporation
R1-1710732 Indication of Preempted Resources in DL Samsung
R1-1710865 Remaining issues on using pre-emption indicator for DL URLLC/eMBB multiplexing Sony
R1-1710955 Signalling design considerations for DL pre-emption indication InterDigital, Inc.
R1-1711002 On pre-emption indication Nokia, Alcatel-Lucent Shanghai Bell
R1-1711119 Pre-emption indication for downlink NTT DOCOMO, INC.
R1-1711362 Discussion on UE behavior by pre-emption indication WILUS Inc.
R1-1711474 Views on preemption indication for DL KT Corp.
R1-1711513 On Pre-emption Indication for Downlink Ericsson
R1-1711551 Considerations on multiplexing with different transmission durations KDDI Corporation
R1-1711554 URLLC DL pre-emption and UL suspension indication channel design Qualcomm Incorporated

#### 5.1.3.3.7.2 Possible enhancements for uplink

R1-1709988 Discussion on UL multiplexing of grant-based eMBB and grant-free URLLC Huawei, HiSilicon
R1-1710124 Uplink multiplexing for different transmission durations ZTE
R1-1710243 On eMBB and URLLC multiplexing for Uplink Fujitsu
R1-1710337 Discussion on eMBB and URLLC multiplexing for uplink LG Electronics
R1-1710383 Discussion on UL multiplexing data with different transmission durations vivo
R1-1710576 Multiplexing of UL transmissions with different data durations and latency requirements Intel Corporation
R1-1710606 On eMBB/URLLC multiplexing for uplink transmission Lenovo, Motorola Mobility
R1-1710733 On Indication of Preempted Resources in UL Samsung
R1-1710867 Multiplexing data with different transmission durations for Uplink Sony
R1-1710956 Multiplexing of low-latency traffic and non-latency sensitive traffic in UL InterDigital, Inc.



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R1-1711003 Pause-Resume Scheduling for Low Latency Uplink Transmissions Nokia, Alcatel-Lucent Shanghai Bell
R1-1711120 Multiplexing of different data durations for uplink NTT DOCOMO, INC.
R1-1711208 Timing advance for different numerology Qualcomm Incorporated
R1-1711514 On Pre-emption Indication for Uplink Ericsson

#### 5.1.3.3.8 Ultra-reliable part of URLLC for scheduling/HARQ procedure

*Identify necessary techniques for scheduling/HARQ procedure to meet the URLLC requirements set forth by TR38.913.*

R1-1709985 PDSCH reliability for URLLC Huawei, HiSilicon
R1-1709987 Discussion on URLLC numerology Huawei, HiSilicon
R1-1709990 Link adaption for URLLC transmission Huawei, HiSilicon
R1-1710016 Repetition/hopping related design and reliablity evaluations for grant-free URLLC ZTE
R1-1710125 Supporting Ultra reliability in scheduling ZTE
R1-1710338 Discussion on scheduling and HARQ procedure for URLLC LG Electronics
R1-1710381 Scheduling and HARQ aspects for URLLC reliability vivo
R1-1710466 Consideration on subsequent transmission after pre-emption Huawei, HiSilicon
R1-1710468 Discussion on Multi-TRP cooperation for URLLC Huawei, HiSilicon
R1-1710469 Support of URLLC for TDD Huawei, HiSilicon
R1-1710577 On link adaptation enhancements to support URLLC Intel Corporation
R1-1710734 Scheduling/HARQ Procedures for URLLC Samsung
R1-1710837 HARQ procedure for DL URLLC MediaTek Inc.
R1-1710866 Feedback for improving URLLC reliability Sony
R1-1711004 Discussion on scheduling based URLLC transmission Nokia, Alcatel-Lucent Shanghai Bell
R1-1711005 CSI measuring and reporting procedure for URLLC Nokia, Alcatel-Lucent Shanghai Bell
R1-1711121 Scheduling and HARQ procedures for URLLC NTT DOCOMO, INC.
R1-1711343 Discussion on URLLC transmitted in same or different numerology resources ASUSTEK COMPUTER (SHANGHAI)
R1-1711432 Discussion on over-the-air time synchronization for URLLC Huawei, HiSilicon
R1-1711515 On Supporting High Reliability for Data Transmissions Ericsson
R1-1711555 UL URLLC Capacity Based on URLLC and eMBB dynamic multiplexing Qualcomm Incorporated
R1-1711556 Ultra reliable HARQ design with async CSI feedback Qualcomm Incorporated
R1-1711560 Discussion on wireless time synchronization for URLLC SIA

#### 5.1.3.3.9 Other

R1-1709964 HARQ processing time Huawei, HiSilicon
R1-1710735 Remaining Aspects for Short Scheduling Durations Samsung
R1-1710736 Triggered UCI Transmissions Samsung
R1-1710737 DL Resource Allocation for Multiplexing Data with Different Transmissions Durations Samsung
R1-1710738 Average User Plane Latency for Preemption based Multiplexing Samsung
R1-1711367 On UE processing time Ericsson LM
R1-1711422 Resource allocation for data channels Huawei, HiSilicon
R1-1711426 CBG-based transmission/retransmission for DL multiplexing of eMBB and URLLC Huawei, HiSilicon
R1-1711427 Discussion on group common pre-emption indication Huawei, HiSilicon
R1-1711428 Superposed transmission of pre-emption indication with eMBB data Huawei, HiSilicon
R1-1711429 Consideration on ACK/NACK error in CBG-based retransmission Huawei, HiSilicon
R1-1711430 Discussion on UL multiplexing of grant-based eMBB and URLLC Huawei, HiSilicon
R1-1711434 Discussion on TB size determination Huawei, HiSilicon
R1-1711435 Unified design for slot and mini-slot Huawei, HiSilicon
R1-1711456 HARQ Process Management in NR Samsung
R1-1711457 Indication of Preempted Resources Prior to HARQ-ACK Feedback Samsung
R1-1711458 Considerations on Signaling for Indicating Preempted Resources Samsung
R1-1711516 On Mixed Numerology Ericsson

### *5.1.3.4 Scheduling/HARQ aspects for carrier aggregation and dual connectivity*

R1-1711425 Summary of LTE CA/DC and remaining issues for NR Huawei, HiSilicon

#### 5.1.3.4.1 Carrier aggregation

**R1-1711846 Way Forward on NR Carrier Aggregation Huawei, HiSilicon, KT, CATR, MediaTek, Nokia, ASB, Ericsson, Intel**
Also supported by LGE

Conclusions:
Email approval on the following until July 10th – Zhenfei (Huawei):



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- NR support Primary Component Carrier (PCC) and Secondary Component Carrier (SCC)
  - A UE monitors PDCCH candidates in common search space(s) and UE specific search space(s) on PCC
  - A UE monitors PDCCH candidates on UE-specific search space(s) for an SCC
- Support cross carrier scheduling with CIF
  - A carrier is scheduled by one and only one carrier
  - FFS: the number of CIF bits and possible connection to BWPs
- NR Supports at least 2 cell groups for PUCCH
  - Carrier transmitting the PUCCH can be configured within the cell group
    - FFS The PUCCH configuration can be done by the UL PCC reconfiguration or PUCCH reconfiguration
- For scheduling with different and the same numerologies:
  - For self-scheduling
    - PDCCH and the scheduled PDSCH have the same numerologies
    - PDCCH and the scheduled PUSCH can have the same or different numerologies
      - The time granularity indicated in the DCI for the timing relationship between DCI and the corresponding PUSCH follows the numerology of the PUSCH transmission
  - For cross-carrier scheduling
    - PDCCH and the scheduled PDSCH/PUSCH can have different or the same numerologies
      - The time granularity indicated in the DCI for the timing relationship between DCI and the corresponding PDSCH/PUSCH follows the numerology of the PDSCH/PUSCH transmission
    - UE is not expected to support faster processing for the case of cross-carrier scheduled PDSCH/PUSCH transmission scheduled by a DCI requiring than the case of self-scheduled PDSCH/PUSCH transmission scheduled by the DCI.
- UCI feedback related to multiple DL component carriers is supported for DL component carriers operating with the same and different numerology
  - The time granularity indicated in the DCI for PDSCH and the corresponding HARQ-ACK follows the numerology for HARQ-ACK transmission
  - UE is not expected to support faster processing for the case when PDSCH and the corresponding HARQ-ACK use a different numerology than the case of the case when PDSCH and HARQ-ACK use the same numerology
- NR support 4 timing advance groups including Primary Timing Advance Group and Secondary Timing Advance Group(s)
  - Support PRACH transmission for timing advance acquisition on SCC

#### 5.1.3.4.1.1 Self-/cross-carrier scheduling and joint/separate UCI feedback

*For carriers with the same and different numerology*

| | | |
|---|---|---|
| R1-1709975 | On NR carrier aggregation | Huawei, HiSilicon |
| R1-1710102 | Scheduling and HARQ support for NR CA | CATT |
| R1-1710171 | Bandwidth part based resource scheduling for carrier aggregation | Guangdong OPPO Mobile Telecom. |
| R1-1710339 | Support of cross-CC DCI/UCI transmission for NR CA | LG Electronics |
| R1-1710578 | Scheduling and UCI feedback for carrier aggregation | Intel Corporation |
| R1-1710739 | Cross-Carrier Scheduling and HARQ-ACK Feedback | Samsung |
| R1-1710885 | On cross-carrier scheduling and joint UCI design | Nokia, Alcatel-Lucent Shanghai Bell |
| R1-1710964 | On UE-to-UE measurement for CLI management | NEC |
| R1-1711122 | NR carrier aggregation | NTT DOCOMO, INC. |
| R1-1711209 | CA with mixed numerology | Qualcomm Incorporated |
| R1-1711517 | On Scheduling and UCI Handling in Carrier Aggregation | Ericsson |

#### 5.1.3.4.1.2 SRS fast switching

*For carriers with the same and different numerology*

| | | |
|---|---|---|
| R1-1711847 | Way Forward on SRS Switching | Huawei, HiSilicon, MediaTek, Intel |
| R1-1709976 | SRS switching among CCs and bandwidth parts | Huawei, HiSilicon |
| R1-1710579 | On SRS fast switching | Intel Corporation |
| R1-1710740 | Fast Carrier Switcing for SRS Transmissions | Samsung |
| R1-1711518 | On SRS Fast Switching in NR | Ericsson |

#### 5.1.3.4.2 Dual connectivity

| | | |
|---|---|---|
| R1-1709977 | On NR dual connectivity | Huawei, HiSilicon |
| R1-1710103 | Scheduling and HARQ support for NR DC | CATT |
| R1-1710340 | Discussion on dual connectivity with single active UL at a given time | LG Electronics |



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| | | |
|---|---|---|
| R1-1710580 | On Dual Connectivity for NR | Intel Corporation |
| R1-1710741 | DC for UE with Single UL Carrier Capability | Samsung |
| R1-1710884 | On NR CA/DC configuration | Nokia, Alcatel-Lucent Shanghai Bell |
| R1-1711123 | LTE-NR Dual connectivity | NTT DOCOMO, INC. |
| R1-1711519 | On Dual Connectivity for NR | Ericsson |

### 5.1.4 Channel coding

**R1-1711917** **Chairman's notes of AI 5.1.4 Channel coding** **Ad-Hoc chair (Nokia)**
The document was presented by Matthew Baker from Nokia.
**Decision:** The document is endorsed and the content is incorporated as below.

#### *5.1.4.1 LDPC code*

##### 5.1.4.1.1 Coding chain

| | | |
|---|---|---|
| R1-1711344 | LDPC Coding chain | Intel Corporation |
| R1-1710844 | Consideration on coding chain for eMBB data channel | ZTE |

##### 5.1.4.1.1.1 CRC attachment

**R1-1710482** **Study of Number of CRC Bits for Small Transport Blocks** **Ericsson**
**R1-1711533** **CRC attachment for Smaller TBs** **Nokia, Alcatel-Lucent Shanghai Bell**
**R1-1710827** **On CRC attachment for TB and CB** **MediaTek Inc.**
Note: proposal is for $L_{TB\text{-}CRC}$ =14 for TBs less than e.g. 512 (or higher?)
**R1-1710957** **Data channel processing and CRC attachment** **InterDigital, Inc.**
**R1-1711210** **CRC attachment** **Qualcomm Incorporated**

**Proposal** to be checked until RAN1#90 after LDPC design is complete:

- $L_{TB\text{-}CRC}$ = 16 bits for TBs smaller than e.g. 1008 or 8432 bits
- $L_{CB\text{-}CRC}$ = 8 bits
- Checking other values is not precluded

Agreement: CBG-level CRC is not adopted

Not treated.

| | | |
|---|---|---|
| R1-1710481 | Study of Number of CRC Bits for Code Blocks | Ericsson |
| R1-1710044 | Consideration on CRC attachment for eMBB data | CATT |
| R1-1710341 | Discussion on CRC reduction and attachement for eMBB data | LG Electronics |
| R1-1710480 | CRC Attachment for Code Block Group | Ericsson |
| R1-1711532 | CRC attachment for CBG | Nokia, Alcatel-Lucent Shanghai Bell |

##### 5.1.4.1.1.2 Segmentation

**R1-1710342** **Code block segmentation for eMBB** **LG Electronics**
**R1-1710742** **CB segmentation on data channel** **Samsung**
**R1-1711534** **Code block segmentation of eMBB** **Nokia, Alcatel-Lucent Shanghai Bell**
**R1-1711211** **LDPC segmentation** **Qualcomm Incorporated**
**R1-1711439** **Segmentation for eMBB data** **Huawei, HiSilicon**

Agreement: Same value of Z for code blocks within a TB

**R1-1711535** **Padding for LDPC** **Nokia, Alcatel-Lucent Shanghai Bell**

Agreement: Working assumption from RAN1-NRAH#1 is confirmed that filler bits F are attached at the end of info block B

Not treated.

| | | |
|---|---|---|
| R1-1710743 | UE operation for two different base graphs | Samsung |
| R1-1710958 | Code block segmentation for eMBB data channel | InterDigital, Inc. |

##### 5.1.4.1.1.3 Rate matching

**R1-1710344** **Discussion on bit level interleaver** **LG Electronics**



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**R1-1710484** **Bit Ordering for Circular Buffer of LDPC Codes Ericsson**
**R1-1711538** **Interleaving for LDPC Nokia, Alcatel-Lucent Shanghai Bell**
**R1-1710828** **On interleaver for NR LDPC code MediaTek Inc.**
R1-1711212 LDPC rate matching Qualcomm Incorporated

**Conclusion for bit-level interleaving**: Revisit after the decision on modulation symbol interleaving in the MIMO session.

**R1-1710045** **IR-HARQ scheme for NR LDPC codes CATT**
**R1-1710485** **Rate Matching for NR LDPC codes Ericsson**
**R1-1711438** **Rate matching for LDPC codes Huawei, HiSilicon**

Agreement:
- The number of RVs is 4.
- The RVs are at fixed locations in the circular buffer
- RV#0 is self-decodable
- Working assumption (to be confirmed after selection of the BGs): The first 2Z punctured systematic bits are not entered into the circular buffer

Not treated
R1-1711536 Rate matching for LDPC Nokia, Alcatel-Lucent Shanghai Bell
R1-1710343 On rate matching with LDPC code for eMBB LG Electronics
R1-1710483 LDPC Code Performance at High Code Rate Ericsson

#### 5.1.4.1.1.4 Other

R1-1710486 Throughput Requirements of LDPC Decoder Ericsson
R1-1711440 On LDPC codes for eMBB data Huawei, HiSilicon

#### 5.1.4.1.2 LDPC code design

*Finalise number of base graphs, compact vs. extended design, and other design details*

**R1-1711944** **Observations on LDPC Shift Coefficients Qualcomm, Intel, Ericsson**
**R1-1711692** **WF on final parity check matrix selection Nokia**

Agreements: Down selection of PCMs are facilitated as follows:
- Considering the priority given to certain merged proposals in BG1 and BG2, the following ranking is used to facilitate the selection of parity check matrices in more fairer manner.
- The proponent(s) who are not selected for BG1 or BG2 are ranked above.
- The proponent(s) who are only in one selected solution of BG1 and BG2 are ranked next.
- The proponent(s) who are selected for both BG1 and BG2 are ranked below.
- Any PCMs with significant overlaps with previous PCM designs are ranked below.
- If there are several proponents end up with the same rank, mutual understanding may use to rank the companies.
  - Previous proposals on BG1 and BG2 and the effort put in there shall be considered when ranking.
  - Higher ranking may provide to proponents who were not in the BG1.
- Ranking changes from top to bottom when the proponent's proposal selected for a shift coefficient design.

Selection of final parity check matrices for BG1 is facilitated as below.
For Set **i** = 1:8
- Step 1: Cross check BLER performance at 10-2 and 10-4 for the block sizes related to the Set **i** (within 512-to-8448) and code rates 8/9-to-1/3.
- Step 2: Identify the candidates which are within 0.1 dB BLER performance across most block sizes related to the Set **i** (within 512-to-8448) and code rates 8/9-to-1/3.
- Step 3: Higher ranked identified candidate which is proven to satisfy the selection criteria as below, the proposal is selected as shift coefficient design for Set **i**.
- Step 4: the selected proponent is ranked below others.

End

**Selection criteria for a ranked high proposal as candidate X:**
- A candidate among existing candidates which has better (>0.1dB) BLER performance for block sizes related to the Set **i** (within 512-to-8448) and code rates 8/9-to-1/3 is selected as candidate Y.



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- Error floor should be checked by examining slope of BLER curves at BLER=10-4.
- Denote P1 as the number of simulation cases for which the required SNR of candidate X is smaller than the required SNR of candidate Y for more than 0.1dB
- Denote P2 as the number of simulation cases for which the required SNR of candidate Y is smaller than the required SNR of candidate X for more than 0.1dB
- If P2 – P1 <= 2% of all simulation cases (QPSK, block sizes related to the Set **i** (within 512-to-8448) and code rates 8/9-to-1/3, BLER targets), and satisfies the error floor requirement, candidate X is deemed to satisfy the selection criteria.

Selection of final parity check matrices for BG2 is facilitated as below.
For Set **i** = 1:8

- Step 1: Cross check BLER performance at 10-2 and 10-4 for the block sizes related to the Set **i** (within 40-to-2560) and code rates 2/3-to-1/5.
- Step 2: Identify the candidates which are within 0.1 dB BLER performance across most block sizes related to the Set **i** (within 40-to-2560) and code rates 2/3-to-1/5.
- Step 3: Higher ranked identified candidate which is proven to satisfy the selection criteria as below, the proposal is selected as shift coefficient design for Set **i**.
- Step 4: the selected proponent is ranked below others.

End

**Selection criteria for a ranked high proposal as candidate X:**

- A candidate among existing candidates which has better (>0.1dB) BLER performance for block sizes related to the Set **i** (within 40-to-2560) and code rates 2/3-to-1/5 is selected as candidate Y.
- Error floor should be checked by examining slope of BLER curves at BLER=10-4.
- Denote P1 as the number of simulation cases for which the required SNR of candidate X is smaller than the required SNR of candidate Y for more than 0.1dB
- Denote P2 as the number of simulation cases for which the required SNR of candidate Y is smaller than the required SNR of candidate X for more than 0.1dB
- If P2 – P1 <= 2% of all simulation cases (QPSK, block sizes related to the Set **i** (within 40-to-2560) and code rates 2/3-to-1/5, BLER targets), and satisfies the error floor requirement, candidate X is deemed to satisfy the selection criteria.

R1-1711545 Summary of [89-24] Email discussion LDPC code base graph #1 for NR Nokia, Alcatel-Lucent Shanghai Bell
R1-1711546 Summary of [89-25] Email discussion on LDPC code base graph #2 for NR Nokia, Alcatel-Lucent Shanghai Bell

Not treated.
R1-1710046 LDPC design for eMBB data CATT
R1-1710047 Offset optimization for NR LDPC CATT
R1-1710345 Circulant permutation matrix design for LDPC codes LG Electronics
R1-1710487 LDPC Code Design for Base Graph #1 Ericsson
R1-1710488 LDPC Code Design for Base Graph #2 Ericsson
R1-1710489 Application of Two Base Graphs for NR Data Channels Ericsson
R1-1710744 LDPC Code for BG#1 Samsung
R1-1710745 LDPC Code for BG#2 Samsung
R1-1710746 Modulo Lifting for Length-Flexible QC LDPC Codes Samsung
R1-1710829 On NR LDPC design and performance MediaTek Inc.
R1-1710845 Shift coefficients design for base graph 1 ZTE
R1-1710846 Shift coefficients design for base graph 2 ZTE
R1-1711213 LDPC rate compatible design Qualcomm Incorporated
R1-1711345 Base Graph 1 lifting and evaluations Intel Corporation
R1-1711346 Base Graph 2 lifting and evaluations Intel Corporation
R1-1711436 LDPC design for base graph 1 Huawei, HiSilicon
R1-1711437 LDPC design for base graph 2 Huawei, HiSilicon
R1-1711537 LDPC designs for base graph 1 and base graph 2 Nokia, Alcatel-Lucent Shanghai Bell

**R1-1711731 WF on LDPC code usage scenarios MediaTek, Qualcomm, InterDigital, ZTE**

**R1-1711982 WF on LDPC parity check matrices Nokia**



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Agreement: Final parity check matrices for NR LDPC base graph #1 and #2 are agreed as in excel files R1-1711982_BG1.xlsx and R1-1711982_BG2.xlsx in R1-1711982.

Agreements:

- Base graph #1 is used for the initial transmission and subsequent re-transmissions of the same TB when
  - CBS > X or code rate of the initial transmission > Y
- Base graph #2 is used for the initial transmission and subsequent re-transmissions of the same TB when
  - CBS <= X and code rate of the initial transmission <= Y
- Working assumption: X = 2560 and Y = 0.67
  - FFS after PCM decisions if X can be extended to 3840 and/or Y can be extended to 0.75

To be checked how the receiver knows in each case the code rate of the initial transmission, and how exactly it is defined.
FFS whether some UE capabilities may be possible that do not require the implementation of both base graphs.

### *5.1.4.2 Polar code*

#### 5.1.4.2.1 Code construction

**R1-1711443 Summary of [89-26] Polar code for NR -- alignment of latency/complexity calculation for early termination Huawei**
The document was presented by Zukang Shen from Huawei.
**Decision:** The document is noted.
**R1-1711442 Summary of [89-27] Polar code proposal for NR Huawei**
**Decision:** The document is noted.

**R1-1711644 Study of Split-CRC Polar Code Construction for Early Termination Tsofun Algorithm**
(Revision of R1-1709883)

- Proposal 1: Use J+J'=$n_{FAR}$ + 3 for polar code construction.
- Proposal 2: If some of the J+J' bits are distributed to allow ET, a relaxed requirement for FAR due to undetectable decoding errors should be agreed.

**Decision:** The document is noted.

**R1-1711347 Simple distributed CRC design for Polar codes Intel Corporation**

- Any assistance bits (if distributed) are based on CRC and are distributed in a controlled and simple way as proposed in the companion document [R1-1711348].

**Decision:** The document is noted.

**R1-1711215 Evaluation of early termination for Polar codes Qualcomm Incorporated**

- Proposal: Adopt CRC-aided successive-cancellation list decoding (CA-SCL) (with one long CRC) solution of Polar codes for control channel for robust performance, lower complexity and latency.

**Decision:** The document is noted.

**R1-1710490 CRC-based Polar Code Construction Ericsson**

- Proposal 1: Adopt CA-Polar for both DL and UL of NR.
- Proposal 2: Recursive and non-recursive distributed CRC (D-CRC) can be considered as alternative choices, if early termination is required to be supported via modified code construction.

**Decision:** The document is noted.

**R1-1711764 WF on Polar codes construction NTT DOCOMO, Ericsson, Qualcomm, Intel, Tsofun Algorithm, CATT, AT&T**

- Assume the input information sequence of channel coding is ($u_1$, $u_2$, …, $u_K$)
- If the $i$th assistant bit $p_i$ of Polar codes are inserted after $u_b$ ($b$=1,2,…,$K$), then $p_i$ can only linearly generated from information bits ($u_1$, $u_2$, …, $u_b$) without any interleaving,
  - That is, no interleaver is used before the basic Polar encoder, and the information bits are mapped into the encoder by keeping the same input order and no de-interleaver is used after the basic Polar decoder
  - i.e., $p_i = a_1u_1 \oplus a_2u_2 \oplus \cdots \oplus a_bu_b \oplus \cdots \oplus a_Ku_K$, where

$$a_j = \begin{cases} 0 \text{ or } 1, & \text{if } j \le b \\ 0, & \text{if } j > b \end{cases}$$

**Decision:** The document is noted.



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**R1-1711730** **WF on the Number of Assistant Bits for Polar Construction** **Ericsson, NTT DOCOMO, Qualcomm, Intel, Tsofun Algorithm, Samsung, LG, Fujitsu**

- The number of assistant bits of Polar codes is
  - $J+J' = n_{FAR} + 3$

**Decision:** The document is noted.

**Questions**:

- J' = 3 or 6?
- How are the J+J' bits generated?
- Which bits are distributed (if any) and how?

Proposal for further consideration over lunch:

- For DL and UL for K>=22:
  - The number of assistant bits of Polar codes is
    - $J+J' = n_{FAR} + 3$
    - The J+J' bits are generated from a single CRC polynomial
    - Working assumption that 3 bits are distributed
      - 6 distributed bits can be further considered if 3 is shown to be insufficient
- (FFS?) For UL for K<22:
  - The number of assistant bits of Polar codes is
    - J' = 6
    - The J' bits comprise 3 CRC bits and 3 parity bits
    - 6 bits are distributed

Alternative proposal (Nokia)

- The number of assistant bits of Polar codes is
  - $J+J' = n_{FAR} + 6$
- The J+J' bits are generated from a single CRC polynomial plus at least 3 parity bits
- 9 of the J+J' bits are distributed

Possible compromise:

- The number of assistant bits of Polar codes is
  - $J+J' = n_{FAR} + 6$
- The J+J' bits are generated from a single CRC polynomial
- Confirm working assumption that some (9?) of the J+J' bits are distributed

---

Proposal:

- For DL & UL, at least for K>22:
  - The number of assistant bits of Polar codes is
    - $J+J' = n_{FAR} + 3$
    - The J+J' bits are generated from:
      - Working assumption a single CRC polynomial with no interleaver
        - If it turns out that the FAR target cannot be satisfied, then FFS between:
          - Single CRC with interleaver, or
          - Two CRCs
    - Working assumption that 3 bits are distributed
      - 6 distributed bits can be further considered if 3 is shown to be insufficient
- FFS: For UL for K<=22:
  - The number of assistant bits of Polar codes is
    - J' = 6
    - The J' bits comprise 3 CRC bits and 3 parity bits
    - 6 bits are distributed

**Question**: Can the FAR target be satisfied using a single CRC polynomial with no interleaver, while achieving early termination benefits?
Yes: Intel, NTT DOCOMO, Ericsson, CATT, Qualcomm, ~~Tsofun~~, ~~NEC~~
No: Nokia, LG, Huawei, CohLog, MediaTek, ZTE, Accelercomm, NEC, Tsofun

**Question**: Are the achievable early termination benefits (while achieving the FAR and BLER targets) worthwhile compared to the complexity of adding an interleaver?
Yes: LG, Nokia, MediaTek, Huawei, Accelercomm, ITRI, CohLog, NEC, Spreadtrum, InterDigital
No: Ericsson, NTT DOCOMO, Qualcomm, Intel, CATT, Fujitsu, Tsofun



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**Question**: Should we work on a code construction based solution to deliver early termination benefits while achieving the FAR and BLER targets with acceptable complexity?

a) Downlink

Yes: Samsung, Nokia, LG, Huawei, MediaTek, Intel, InterDigital, ZTE, ITRI, Spreadtrum, Tsofun, Coherent Logix, Accelercomm, NEC, Qualcomm (if there is a plan B), NTT DOCOMO (if there is a plan B)

No: Ericsson

b) Uplink

Yes: Nokia, Huawei, Accelercomm, LG, NEC, Intel (if same scheme as for DL)

No: Ericsson, Qualcomm, Samsung, Fujitsu

Conclusion:

- RAN1 will work on a code construction based solution to deliver early termination benefits while achieving the FAR and BLER targets with acceptable complexity at least for the DL
- Revisit UL after designing the DL solution.

**Possible solutions for code construction based solution to deliver early termination benefits while achieving the FAR and BLER targets with acceptable complexity for downselection:**

- Single CRC + interleaver
  - LG, Huawei, HiSilicon, Nokia, ASB, Coherent Logix, ZTE, Accelercomm, Spreadtrum, MediaTek
- Multiple segment CRCs
  - Tsofun, NTT DOCOMO, Qualcomm, CATT, Intel, Ericsson

Agreement:

- All companies work together to design for the DL a Single CRC polynomial + Interleaver scheme to deliver early termination benefits while achieving the FAR (in presence of AWGN, and in presence of random QPSK, and undetected errors in intended user's codeword), and BLER targets with acceptable complexity and latency.
  - Working assumption that the CRC length is 19 bits, to be finalised as part of the design, taking into account the number of blind decodes or hypotheses to be tested.
    - Longer CRCs will be considered if required to meet the FAR target
- For DL for K+nFAR>=12, and for UL where K+nFAR>22, J+J' = nFAR + 3
- For UL, where 12<=K+nFAR<=22, J+J' = nFAR + 6, comprising 3 parity bits and nFAR + 3 additional CRC bits

Note: K is the number of payload information bits without CRC or parity bits
Note: nFAR may be zero in some circumstances.
Note: UE specific scrambling is not precluded and will be considered separately.

From **R1-1708833** (submitted to RAN1#89):
Proposal: The interleaver is determined from the CRC generator matrix

**R1-1711980** **Performance with L1 CRC polynomial** **Qualcomm**

**R1-1709996** **Parity check bits for Polar code** **Huawei, HiSilicon**
**R1-1709997** **Early termination for Polar code** **Huawei, HiSilicon**
**R1-1710048** **Polar codes construction for NR control channel** **CATT**
R1-1710747 Polar code construction Samsung
R1-1710847 Performance evaluations on Polar codes ZTE
**R1-1711125** **Performance evaluation of DSPC-Polar codes** **NTT DOCOMO, INC.**
R1-1711214 Early termination scheme for Polar codes Qualcomm Incorporated
R1-1711540 Early termination benefits of CRC distribution Nokia, Alcatel-Lucent Shanghai Bell
R1-1711541 Performance evaluation of polar code constructions Nokia, Alcatel-Lucent Shanghai Bell

R1-1709882 Enhancement of Early Termination of Polar Codes by placing UE-ID on Frozen Symbols Tsofun Algorithm
R1-1711570 UE_ID Insertion for Early Block Discrimination on DCI Blind Detection Coherent Logix
**R1-1709998** **Polar code for very small block length** **Huawei, HiSilicon**
R1-1711557 Performance of polar code for very small block length Qualcomm Incorporated

R1-1709902 Enhancements for Polar code construction Sequans Communications
R1-1709995 Polar code construction Huawei, HiSilicon



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R1-1710346 Early termination effect of polar codes LG Electronics
R1-1710479 Evaluation of PM based early termination for Polar code Huawei, HiSilicon
R1-1710491 Study of Early Termination for DCI Ericsson
R1-1710748 Scrambling for polar codes Samsung
R1-1710770 Discussion on Polar code construction Spreadtrum Communications
R1-1711124 Distributed simple parity check Polar codes NTT DOCOMO, INC.
**R1-1711216 Decoding and encoding latency for polar codes with PC frozen bits or distributed CRC bits Qualcomm Incorporated**
R1-1711217 Performance comparison between CA-polar and PC-polar for very small block length Qualcomm Incorporated
R1-1711348 Evaluations of Polar code designs Intel Corporation
R1-1711539 Distributed CRC Polar code construction Nokia, Alcatel-Lucent Shanghai Bell
R1-1711571 Scrambling Sequence Design for Early Block Discrimination on DCI Blind Detection Coherent Logix
R1-1711572 Scrambling Sequence Design for Multi-Mode Block Discrimination on DCI Blind Detection Coherent Logix
R1-1711573 Early Block Discrimination on DCI Blind Detection Coherent Logix

**R1-1711983 WF on Polar Code Construction With PC bits Huawei, Hilisicon, CATT, MTK,ZTE, Accelercomm, Coherent Logix, LG, Spreadtrum, Interdigital, Nokia**

Agreement: For UL, where 12<=K+nFAR<=22, J+J' = nFAR + 6, 3 PC bits are generated according to the following steps:

1. Encode *K* info bits to *K+nFAR+3* CRC encoded bits,
   - *FFS the nFAR+3* CRC bit locations
2. Select K' = K+nFAR+6 most reliable bit positions
3. Select *3* PC bits from the *K'* reliable positions
   - *The most reliable n* positions with $w_{min}$, where
     - $w_{min}$ is the minimum row weight (as defined in R1-1706193) of the *K+nFAR+3* most reliable positions within the K' reliable positions, where *n* is given by:
       - *n*=1 if *M-K-nFAR*>192
       - *n*=0 otherwise
   - 3-*n* positions selected *in least reliable positions within the K' reliable positions*.
4. Working Assumption: The value of the PC bits is obtained from a length-5 cycle shift register as in R1-1706193

#### 5.1.4.2.2 Sequence design

**R1-1710470 Necessity of multiple sequence for Polar code Huawei, HiSilicon**

Agreement:

- Channel bit interleaving is applied
  - The interleaving is either performed as part of the rate matching and/or after rate matching
    - To be confirmed after the rate matching discussion whether the interleaving is a separate function
  - FFS whether the interleaver is a function of the modulation
- The same sequence for each mother code size is used for all modulations
- The UL sequence for a given mother code size is also used for the DL

R1-1710348 Design of polar codes with high order modulations LG Electronics
R1-1710961 Interleaver design for polar codes with high order modulation InterDigital, Inc.

**R1-1710000 Nested sequence for Polar code Huawei, HiSilicon**
R1-1710493 On Bit Mapping Design for Polar Codes Ericsson
**R1-1710843 On the storage of polar code sequences AccelerComm Ltd**
**R1-1711126 Sequence design of Polar codes NTT DOCOMO, INC.**
**R1-1711218 Sequence construction of Polar codes for control channel Qualcomm Incorporated**
R1-1711542 Sequence design for Polar codes Nokia, Alcatel-Lucent Shanghai Bell
**R1-1711822 Design of combined-and-Nested polar code sequences Samsung** (Revision of R1-1710749)
**R1-1711781 Performance comparison of sequences for Polar code Huawei**

**R1-1711794 WF on Polar Code Sequence evaluation criteria Samsung**

Current support for each sequence:

- Polarization Weight (PW): Huawei, MediaTek, Nokia, LG, InterDigital, ZTE, Spreadtrum, CATT, Accel., Tsofun



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- Optimized- combined-and-nested (CN): Samsung, Qualcomm, NTT DOCOMO, Ericsson, Tsofun
- mutual information density evolution (MI-DE): Qualcomm, Samsung, NTT DOCOMO, Ericsson, Tsofun,
- Intel: Intel, Samsung, Qualcomm, NTT DOCOMO, Ericsson, Tsofun
- Docomo: NTT DOCOMO, Ericsson, Samsung, Qualcomm, Tsofun

**Proposal:**
- PW is adopted up to N=512
- Companies work together to design the sequence for N>512

Objected by Samsung, Qualcomm, NTT DOCOMO, Ericsson, Tsofun

Agreement for Next Steps:
- Polar code sequence candidates, including any merged solutions, should be provided by Wed 2nd Aug – Zukang (Huawei)
- Identify candidates of polar code sequence according to the procedure below by Wed 9th Aug– Zukang (Huawei)
- Rate matching proposals for any sequence that has been selected as a winner by at least one company to be provided by Wed 16th Aug. – Zukang (Huawei)

**Decision procedure:**

Candidate sequences shall have the property of simple nestedness, i.e. one sequence of length N/2 is nested with the sequence of length N
- Presence or absence of any other property (including symmetry, arithmetic describability, down-nestedness (i.e. a sequence of length N/2 is nested within the lower half of the sequence of length N), up-and-down-nestedness (i.e. a sequence of length N/2 is nested in both the upper and lower halves of the sequence of length N)) shall not be used as a decision criterion.

- Performance metric
  - SNR to achieve $10^{-2}$ and $10^{-3}$ BLER
- Simulation assumptions
  - Evaluate the block error rate (BLER) performance versus SNR

| | |
|---|---|
| Channel | AWGN Channel |
| Modulation | QPSK |
| Info. Block length (=K bits w/o CRC) | K = 8:1:min (200, $K_{\max,N}$), where $K_{\max,N} = \lfloor 5N/6 - (J + J') \rfloor$<br>K = min (200, $K_{\max,N}$):24:$K_{\max,N}$, where $K_{\max,N} = \lfloor 5N/6 - (J + J') \rfloor$<br>excluding any code rates below 1/8 |
| Codeword length (=N) | {64, 128, 256, 512, 1024} |
| Decoding algorithm | List-X with LLR-based min-sum |
| List sizes | 1,2,4,8,16 (pruned to 8 best paths for CRC check) |
| Code construction for evaluation | CA polar |
| Number of ($J$+$J'$) bits | 19 bits (0b1010001010110111100 1 where the last bit is d19) |

PerfThresh_K = 0.1dB for lower range of K, 0.3dB for higher range of K
PerfThresh_L = 0.4dB for L=1, 0.2dB for L=2, 0.1dB otherwise.
PerfThresh = max (PerfThresh_K, PerfThresh_L)

Each company selects a winning sequence by the following algorithm:
- For sequence A,
  - compare with sequence Bat each simulation case.
    - For each simulation case:
      - if A's performance is worse than B – PerfThresh, increment FailCount_AB
      - if A's performance is better than B + PerfThresh, increment WinCount_AB
    - If (FailCount_AB – WinCountAB) / Total number of simulation cases > 2%, increment OverallFail_A
  - compare with sequence Cat each simulation case.



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        - For each simulation case:
            - if A's performance is worse than C – PerfThresh, increment FailCount_AC
            - if A's performance is better than C + PerfThresh, increment WinCount_AC
        - If (FailCount_AC – WinCountAC) / Total number of simulation cases > 2%, increment OverallFail_A
    - repeat for sequences D…N
- For sequence B,
    - compare with sequence A at each simulation case
    - etc
- …
- For sequence N,
    - compare with sequence A
    - etc
- Select sequence with smallest OverallFail

If multiple sequences A to M have the same smallest OverallFail,

- For sequence A,
    - compare with sequence Bat each simulation case.
        - For each simulation case, if A's performance is better than B + PerfThresh, increment WinCount_AB
    - compare with sequence C at each simulation case.
        - For each simulation case, if A's performance is better than C + PerfThresh, increment WinCount_AC
    - WinCount A = ∑WinCount_AB…AM
    - repeat for sequences up to M
- Repeat for sequences B to M.
- Select sequence with highest WinCount, referred to as sequence W.
- If any WinCount_xW > WinCount Wx, then sequence(s) x is/are also selected.

If more than 1 sequence is selected by at least one company, then the final sequence will be chosen from the sequences that were selected by at least one company according to the largest support in RAN1#90.

R1-1710347 Repetition scheme of polar codes LG Electronics
R1-1710750 Design of unfied rate-matching for polar codes Samsung
R1-1710825 Optimization and comparison of Polar code rate-matching design MediaTek Inc.
R1-1710848 Rate matching scheme of Polar codes ZTE
R1-1710960 Parameter selection for polar codes repetition InterDigital, Inc.
R1-1711219 Determination of the values for the parameters in rate-matching for control channel Qualcomm Incorporated
R1-1710496 Thresholds for Mother Code Size Determination Ericsson
R1-1711349 Discussion on Polar code rate-matching Intel Corporation

**R1-1711697 WF on rate matching for Polar codes Qualcomm**

Agreement: $R_{min} = 1/8$

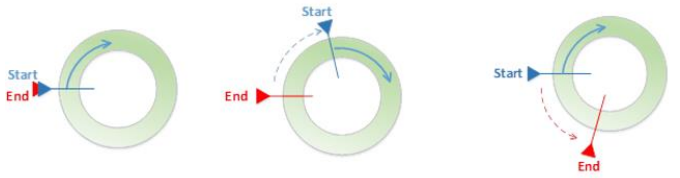
**R1-1711729 WF on Circular buffer of Polar Code Ericsson, Qualcomm, MediaTek, LGE**

Agreement:

- To support repetition, puncturing, and shortening of Polar code:
    - The $N=2^n$ coded bits at the output of Polar encoder is written into a length-N circular buffer in an order that is predefined for a given value of N
    - To obtain M coded bits for transmission
        - Puncturing is realized by selecting bits from position (N-M) to position (N-1) from the circular buffer
        - Shortening is realized by selecting bits from position 0 to position M-1 from the circular buffer
        - Repetition is realized by selecting all bits from the circular buffer, and additionally repeat (M-N) consecutive bits from the circular buffer
            - Exact set of repeated bits FFS till RAN1#90



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(a) No puncturing or shortening (b) puncturing (c) shortening

**R1-1710751** **Circular buffer management for polar code rate-matching Samsung**

R1-1710492 Information Sequence Design for Polar Codes Ericsson
R1-1710494 Impact of Puncturing on Bit-channel Capacities Ericsson
R1-1710495 Polar Code Performance in Fading Channel Ericsson
R1-1710591 Sequence design evaluation for rate-matched polar codes NEC Corporation
R1-1710959 Parameter selection for polar codes puncturing and shortening InterDigital, Inc.
R1-1711127 Rate matching of Polar codes NTT DOCOMO, INC.
R1-1711220 Rate-matching scheme for control channel Qualcomm Incorporated
R1-1711543 Rate matching for Polar codes Nokia, Alcatel-Lucent Shanghai Bell

#### 5.1.4.2.3 Other

R1-1709999 Interleaver design for Polar code Huawei, HiSilicon
R1-1710752 Design of channel interleaver for polar codes Samsung
R1-1710849 Segementation of Polar codes ZTE
R1-1711128 Interleaving design of Polar codes NTT DOCOMO, INC.
R1-1711222 Design and evaluation of Interleaver for Polar codes Qualcomm Incorporated

R1-1710001 Rate matching for Polar code Huawei, HiSilicon
R1-1710003 Channel coding chain for control channel Huawei, HiSilicon
R1-1710842 A flexible, low-latency, hardware-efficient SCL polar decoder AccelerComm Ltd
R1-1710868 Blind Detection with Polar Codes McGill University
R1-1710869 Partitioned List Decoding of Polar Codes McGill University
R1-1711221 Design of Polar code for large UCI with segmentation Qualcomm Incorporated

### *5.1.4.3 PBCH*

R1-1710002 Support of implicit soft combining for PBCH by Polar code construction Huawei, HiSilicon
R1-1710004 Channel coding for URLLC Huawei, HiSilicon
R1-1710049 Discussion on Polar codes for PBCH CATT
R1-1710349 Details on PBCH coding LG Electronics
R1-1710472 Benefits of implicit soft combining for PBCH by Polar code construction Huawei, HiSilicon
R1-1710497 Study of Number of CRC Bits for PBCH Ericsson
R1-1710498 Polar Code Design for NR-PBCH Ericsson
R1-1710826 Polar coding design for NR-PBCH combining MediaTek Inc.
R1-1710850 Considerations on Channel Coding for NR-PBCH ZTE
R1-1711223 PBCH channel coding Qualcomm Incorporated
R1-1711544 Implicit timing indication for PBCH Nokia, Alcatel-Lucent Shanghai Bell

### *5.1.4.4 Other*

R1-1709903 Discussion of LTE-RM decoding ambiguity Sequans Communications
R1-1710471 CRC polynomial for L1 control information and MIB Huawei, HiSilicon
R1-1710499 LDPC Code Performance for High Reliability Use Cases Ericsson

## 5.1.5 Modulation

**R1-1711956** **On Pi/2-BPSK with spectrum shaping** **Ericsson**

- Proposed agreement: Spectrum shaping is supported without RAN1 impact

**Decision:** The document is noted.



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**R1-1711831 WF on pi/2 BPSK with spectrum shaping IITH, ATT, Qualcomm, Deutsche Telekom, IITM, Reliance Jio, Samsung, Thales, INL, CEWiT, Tejas Networks, DISH, Sony**

- pi/2 BPSK DFT-s-OFDM supports spectrum shaping without spectrum expansion of pi/2 BPSK data at least for uplink data for carrier frequencies below 6GHz
  - The spectrum shaping function shall be specified in RAN1

**Discussion:** Also supported by Interdigital
Ericsson is OK with main bullet, commented that RAN4 was expecting information by end of June meeting – if we proceed now with proposal, RAN1 will delay RAN4 progress
**Decision:** The document is noted.

**R1-1711909 [Draft] LS response on required NR parameters from RAN4 perspective Ericsson**
**Decision:** The document is noted and final LS is approved in R1-1711975 with following typo corrections

Based on this, RAN1 would like ~~the~~ to inform RAN4 that the RAN1 specifications will support the following modulation schemes in the uplink transmission direction: π/2-BPSK, QPSK, 16QAM, 64QAM, and 256QAM.

RAN1 specifications will support both OFDM (without DFT precoding) and DFT-precoded OFDM (a.k.a. DFTS-OFDM) for the uplink transmission direction. All above modulation schemes are supported for both OFDM and DFTS-precoded OFDM.

Although indicated in the RAN4-sourced LS as information not being necessary until later, RAN1 would also like to inform RAN4 that the RAN1 specifications will support the following modulation schemes in the downlink transmission direction: QPSK, 16QAM, 64QAM, and 256QAM.

Not treated.

| | | |
|---|---|---|
| R1-1710474 | Further consideration on pi/2 BPSK with FDSS | Huawei, HiSilicon |
| R1-1710592 | Next steps for pi/2 BPSK with spectrum shaping | IITH |
| R1-1710753 | Modulation Schemes for NR | Samsung |
| R1-1710881 | On pi/2-BPSK DFTS-OFDM with spectrum shaping | Ericsson AB |
| R1-1711224 | Consideration for MCS table | Qualcomm Incorporated |
| R1-1711398 | On spectrum shaping for uplink Pi/2 BPSK with DFT-S-OFDM | Nokia, Alcatel-Lucent Shanghai Bell |

### 5.1.6 Duplexing

*Focus on cross-link interference management for duplexing flexibility*

**R1-1711918 Chairman's notes of AI 5.1.6 Duplexing Ad-Hoc chair (Qualcomm)**
The document was presented by RAN1 chair on behalf of Wanshi Chen (Vice Chair).
**Decision:** The document is endorsed. Content incorporated below.

**R1-1710127 Viewpoint on NR CLI Management for Duplexing Work Plan ZTE**

#### *5.1.6.1 Cross-link interference management*

*Note that potential schemes are listed in Section 10.1 of TR38.802*

| | | |
|---|---|---|
| **R1-1709982** | **UE-to-UE measurement for cross-link interference mitigation** | **Huawei, HiSilicon** |
| **R1-1710039** | **Support of interference management schemes in duplexing flexbility** | **CATT** |
| **R1-1710350** | **Discussion on CLI measurement for Duplexing Flexibility** | **LG Electronics** |
| **R1-1710581** | **Details on cross-link interference measurement** | **Intel Corporation** |
| **R1-1710755** | **Cross-link Interference Management based on Coordinated Beamforming** | **Samsung** |
| **R1-1710771** | **Discussions on UE-to-UE interference measurement and report** | **Panasonic** |
| **R1-1710784** | **Discussion on UE-to-UE cross-link interference management** | **CMCC** |
| **R1-1710818** | **CLI measurements in NR** | **MediaTek Inc.** |
| R1-1710965 | On cross-carrier scheduling and HARQ-ACK feedback for NR CA | NEC |
| **R1-1710128** | **UE-to-UE measurement as an enabler for CLI mitigation schemes** | **ZTE** |
| **R1-1711129** | **Discussion on cross-link interference mitigation for duplexing flexibility** | **NTT DOCOMO, INC.** |
| R1-1711225 | Dynamic TDD UE-to-UE measurement considerations | Qualcomm Incorporated |
| **R1-1711314** | **On NR Cross-Link Symbol Alignment Scheme** | **Nokia, Alcatel-Lucent Shanghai Bell** |
| **R1-1711562** | **On Hybrid TDD and Signaling for Cross-link Interference Mitigation** | **Ericsson** |

Further revised in R1-1711706

**R1-1711682 WF on UE-to-UE measurement as an enabler for CLI mitigation schemes ZTE**



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Agreements:
- For CLI management, support UE-to-UE interference measurement and reporting without the introduction of new RS(s)

Agreements:
- For UE-to-UE interference, support CLI measurement metrics which include at least one of
  - RSRP for the purpose of CLI
    - FFS the definition (e.g., based on SRS, DM-RS, etc.) and the corresponding reporting
  - RSSI for the purpose of CLI
    - FFS the definition (e.g., resources for the measurement) and the corresponding reporting
- For UE-to-UE interference, FFS additionally support CQI/CSI as the CLI measurement metrics and if so, its definition/reporting

**R1-1711707** **WF on inter-TRP signaling for UE-to-UE cross-link interference measurement** **LGE**
**R1-1711700** **WF on CLI measurement** **MediaTek**
**R1-1711842** **WF on UE-to-UE crosslink measurement** **CMCC, Spreadtrum**
**R1-1711830** **WF on UE-UE CLI measurement** **Huawei, HiSilicon, ZTE, MediaTek, Intel, CMCC**
**R1-1711851** **WF on inter-gNB signaling for cross-link interference management** **LGE**

R1-1709981 TRP-to-TRP measurement for cross-link interference mitigation Huawei, HiSilicon
R1-1710129 Channel sensing based schemes for cross-link interference mitigation in NR ZTE
R1-1710351 Discussion on details of backhaul signaling for duplexing flexibility LG Electronics
R1-1710582 On RS transmission location for cross-link interference measurement for NR duplex flexibility Intel Corporation
R1-1710754 Cross-link Interference Management Based on UE Measurements Samsung
R1-1710772 Discussions on intended DL/UL direction configuration via Xn signalling Panasonic
R1-1711226 Dynamic TDD Cross-link interference management consideration Qualcomm Incorporated
R1-1711313 Cross-link interference management based on Xn support Nokia, Alcatel-Lucent Shanghai Bell
R1-1711561 On Hybrid TDD and Measurements for Cross-link Interference Mitigation Ericsson

#### *5.1.6.2 Other*

R1-1709983 UL Power control for cross-link interference mitigation Huawei, HiSilicon
R1-1710130 TRP-to-TRP measurement as an enabler for CLI mitigation schemes ZTE
R1-1710756 Performance Evaluation of Cross-Link Interference Management Samsung
R1-1710757 Timing Alignment on Cross-Link for Dynamic TDD Samsung
R1-1710758 Cross-Link Interference Management based on Power Control Samsung
R1-1710759 Discussion on CLI Mitigation with Network Coordination Samsung
R1-1710760 Interference Measurement Table and Beam Coordination Samsung
R1-1711130 Discussion on prioritized scenarios for duplexing flexibility NTT DOCOMO, INC.
R1-1711315 LBT-based UL transmission for dynamic TDD Nokia, Alcatel-Lucent Shanghai Bell
R1-1711563 On Dynamic TDD Scenarios Ericsson
R1-1711564 On Duplexing in Paired Spectrum Ericsson

### 5.1.7 Wider bandwidth operations

*Refer to R1-1709841 for work plan. Note that this agenda will be closed after this meeting.*

**R1-1711795** **On bandwidth parts and "RF" requirements** **Ericsson**

Possible observations (from Wednesday offline)
- Usage scenarios #1, and 2, and 3 are at least identified as usage scenarios for BW part
  - From UE perspective, usage scenarios #1 and 3 are the same
- Usage scenario #4 can be considered in the context of carrier aggregation

Observation:
- Usage scenarios #1, and 2, and 3 in R1-1711795 are at least identified as usage scenarios for BW part
  - From UE perspective, at least for single active BW part scenario, usage scenarios #1 and 3 are the same

Agreements:
- Usage scenario #4 in R1-1711795 is supported in the context of non-contiguous intra-band carrier aggregation
  - Carrier without SS block can be configured for some UEs
- Send LS to RAN2/4 to tell above agreement/observation in R1-1711824



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R1-1711824 **Draft LS on non-contiguous CA AT&T**
**Decision:** The document is noted and final LS is approved in R1-1711825
MCC: to attach R1-1711795 to the LS

R1-1711788 **Way forward on further details of bandwidth part operation** **Intel, AT&T, Huawei, HiSilicon**

Possible agreements (from Wednesday offline)
- For a single carrier WB UE, multiple active bandwidth parts with different numerologies are considered for a UE simultaneously
  - One TB is mapped per each active BWP.
  - FFS: The multiple active BWPs may overlap in frequency domain.
  - FFS: Cross-BWP scheduling is supported.
- Primary focus is to complete the single active bandwidth part case

Agreements:
- Primary focus is to complete the single active bandwidth part case
- If time is available later after completing the single active bandwidth part case, following cases should be considered for UE
  - For a single carrier WB UE, multiple active bandwidth parts with different numerologies are configured for a UE simultaneously
    - One TB is mapped per each active BWP.
    - FFS: The multiple active BWPs may overlap in frequency domain.
    - FFS: Cross-BWP scheduling is supported.

Possible agreement (from Wednesday offline)
- For intra-band scenario, capability(capabilities) of time required for bandwidth adaptation is reported by UE.
  - FFS: Detailed reporting contents
  - Minimum requirement for RF retuning time is to be determined by RAN 4

R1-1711802 **Way Forward on Further Details for Bandwidth Part** **MediaTek, Huawei, HiSilicon**

Agreements:
- For FDD, separate sets of bandwidth part (BWP) configurations for DL & UL per component carrier
  - The numerology of DL BWP configuration is applied to at least PDCCH, PDSCH & corresponding DMRS
  - The numerology of UL BWP configuration is applied to at least PUCCH, PUSCH & corresponding DMRS
- For TDD, separate sets of BWP configurations for DL & UL per component carrier
  - The numerology of DL BWP configuration is applied to at least PDCCH, PDSCH & corresponding DMRS
  - The numerology of UL BWP configuration is applied to at least PUCCH, PUSCH & corresponding DMRS
  - For UE, if different active DL and UL BWPs are configured, UE is not expected to retune the center frequency of channel BW between DL and UL

Agreements:
- At least one of configured DL BWPs includes one CORESET with common search space at least in primary component carrier
- Each configured DL BWP includes at least one CORESET with UE-specific search space for the case of single active BWP at a given time
  - In case of single active BWP at a given time, if active DL BWP does not include common search space, then UE is not required to monitor the common search space

Possible agreement:
- For the indication of active DL/UL bandwidth part(s), support both DCI and time pattern schemes
  - FFS UE-specific DCI or group common DCI
  - FFS details of time pattern schemes

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**Thursday**
R1-1711812 **WF on configuration of a BWP in wider bandwidth operation** **LG Electronics, MediaTek**

Agreement:
- In configuration of a BWP,
  - A UE is configured with BWP in terms of PRBs.
    - The offset between BWP and a reference point is implicitly or explicitly indicated to UE.



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- FFS for reference point, e.g., center/boundary of NR carrier, channel number used for sync. and/or channel raster, or center/boundary of RMSI BW, center/boundary of SS block accessed during the initial access, etc.
- NR supports MU-MIMO between UEs in different (but overlapping) BWPs

**R1-1711855** **Way forward on PRB indexing** **Intel, Sharp, Ericsson, MediaTek, NTT DOCOMO, Panasonic, Nokia, ASB, NEC, KT, ETRI**

Agreements:
- Common PRB indexing is supported
  - The indexing is common to all the UEs sharing a wideband CC from network perspective, regardless of whether they are NB, CA, or WB UEs.
  - The indexing is with respect to the reference point
  - The indexing is with respect to a given numerology
  - Note: Example usage of common PRB indexing is for scheduling group common PDSCH, RS sequences, BWP configuration, etc.
- UE-specific PRB indexing is supported
  - It is indexed per BWP with respect to the configured SCS for the BWP
  - Note: Example usage of UE-specific indexing is for scheduling UE-specific PDSCH

**R1-1711853** **Activation/deactivation of bandwidth partEricsson**

Agreements:
- Activation/deactivation of DL and UL bandwidth parts can be
  - by means of dedicated RRC signaling
    - Possibility to activate in the bandwidth part configuration
  - by means of DCI (explicitly and/or implicitly) or MAC CE [one to be selected]
    - by means of DCI could mean
      - Explicit: Indication in DCI (FFS: scheduling assignment/grant or a separate DCI) triggers activation/deactivation
        - Separate DCI means DCI not carrying scheduling assignment/grant
      - Implicit: Presence of DCI (scheduling assignment/grant) in itself triggers activation/deactivation
      - This does not imply that all these alternatives are to be supported.
  - FFS: by means of timer
  - FFS: according to configured time pattern

Prepare draft LS to RAN2/4 until Friday – Pei-Kai (Mediatek), Intel
**Friday**
R1-1711948 [Draft] LS on bandwidth part operation in NR MediaTek
Further revised in **R1-1711989** [Draft] LS on Bandwidth Part Operation in NR Mediatek
**Decision:** The document is noted and final LS is approved in R1-1711998.

**R1-1711913** **WF on introduction indication in SS block for cell update** **CMCC**

**R1-1711873** **WF on initial bandwidth part** **LG Electronics, Ericsson, MediaTek**

R1-1711795 On bandwidth parts and 'RF' requirements Ericsson
R1-1709972 Overview of wider bandwidth operations Huawei, HiSilicon
R1-1710040 NR wider bandwidth operation CATT
R1-1710126 Resource allocation for wideband operation ZTE
R1-1710172 Discussion on UE specific RF bandwidth adaptation in NR Guangdong OPPO Mobile Telecom.
R1-1710249 PRB and RBG indexing within wider channel BW for NR NEC
R1-1710352 Remaining details on wider bandwith operation LG Electronics
R1-1710398 NR transmission on anchor bandwidth part vivo
R1-1710416 Design considerations for NR operation with wide bandwidths AT&T
R1-1710583 Open issues for wider bandwidth operations Intel Corporation



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| | | |
|---|---|---|
| R1-1710622 | UE bandwidth configuration during initial access | ETRI |
| R1-1710761 | Wider Bandwidth Operations | Samsung |
| R1-1710785 | Discussion on the change of SS block frequency position | CMCC |
| R1-1710796 | Further Details on Wider Bandwidth Operations in NR | MediaTek Inc. |
| R1-1710878 | Bandwidth Adaptation via BWP Selection in NR | InterDigital, Inc. |
| R1-1710883 | On wider band aspects of NR | Nokia, Alcatel-Lucent Shanghai Bell |
| R1-1710943 | Discussion on PRB grid and PRB indexing | Panasonic Corporation |
| R1-1711131 | Remaing issues on wider bandwidth operations for NR | NTT DOCOMO, INC. |
| R1-1711227 | UE Power Saving during Active State | Qualcomm Incorporated |

### 5.1.8 NR-LTE co-existence

*Refer to R1-1709844 for work plan.*

**R1-1711919** **Chairman's notes of AI 5.1.8 NR-LTE co-existence** **Ad-Hoc chair (Qualcomm)**
The document was presented by RAN1 chair on behalf of Wanshi Chen (Vice Chair).
**Decision:** The document is endorsed. Content incorporated below.

| | | |
|---|---|---|
| **R1-1709980** | **Subcarrier mapping for LTE-NR coexistence** | **Huawei, HiSilicon** |
| **R1-1710173** | **Discussion on the NR-LTE self-interference issue** | **Guangdong OPPO Mobile Telecom.** |
| **R1-1710250** | **Discussion on UL sharing of NR and LTE** | **NEC** |
| R1-1710354 | Remaining details on UL sharing between LTE and NR | LG Electronics |
| **R1-1710384** | **Interference analysis for LTE-NR co-existence** | **vivo** |
| **R1-1710417** | **Remaining details of NR-LTE coexistence in overlapping spectrum** | **AT&T** |

Proposals:

- Send an LS to RAN3 that specifications of Xn interface and enhanced X2 interface shall include messages to enable coordination between LTE MCG and NR SCG of:
  - SCell activation/deactivation/reconfiguration
  - MBSFN subframe configuration
  - Signaling needed for timing synchronization and SFN alignment between LTE and NR
  - TDD UL/DL configuration
  - Indication of semi-statically reserved resources reserved of LTE

Continue discussion offline – Ralf (AT&T)
**Thursday**

**R1-1711710** **WF on NR-LTE coexistence** **AT&T, Nokia, Ericsson, Vodafone**
Agreements:

- For LTE-NR coexistence in overlapping spectrum, support on the Xn interface and enhanced X2 interface messages
  - FFS details, e.g., SCell ON/OFF, LTE MBSFN subframe configuration, synchronization aspects between LTE and NR, indication of semi-statically reserved resources in frequency domain, Indication of semi-statically reserved resources in time domain, etc.
- For LTE-NR coexistence in adjacent spectrum, support on the Xn interface and enhanced X2 interface messages
  - FFS details, e.g., synchronization aspects between LTE and NR, TDD UL/DL configuration, etc.
  - FFS the case of multi-operator scenarios
- Aim to conclude the FFS parts for the above and send an LS to RAN3 in the next meeting

---

| | | | |
|---|---|---|---|
| **R1-1710584** | **Open issues for LTE-NR coexistence** | **Intel Corporation** | |
| **R1-1710763** | **LTE-NR coexistence for UL** | **Samsung** | |
| **R1-1710840** | **Discussion on Uplink TDM Operation for NR NSA** | **China Telecommunications** | |
| **R1-1710880** | **On uplink half-tone shift** | **Ericsson AB** | |
| **R1-1710904** | **Uplink transmission in NR NSA mode** | **Apple Inc.** | |
| **R1-1711701** | **Considerations of NR-LTE coexistence in uplink** | **ZTE** | (Revision of R1-1710910) |
| **R1-1711132** | **Views on single UL transmission and UL sharing** | **NTT DOCOMO, INC.** | |
| **R1-1711229** | **NR-LTE Co-channel Coexistence Considerations** | **Qualcomm Incorporated** | |
| **R1-1711337** | **On NR-LTE coexistence for NSA and SA** | **China Unicom** | |
| **R1-1711584** | **On UL coverage extension of TDD @3.5GHz** | **ORANGE** | (Revision of R1-1711365) |
| **R1-1711400** | **On 1Tx only UE in LTE-NR Dual Connectivity** | **Nokia, Alcatel-Lucent Shanghai Bell** | |



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**R1-1711709** **WF on NR-LTE coexistence in overlapping spectrum** **AT&T, Deutsche Telekom, Vodafone, Intel, Ericsson, Samsung, Orange, China Unicom, Huawei, HiSilicon, China Telecom**

Agreements:

- In NR, support configuration between the following for paired spectrum (support of scheme 2 below is conditioned on the assumption that 100kHz is adopted as a supported UL channel raster in NR to support LTE/NR co-existence with LTE FDD)
  - Scheme 1: Do nothing to allow subcarrier alignment between NR UL (15 kHz) and LTE UL
  - Scheme 2: Allow subcarrier alignment between NR UL (15 kHz) and LTE UL, where NR UL raster is with a 7.5 kHz shift to the LTE UL raster
- Send an LS to RAN4 - Ralf (AT&T)

**Wednesday**

**R1-1711779** **[DRAFT] LS on subcarrier alignment and channel raster** **AT&T, Sprint, T-Mobile USA, Huawei, HiSilicon, Samsung, Deutsche Telekom, Ericsson, Intel, China Telecom**

The document was presented by Ralf Bendlin from AT&T.

**Discussion:** .Qualcomm: let's delete "to support configuration of subcarrier alignment between NR UL (15 kHz) and LTE UL in paired spectrum".

AT&T compromise: RAN1 kindly requests RAN4 to take the above RAN1 agreement into account ensuring scheme 1 and scheme 2 are possible

Qualcomm: Scheme 2 is conditioned to RAN4 decision

**Decision:** The document is noted and final LS is approved in R1-1711839 with the following updates:

Action to RAN4 WG:

RAN1 kindly requests RAN4 to take the above RAN1 agreement ~~to support configuration of subcarrier alignment between NR UL (15 kHz) and LTE UL in paired spectrum~~ into account when discussing NR channel raster.

Dates of next TSG-RAN WG1 Meetings:

| | | |
|---|---|---|
| RAN1 #90 | 21st – 25th August 2017 | Prague, Czech Republic |
| RAN1 NR Ad-Hoc#~~32~~ | 18th – 21th September 2017 | Nagoya, Japan |

**Thursday**

**R1-1711675** **Way forward on UE self-interference** **Vivo, OPPO, Coolpad, China Telecom, Xiaomi, Huawei, HiSilicon, China Unicom**

Agreements:

- RAN1 to continue study the solution(s) to mitigate UE self-interference due to the simultaneous transmission and reception at the same time
  - Note: the issue is particular applicable for specific band combination(s) (e.g. harmonics related issues)
  - Note: the issue can be addressed if UE is not mandated to transmit on one carrier (F1) and receive on another carrier (F2) at the same time
- Send an LS to RAN4 regarding the above agreements – Xueming (Vivo), which is approved in **R1-1711872**

R1-1711705 Way forward on handling of single UL transmission NTT DoCoMo

**R1-1711848** **Way forward on handling of single UL transmission** **NTT DoCoMo, Apple**

Agreements:

- Support the following solution to single UL transmission where NW synchronization between eNodeB and gNodeB is assumed (where there is at least one LTE carrier and at least one NR carrier of a different carrier frequency)
  - When UE is activated with multiple UL carriers on different frequencies, time-switching of LTE UL carrier and NR UL carrier is used
    - UL transmission timing pattern of LTE carrier and NR carrier is semi-statically shared between eNodeB and gNodeB
    - FFS: Signaling to UE of UL transmission timing pattern
  - UE simultaneously receives signals/channels from both NR DL carrier and LTE DL carrier
    - For scheduling/HARQ timing of LTE FDD carrier, the following timing can be considered, e.g., for LTE:
      - DL-reference UL/DL configuration for TDD
      - DL-reference UL/DL configuration defined for FDD-SCell in TDD-FDD CA with TDD-PCell
      - Up to NW implementation (i.e., no RAN1 spec. impact)
    - For scheduling/HARQ timing of NR carrier, no special handling would be necessary
  - Other solutions are not precluded



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- Send an LS to RAN2, RAN3, and RAN4 – Kazuaki (DCM), which is drafted and endorsed in **R1-1711877.** Final LS approved in R1-1711878.

**R1-1711817** **WF on LTE/NR DC deployment scenarios to extend NR UL coverage Orange, Deutsche Telekom, Ericsson, China Unicom, OPPO, Huawei, China Telecom, Nokia, ZTE**

Agreements:
- RAN1 should consider the following scenarios as listed in R1-1711817 in the future work especially in terms of UL coverage
  - Scenario 1
  - Scenario 2 where UL sharing is from network perspective
    - FFS where UL sharing from UE perspective
      - Aim to conclude in the next meeting; if no consensus, consider sending an LS to RANP for clarification
  - Scenario 3

Not treated.

| | | |
|---|---|---|
| R1-1709979 | Overview of NR UL for LTE-NR coexistence | Huawei, HiSilicon |
| R1-1710041 | Support of UL carrier sharing between NR-LTE | CATT |
| R1-1710353 | Remaining details on DL sharing between LTE and NR | LG Electronics |
| R1-1710385 | Issues on UL transmission for LTE-NR co-existence | vivo |
| R1-1710762 | LTE-NR coexistence for DL | Samsung |
| R1-1710909 | Discussion of NR-LTE coexistence on DL | ZTE |
| R1-1710912 | Reserved resources supporting NR co-existence with LTE and NB-IoT | Ericsson AB |
| R1-1711228 | NR LTE Adjacent Channel Coexistence Consideration | Qualcomm Incorporated |
| R1-1711247 | NR LTE Adjacent Channel Coexistence Consideration | Qualcomm Incorporated |
| R1-1711248 | NR-LTE Co-channel Coexistence Considerations | Qualcomm Incorporated |
| R1-1711399 | LTE and NR performance in NR-LTE UL sharing | Nokia, Alcatel-Lucent Shanghai Bell |
| R1-1711559 | Uplink operation for LTE+NR Dual Connectivity | VODAFONE Group Plc |

### 5.1.9 UL power control

**R1-1711947** **Chairman's notes of AI 5.1.9 UL Power Control** **Ad-Hoc chair (Qualcomm)**
The document was presented by RAN1 chair on behalf of Wanshi Chen (Vice Chair).
**Decision:** The document is endorsed. Content incorporated below.

#### *5.1.9.1 Power sharing mechanism*

*Including power sharing mechanism for LTE-NR dual connectivity, NR carrier aggregation and dual connectivity*

| | | |
|---|---|---|
| **R1-1709949** | **Power control for CA and DC** | **Huawei, HiSilicon** |
| **R1-1710042** | **Power Sharing Mechanism** | **CATT** |
| **R1-1710839** | **UL Power Sharing for LTE-NR Dual Connectivity** | **MediaTek Inc.** |
| **R1-1710879** | **Power Sharing Mechanisms with LTE-NR DC and NR DC** | **InterDigital, Inc.** |
| **R1-1711526** | **Power Sharing for LTE-NR Dual Connectivity** | **Ericsson** |

Agreements:
- Regarding power sharing for LTE-NR dual connectivity, support at least semi-static power sharing between LTE and NR
  - FFS details
  - Discuss further whether or not to support dynamic power sharing between LTE and NR
  - Discuss further impacts due to other factors, e.g., different TTI lengths, channel/service types, synchronous vs. asynchronous, different processing latency for LTE vs. NR, assumption regarding communication between NR vs. LTE at UE, specification impact to LTE (if any) and/or NR, etc.

Send an LS to RAN4 to inform the above agreements – Ravi (Ericsson)
**Friday**
**R1-1711898** **[DRAFT] LS on power sharing for LTE-NR Dual Connectivity** **Ericsson**
**Discussion:** Nokia → should RAN2 be informed as well?
AT&T → WI code is incorrect
**Decision:** The document is noted and final LS is approved in R1-1711999 by adding RAN2 in CC part and updating work item code to "NR_newRAT".

| | | |
|---|---|---|
| **R1-1711862** | **WF on LTE-NR power sharing mechanism** | **NTT DoCoMo, InterDigital** |
| R1-1710355 | Discussion on power sharing for LTE-NR dual connectivity | LG Electronics |



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R1-1710585 Power sharing mechanism for NR dual connectivity Intel Corporation
R1-1710764 On UL Power Sharing for Multi-Cell Transmissions Samsung
R1-1710911 Power Control for CA and DC in NR ZTE
R1-1711133 LTE-NR power sharing mechanism NTT DOCOMO, INC.
R1-1711396 On power sharing between LTE and NR in DC Nokia, Alcatel-Lucent Shanghai Bell

#### *5.1.9.2 NR power control framework*

*Including power control for PUSCH/PUCCH/SRS/DMRS, PHR calculation*

**R1-1710174 Uplink power control for NR Guangdong OPPO Mobile Telecom.**
**R1-1710356 Discussion on uplink power control for NR LG Electronics**
**R1-1711818 WF on UL power control LGE, Ericsson, InterDigital**

Agreements:

- In NR, PUSCH and at least some type(s) of SRS can share same closed loop power control command from gNB
  - FFS details, e.g., the type(s) of SRS, beam related aspects, etc.
- In NR, PUSCH and PUCCH rely on independent closed loop power control commands from gNB
- Study aspects related SRS carrier switching

**R1-1711134 Power control framework for PUSCH NTT DOCOMO, INC.**
**R1-1711230 Power control and PHR for NR Qualcomm Incorporated**
**R1-1711397 UL Power Control for MIMO Nokia, Alcatel-Lucent Shanghai Bell**
**R1-1711724 Summary of power control ZTE**
**R1-1711721 WF on UL power control ZTE, NTT DoCoMo**
**R1-1711863 WF on NR power control framework NTT DOCOMO, Nokia, Intel, InterDigital**
**R1-1711819 WF on PHR for different waveforms LG Electronics, NTT DOCOMO, InterDigital**

Agreement: UE's power headroom report is based on the corresponding PUSCH transmission(s)

- FFS details

Not treated.
R1-1709948 General considerations on UL power control design Huawei, HiSilicon
R1-1710043 NR Power Control Framework CATT
R1-1710209 On NR power control ZTE
R1-1710210 On NR PHR calculation ZTE
R1-1710219 UL transmission power control Mitsubishi Electric Co.
R1-1710357 Discussion on uplink power headroom report for NR LG Electronics
R1-1710404 UL multi-beam power control vivo
R1-1710475 Discussion on PHR calculation Huawei, HiSilicon
R1-1710586 PUSCH and PUCCH power control Intel Corporation
R1-1710765 Power Control Framework Samsung
R1-1710766 On PHR Requirements and Calculation Samsung
R1-1710786 Discussion on NR power control and sharing CMCC
R1-1711602 Common and Beam Specific Power Control Parameters InterDigital, Inc.
R1-1711054 On the NR UL power control framework Ericsson
R1-1711249 Power control and PHR for NR Qualcomm Incorporated
R1-1711335 UL power control in multi-beam based approaches ASUSTEK COMPUTER (SHANGHAI)

### 5.1.10 Channel model

**R1-1711623 Correction on the formula of AnnexA ZTE, Ericsson** (Revision of R1-1711255)
**Decision:** Agreed in R1-1711758 as 38.901CR0016 with latest version of cover sheet (v11.2).

**R1-1711624 Correction on Procedure A of spatially-consistency UT mobility modeling ZTE, Ericsson** (Revision of R1-1711256)
**Decision:** Agreed in R1-1711760 as 38.901CR0017 with latest version of cover sheet (v11.2).

### 5.1.11 Other

R1-1709971 Remaining issues on ECP Huawei, HiSilicon
R1-1710358 Multiplexing NCP and ECP LG Electronics
R1-1710405 Feasibility study on subband constellation rotation for uplink PAPR reduction for CP-OFDM waveform vivo
R1-1710406 PAE consideration on supporting CP-OFDM and DFT-S-OFDM vivo



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R1-1710407 Forward compatibility consideration for ECP design and NR-MBMS vivo
R1-1710767 ECP Aspects for 60kHz SCS Samsung
R1-1710768 On PAPR of DMRS for p/2-BPSK DFT-s-OFDM with Spectrum Shaping Samsung
R1-1710769 RACH Aspects for CA and DC Samsung
R1-1710966 Flexible subcarrier spacing in the uplink for NR use cases including mMTC ATR
R1-1711231 TDD-SUL CA scenario Qualcomm Incorporated
R1-1711250 TDD-SUL CA scenario Qualcomm Incorporated
R1-1711326 Comment on NR specification Panasonic
R1-1711389 Further details on scrambling Ericsson
R1-1711424 On bandwidth adaptation Huawei, HiSilicon
R1-1711459 Modulation Scheme for URLLC with Preemption Multiplexing Samsung
R1-1711460 On Transparency of Spectrum Shaping for p/2-BPSK DFT-s-OFDM Samsung
R1-1711461 On Spectrum Shaping Methods for p/2-BPSK DFT-s-OFDM Samsung
R1-1711462 On Modulation Schemes for High Spectral Efficiency Samsung
R1-1711463 Transmission and Reception for High-Order Modulation with MIMO Samsung
R1-1711528 Extended Range Considerations for mMTC HUGHES Network Systems Ltd
R1-1711529 Channel Model for Non-Terrestrial Networks HUGHES Network Systems Ltd
R1-1711574 Discussion on bandwidth part configuration LG Electronics Inc.

### *5.2 Other*

R1-1711317 Discussion on NR Operating in Unlicensed Spectrum ASUSTEK COMPUTER (SHANGHAI)
R1-1711464 High level consideration on NR unlicensed band operation Huawei, HiSilicon
R1-1711465 NR Numerology on unlicensed bands Huawei, HiSilicon
R1-1711466 NR Frame structure on unlicensed bands Huawei, HiSilicon
R1-1711467 Coexistence and Channel access for NR unlicensed band operations Huawei, HiSilicon
R1-1711469 NR standalone operation on unlicensed bands Huawei, HiSilicon
R1-1711470 Discussion on NoMA study for Rel-15 SI Huawei, HiSilicon
R1-1711520 Discussion of Multi-Antenna and Highly Directional Beam-Forming for Operation in Unlicensed Spectrum Ericsson
R1-1711521 On Autonomous UL Transmissions for NR in Unlicensed Spectrum Ericsson
R1-1711522 On Channel Access Mechanisms for NR in Unlicensed Spectrum Ericsson
R1-1711523 On NR Operation in the 60 GHz Unlicensed Band Ericsson
R1-1711524 On Physical Layer Design Policies for Unlicensed Operation of NR Ericsson
R1-1711525 Technology Components for Unlicensed Operation Ericsson
R1-1711549 Considerations on Satellite channel model THALES
R1-1711550 NTN Bentpipe payload architecture and characteristics THALES
R1-1711568 Considerations on HAPS channel model CNES, Thales

# 6 Closing of the meeting

Mr Chair thanked all for the progress achieved during this second ad-hoc meeting on NR.
Special thanks to the Vice chairmen, especially at the start of the meeting and for chairing their respective sessions.
Mr Chair thanked the host ZTE for the organization and facilities. Although meeting's start was a bit challenging, with inadequate number of seats, no power to all seats… during the first 1,5 hours of day one, the number of meeting rooms (5 all together) were really appreciated.

Then Mr chair warned the delegates that organizing the RAN1 chair and vice chair election at the next meeting could also be a challenge (due to the number of voting companies – likely to be around 300 – and the potential number of round of voting. August will be last meeting chaired by Satoshi-san.

Meeting was closed at 20:15.
See you all in Prague.



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**3GPP TSG RAN WG1 Meeting #90** **R1-171xxxx**
**Prague, Czech Rep, 21st – 25th August 2017**

**Annex A: List of Tdocs at RAN1 #AH_NR2**

Please see excel file attached to this report



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**Annex B: List of CRs agreed at RAN1 #AH_NR2**

| TS/TR | CR | Rev | Rel | Title | Cat | Vsn | @ Mtg | TD# | Source to WG | Work Item |
|---|---|---|---|---|---|---|---|---|---|---|
| 38.901 | 16 | - | Rel-14 | Correction on the fomula of Annex A | F | 14.1.0 | R1#AH_NR2 | R1-1711758 | ZTE, Ericsson | NR_newRAT-Core |
| 38.901 | 17 | - | Rel-14 | Correction on Procedure A of spatially-consistency UT mobility modeling | F | 14.1.0 | R1#AH_NR2 | R1-1711760 | ZTE, Ericsson | NR_newRAT-Core |
| | | | | | | | | | | |



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**Annex C-1: List of Outgoing LSs from RAN1 #AH_NR2**

| TDoc # | Title | Source | Release | Related WIs | Reply to | To | Cc | Original LS | Reply in |
|---|---|---|---|---|---|---|---|---|---|
| R1-1711825 | LS on non-contiguous CA | RAN1, AT&T | Rel-15 | NR_newRAT-Core | | RAN2, RAN4 | | | |
| R1-1711839 | LS on subcarrier alignment and channel raster | RAN1, AT&T | Rel-15 | NR_newRAT-Core | | RAN4 | | | |
| R1-1711872 | LS on UE self-interference | RAN1, vivo | Rel-15 | NR_newRAT-Core | | RAN4 | | | |
| R1-1711878 | LS on single UL transmission | RAN1, NTT DOCOMO | Rel-15 | NR_newRAT-Core | | RAN2, RAN3, RAN4 | | | |
| R1-1711880 | LS on Beam Aspects of NR RACH | RAN1, Huawei | Rel-15 | NR_newRAT-Core | | RAN2 | | | |
| R1-1711966 | Reply LS on reading time index indication for RRM measurements | RAN1, Intel | Rel-15 | NR_newRAT-Core | R2-1706160 | RAN2 | | | |
| R1-1711975 | LS response on required parameters from RAN4 perspective | RAN1, Ericsson | Rel-15 | NR_newRAT-Core | R4-1704216 | RAN4 | | | |
| R1-1711987 | "Reply LS response on NR basic handover | | Rel-15 | NR_newRAT-Core | R2-1707503 | RAN2 | | | |
| " | RAN1, Samsung | | Rel-15 | NR_newRAT-Core | S3-171568 | SA3 | RAN2, RAN4 | | |
| R1-1711997 | Response LS on Support for fake gNB detection mechanisms | RAN1, Nokia | Rel-15 | NR_newRAT-Core | | RAN2, RAN4 | | | |
| R1-1711998 | LS on bandwidth part operation in NR | RAN1, MediaTek | Rel-15 | NR_newRAT-Core | | RAN4 | RAN2 | | |
| R1-1711999 | LS on power sharing for LTE-NR Dual Connectivity | RAN1, Ericsson | Rel-15 | NR_newRAT-Core | | RAN2 | RAN3 | | |
| R1-1712000 | LS on support of multi-TRP transmission in NR | RAN1, Intel | Rel-15 | NR_newRAT-Core | | RAN2 | | | |
| R1-1712001 | LS on NR initial access and mobility | RAN1, NTT DOCOMO | Rel-15 | NR_newRAT-Core | | RAN4 | | | |
| R1-1712002 | LS on NR initial access and mobility | RAN1, NTT DOCOMO | Rel-15 | NR_newRAT-Core | | RAN2 | | | |
| R1-1712005 | Reply LS on PDCCH design | RAN1, Ericsson, CATT | Rel-15 | NR_newRAT-Core | | RAN2, RAN4 | | | |



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**Annex C-2: List of Incoming LSs from RAN1 #AH_NR2**

| TDoc # | Title | Source | Release | Related WIs | Reply to | To | Cc | Original LS | Reply in |
|---|---|---|---|---|---|---|---|---|---|
| R1-1710211 | LS on SR design principles in NR | RAN2, Samsung | Rel-15 | NR_newRAT-Core | | RAN1 | | R2-1705867 | |
| R1-1710212 | LS on UE measurement capabilities across LTE and NR | RAN2, NTT DOCOMO | Rel-15 | NR_newRAT-Core | | RAN4 | RAN1 | R2-1706140 | |
| R1-1710213 | LS on UE categories for NR and LTE-NR Dual Connectivity | RAN2, NTT DOCOMO | Rel-15 | NR_newRAT-Core | | RAN, RAN1 | RAN4 | R2-1706141 | |
| R1-1710214 | LS reply to SA2 on maximum data rate | RAN2, MediaTek | Rel-15 | NR_newRAT-Core | S2-172398, R1-1706857 | SA2, RAN1 | RAN3, SA1, CT1, CT4 | R2-1706155 | |
| R1-1710215 | Response LS on reading time index indication for RRM measurements | RAN2, Intel | Rel-15 | NR_newRAT-Core | R1-1706707 | RAN1 | | R2-1706160 | |
| R1-1710216 | LS on Emergency Support in NR | SA2, Nokia | Rel-15 | NR_newRAT-Core | | RAN | SA, RAN1, RAN2, RAN3 | S2-173700 | |
| R1-1710217 | LS on Support for fake gNB detection mechanisms | SA3, Nokia | Rel-15 | NR_newRAT-Core | | RAN1, RAN2, RAN4 | | S3-171568 | |
| R1-1710220 | Reply LS on Emergency Support in NR | RAN, T-Mobile | Rel-15 | NR_newRAT-Core | S2-173700 | SA2 | SA, RAN1, RAN2, RAN3 | RP-171434 | |
| R1-1710221 | Reply LS on UE categories for NR and LTE-NR Dual Connectivity | RAN, NTT DOCOMO | Rel-15 | NR_newRAT-Core | R2-1706141 | RAN2, RAN1 | RAN4 | RP-171480 | |
| R1-1711892 | Reply LS on PBCH content | RAN2, Huawei | Rel-15 | NR_newRAT-Core | R1-1709789 | RAN1 | | R2-1707490 | |
| R1-1711940 | LS to RAN1 on NR basic handover | RAN2, Ericsson | Rel-15 | NR_newRAT-Core | | RAN1 | | R2-1707503 | |
| R1-1711949 | Reply LS to RAN1 on UL data transmission without UL grant for NR | RAN2, Huawei | Rel-15 | NR_newRAT-Core | R1-1709805 | RAN1 | | R2-1707499 | |
| R1-1711950 | LS to RAN1 on Random Access | RAN2, Samsung | Rel-15 | NR_newRAT-Core | | RAN1 | | R2-1707504 | |



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**Annex D: List of Approved updated WIDs**

None



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**Prague, Czech Rep, 21st – 25th August 2017**

**Annex E: List of draft TSs/TRs agreed at RAN1 #AH_NR2**

| Tdoc Number | Title | Source | Conclusion/Decision |
|---|---|---|---|
| R1-1712004 | TS38.211 v0.1.0 NR; Physical channels and modulation | Ericsson LM | Endorsed |
| | | | |
| | | | |
| | | | |
| | | | |



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**Annex F: List of actions**

- **Outgoing LS**

[NRAH2-01] Sundar (Qualcomm)
LS of beam management
Email approval until 10th July

[NRAH2-02] Karri (Nokia)
LS of UL/DL HARQ
Email approval until 6th July

- **CR approval**

None

- **Text proposal for TS and TR**

[NRAH2-03] Editors
Email discussion until August meeting about all specs

- 1st step: All spec editors will provide new draft specs (including all agreements and WA) until July 14th
- 2nd step: All spec editors will provide further updated specs (including all agreements and WA) until August 4th
- All companies are recommended checking these specs and comment via the reflector
- All spec editors will update specs via the reflector and submit them to the August meeting (RAN1#90)
- Objective is to get the updated specs endorsed on Monday on Monday (day 1 of RAN1#90)

- **Miscellaneous**

[NRAH2-04] Daniel (Ericsson)
Email discussion until the August meeting w.r.t the RRC parameters list for NR

- Daniel (Ericsson) will provide an initial RRC parameters list until August 9th
- All companies are recommended checking it and comment via the reflector
- Daniel (Ericsson) will update it via the reflector and submit it to the August meeting (RAN1#90)
- Objective is to get the (updated) RRC parameters list agreed on Monday (day 1 of RAN1#90)

[NRAH2-05] Daewon (Intel)
DMRS sequence for NR PBCH



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Companies are encouraged to provide the information on NR PBCH DMRS sequence until 28th July in order to finalize the design

[NRAH2-06] Yuichi (DOCOMO)
LS of CSI-RS for beam management
Email approval for the LS in R1-1712003 until 7th July

[NRAH2-07] Lihui (DOCOMO)
LS of UL SPS / grant free
Email approval until 6th July to explain RAN1 understandings based on above agreements

[NRAH2-08] Jeongho (Samsung)
Down selection of CBG-based (re)transmission Email approval until 13th July to have down selection

[NRAH2-09] Joseph (Qualcomm)
Processing Time Requriements
l Email discussion about followings – Joseph (Qualcomm)
- Step 1: identify the candidate factors for processing time (until 4th Aug.)
- Step 2: identify the table (until 4th Aug.) l Based on the proponents' input for step 1 and step 2, following work will be done:
- Step 3: fill-in the table
- Targeting finishing step 3 until September meeting.
  ² Note: companies are encouraged to bring up initial numbers for the table to the August meeting
- Note: fill-in the table does not necessarily results in defining some UE capabilities or exact values of K1 and K2 in the specification.

[NRAH2-10] Zhenfei (Huawei)
Scheduling/HARQ aspects for CA
Email approval until 10th July

[NRAH2-11] Zukang (Huawei)
Polar code sequence
- Polar code sequence candidates, including any merged solutions, should be provided by Wed 2nd Aug § Identify candidates of polar code sequence according to the procedure below by Wed 9th Aug § Rate matching proposals for any sequence that has been selected as a winner by at least one company to be provided by Wed 16th Aug.

[NRAH2-12] Zukang (Huawei)
Polar code design on polynomial and interleaver for email discussion until August 7th
Main target is on gathering all proposals about detailed design on polynomial and interleaver.



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**Annex G: List of participants at RAN1 #AH_NR2**

Please see excel file attached to this report



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**Annex H:** **TSG RAN WG1 meetings in 2017 – 2018**

| TITLE | TYPE | DATES | LOCATION | CTRY |
|---|---|---|---|---|
| 3GPPRAN1#90 | WG | 21 – 25 Aug 2017 | Prague | Rep Czech |
| 3GPPRAN1-NR3 | AH | 18 – 21 Sep 2017 | Nagoya | Japan |
| 3GPPRAN1#90bis | WG | 09 – 13 Oct 2017 | Prague | Rep Czech |
| 3GPPRAN1#91 | WG | 27 Nov – 01 Dec 2017 | Reno | US |
| 3GPPRAN1-AH-1801 | AH | 22 – 26 Jan 2018 | TBD | |
| 3GPPRAN1#92 | WG | 26 Feb – 2 Mar 2018 | Athens | Greece |
| 3GPPRAN1#92bis | WG | 16 – 20 Apr 2018 | TBD | China |
| 3GPPRAN1#93 | WG | 21 – 25 May 2018 | TBD | Korea |
| 3GPPRAN1#94 | WG | 20 – 24 Aug 2018 | Gothenburg | Sweden |
| 3GPPRAN1#94bis | WG | 8 – 12 Oct 2018 | TBD | China |
| 3GPPRAN1#95 | WG | 12 – 16 Nov 2018 | TBD | US |

| MEETING TYPES | | |
|---|---|---|
| AH = Ad Hoc | ST = Startup Meeting | RG = Rapporteurs Group |
| JM = Joint | WG = Working Group | SG = Steering Group |
| PM = Preparatory Meeting | CM = Chairmen's meeting | TG = Task Group |
| RM = Resolution Meeting | OR = Ordinary | XO = Extraordinary |

*End of document*



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# Appendix 25

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The Mobile Broadband Standard 5G



# E-mail lists

## Lists

### See all 3GPP email exploder lists at list.3gpp.org

This list-of-lists also contains all the ETSI exploder lists, however the majority of the 3GPP lists are located right at the top.

In order to subscribe to any of these lists, scroll down until you find the list you are interested in, click on the link and follow the simple instructions.

Those delegates who already have an ETSI username and password should use the list management application on the ETSI site.

If you have any problems subscribing to the lists, or you are unsure of which list would be of interest to you send an email to contact@3gpp.org.


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- 5G Phase 1 underway in CT Groups
- 3GPP Initiates Common API Framework Study
- Riding the NB-IoT bicycle
- 5G Communication for Automation in Vertical Domains
- 5G-NR workplan for eMBB

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ABOUT RELEASES

Release 15
Release 14
Release 13
Release 12
Release 11
Release 10
Release 9
Release 8
Release 7
Release 6
Release 5
Release 4
Release 1999

FULL MEETING CALENDAR

| | | | |
|---|---|---|---|
| GERAN | 75 | Berlin (TBC) | 21-25 Aug 2017 |
| CT | 77 | Sapporo | 11-12 Sep 2017 |
| RAN | 77 | Sapporo | 11-14 Sep 2017 |
| SA | 77 | Sapporo | 13-15 Sep 2017 |
| GERAN | 76 | US | 27 Nov-01 Dec 2017 |
| CT | 78 | Lisbon | 18-19 Dec 2017 |
| RAN | 78 | Lisbon | 18-21 Dec 2017 |
| SA | 78 | Lisbon | 20-22 Dec 2017 |
| CT | 79 | India | 19-20 Mar 2018 |
| RAN | 79 | India | 19-22 Mar 2018 |
| SA | 79 | India | 21-23 Mar 2018 |
| CT | 80 | North America | 11-12 Jun 2018 |
| RAN | 80 | North America | 11-14 Jun 2018 |
| SA | 80 | North America | 13-15 Jun 2018 |

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UMTS
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Request for Comments: 3113 3GPP PCG Chair
Category: Informational R. Sanmugam
Ericsson
S. Bradner
Harvard University
J. Klensin
AT&T
June 2001

# 3GPP-IETF Standardization Collaboration

## Status of this Memo

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## Abstract

This document describes the standardization collaboration between 3GPP and IETF.

## 1. Conventions used in this document

This document uses significant terminology that is specialized to IETF, 3GPP, or their areas of work. See Appendix A for definitions of acronyms. The organizational definitions can be found in their respective web-sites.

## 2. Introduction

This document contains a set of principles and guidelines that serves as the basis for establishing the collaboration between 3GPP and IETF, with the objective of securing timely development of technical specification that facilitate maximum interoperability with existing (fixed and mobile) Internet systems, devices, and protocols.

Each organization will operate according to their own rules and procedures including rules governing IPR policy, specification elaboration, approval and maintenance.



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## 3. Reasons For Collaboration

### 3.1 3GPP use of IETF Internet Standards

In the further development of 3GPP specifications, the benefit of adopting Internet specifications has been identified.

The preferred 3GPP approach is to use the Internet standards unchanged, if feasible. In any case, 3GPP has no intention to duplicate work performed in IETF.

However, while this document recognizes the importance of 3GPP interoperability with the existing Internet and hence the use of IETF standards, 3GPP recognizes that additions or modifications might be needed in order to make the IETF internet specification fulfill the needs of 3GPP. In such cases, 3GPP will take its concerns directly to the appropriate IETF working groups for resolution, or to an appropriate Area Director if no appropriate working group can be found.

### 3.2 IETF access to 3GPP Wireless expertise

The technical work in 3GPP is organized in Technical Specification Groups TSGs each with their area of responsibilities. TSG-RAN and TSG-GERAN are responsible for the Radio Access networks based on UTRAN and GERAN and thus the experts in the areas of the characteristics of the physical transport. TSG CN is responsible for the Mobility Management and other core network protocol and functionalities. TSG-T is responsible for Terminal aspects and applications. TSG-SA is responsible for the service and system aspects including the overall architecture, security and O&M aspects. Contacts for the TSGs can be found on the 3GPP web-site http://www.3gpp.org/.

## 4. Document Sharing

Both 3GPP and IETF encourage the sharing of draft documents that are of mutual interest.

3GPP documents are available on its official web-site (http://www.3gpp.org/) and is open to anyone. IETF documents, including preliminary working documents ("Internet Drafts") are available on its web-site (http://www.ietf.org/) and various shadow sites.

IETF representatives can obtain information about the 3GPP document and web-site structures by contacting the relevant 3GPP contact points indicated at the 3GPP web-site http://www.3gpp.org/.



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3GPP representatives can obtain information about the IETF document and web-site structures by contacting the relevant IETF contact points (the Area Directors indicated at the IETF web-site http://www.ietf.org/).

## 5. Communication

Whenever possible, informal communication at working level is encouraged.

The vast majority of the technical discussions and decision making in both IETF and 3GPP is done over mailing lists. Both 3GPP and IETF web sites contain information concerning the associated mailing lists.

It is recommended that interested individuals subscribe to and participate in these lists.

When deemed necessary, formal communication between 3GPP and IETF is also permitted. Relevant IETF Area Directors and 3GPP technical leadership are encouraged and authorized to facilitate such communications when needed.

## 6. Rapporteurs/coordinators

### 6.1 IETF coordination support in 3GPP

An IETF rapporteur function is established in 3GPP TSG-SA.

The individual(s) appointed to undertake the responsibility of this function should be the initial contact point in 3GPP for matters pertaining to the 3GPP-IETF cooperation. Of course, the chairman of TSG-SA can always be contacted.

The 3GPP-IETF rapporteur function, therefore, is expected to work with the concerned working groups and TSGs and support the interaction between 3GPP and IETF.

### 6.2 3GPP Liaison in IETF

The preferred way for organizations to work with IETF is through the working groups. However, IETF has a limited number of liaison relationships with other organizations when conditions warrant the appointment of a specific person.

The appointment, by the IAB, of a specific person to function as a "3GPP liaison" is proposed.



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The role of the 3GPP Liaison is to act as an initial contact point in IETF for administrative aspects of this collaboration that cannot easily be handled in other ways (e.g., at a technical level by interactions with IETF Working Groups or Area Directors). It is agreed that the role does not carry the expectation of attendance at 3GPP meetings or participation in 3GPP administrative processes and anticipated that all liaison efforts assigned to this individual will be carried out by electronic mail. It is understood that the liaison will not have the ability to make exceptions to, or special provisions for, IETF policies and procedures.

## 9. Participation

In order to assist the information flow between the organizations, the IETF can on per case basis appoint a rapporteur to participate and represent IETF at 3GPP technical meetings.

IETF meetings are open to any interested individuals.

3GPP partners (OPs, MRPs) or individual members can participate in any of the IETF meetings, in accordance with the existing IETF procedures.

## 8. Security Considerations

This type of non-protocol document does not directly affect the security of the Internet.



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Note: Changes to the contents of this memo requires the approval from 3GPP PCG: EMail: 3GPPContact@etsi.fr



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## Appendix A: Acronyms

Glossary Of Acronyms:

| | |
|---|---|
| 3GPP | Third Generation Partnership Project |
| BCP | Best Current Practice |
| IAB | Internet Architecture Board |
| IESG | Internet Engineering Steering Group |
| IETF | Internet Engineering Task Force |
| IPR | Intellectual Property rights |
| MRP | Market Representation Partner |
| OP | Organizational Partner |
| O&M | Operation and Maintenance |
| PCG | Project coordination Group |
| RFC | Request for Comments |
| TSG | Technical Specification Group |
| TSG-SA | TSG Services and systems aspects |
| TSG-CN | TSG Core Network |
| TSG-RAN | TSG Radio Access Network |
| TSG-GERAN | TSG GSM Radio Access Network |
| TSG-T | TSG Terminals |
| UTRAN | Universal Terrestrial Radio Access Network |
| WWW | World Wide Web |



https://web.archive.org/web/20011124104400/http://www.ietf.org/rfc/rfc3113.txt
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11/19/2019 Wayback Machine

http://www.ietf.org/rfc/rfc3113.txt Go OCT NOV DEC
38 captures 24 2000 2001 2002
24 Nov 2001 - 20 Sep 2017 About this capture



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https://web.archive.org/web/20011124104400/http://www.ietf.org/rfc/rfc3113.txt

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# Appendix 27

The Wayback Machine - https://web.archive.org/web/20130802235340/http://list.etsi.org:80/



# List Archives at LIST.ETSI.ORG

From this page you can browse the online archives of the following mailing lists:

3GPP-REVIEW
3gpp-review : gsmtrans replacement *(4 subscribers)*
3GPP_3GPP2_SCM
3gpp_3gpp2_scm : 3gpp-3gpp2 spatial channel modelling *(7 subscribers)*
3GPP_COMMON_IMS_XFER
3GPP_common_ims_xfer: IMS work transfer list closed *(15 subscribers)*
3GPP_FFG
3gpp_ffg :3gpp list *(18 subscribers)*
3GPP_GUP
3gpp_gup : evolution of 3gpp *(3 subscribers)*
3GPP_HODS_LEGAL
3gpp_hods : 3gpp_hods_legal list *(17 subscribers)*
3GPP_IT
3GPP_IT *(16 subscribers)*
3GPP_MARCOM
3GPP_Marcom *(19 subscribers)*
3GPP_MARCOM_BRAND_ADHOC
3GPP_MARCOM_brand_adhoc *(44 subscribers)*
3GPP_MARCOM_OP
3gpp_Marcom_OP *(11 subscribers)*
3GPP_ORGANIZATION
3gpp_organization: 3gpp discussion group *(12 subscribers)*
3GPP_RAN_LEADERS
3GPP_RAN_LEADERS *(27 subscribers)*
3GPP_RUN4RAN
3GPP_RUN4RAN *(17 subscribers)*
3GPP_TSG_CN
3GPP_TSG_CN: THIS LIST HAS NOW BEEN CLOSED 18.03.05 *(0 subscribers)*
3GPP_TSG_CN_AH_ITUT
3GPP_TSG_CN_AH_ITUT: THIS LIST HAS NOW BEEN CLOSED *(0 subscribers)*
3GPP_TSG_CN_WG1
3GPP_TSG_CN_wg1: THIS LIST HAS NOW BEEN CLOSED 18.03.05 *(0 subscribers)*
3GPP_TSG_CN_WG2
3GPP_TSG_CN_wg2: THIS LIST HAS BEEN CLOSED 18.03.05 *(0 subscribers)*
3GPP_TSG_CN_WG3
3GPP_TSG_CN_wg3: THIS LIST HAS NOW BEEN CLOSED *(0 subscribers)*
3GPP_TSG_CN_WG4
3GPP_TSG_CN_WG4: THIS LIST HAS NOW BEEN CLOSED 18.03.05 *(0 subscribers)*
3GPP_TSG_CN_WG5
3GPP_TSG_CN_WG5: THIS LIST HAS NOW BEEN CLOSED *(0 subscribers)*
3GPP_TSG_CN_WG5_JOINTAPIWORK
3gpp_tsg_cn_wg5_jointapiwork : THIS LIST HAS NOW BEEN CLOSED 18.03.05 *(0 subscribers)*
3GPP_TSG_CT
3GPP_TSG_CT - Core Network and Terminals *(260 subscribers)*
3GPP_TSG_CT_IETF-COORD
3GPP_TSG_CT_IETF-Coord *(38 subscribers)*
3GPP_TSG_CT_WG1
3GPP_TSG_CT_WG1 - Core Network and Terminals WG 1 *(806 subscribers)*
3GPP_TSG_CT_WG1_MMS_SMS_CBS_AT
3GPP_TSG_CT_WG1_MMS_SMS_CBS_AT:Commands *(139 subscribers)*
3GPP_TSG_CT_WG2
3GPP_TSG_CT_WG2 - Core Network and Terminals WG 2 *(18 subscribers)*
3GPP_TSG_CT_WG3
3GPP_TSG_CT_WG3 - Core Network and Terminals WG 3 *(200 subscribers)*
3GPP_TSG_CT_WG4
3GPP_TSG_CT_WG4 - Core Network and Terminals WG 4 *(368 subscribers)*
3GPP_TSG_CT_WG5
3GPP_TSG_CT_WG5 - Core Network and Terminals WG 5 closed 26th Sept 2008 *(0 subscribers)*
3GPP_TSG_CT_WG6
3GPP_TSG_CT_WG6 - Core Network and Terminals WG 6 *(105 subscribers)*
3GPP_TSG_CT_WG6_API_TEST

3GPP_TSG_CT_WG6_API_TEST: Mailing List *(16 subscribers)*

3GPP_TSG_GERAN
3gpp_tsg_geran : list for etsi tsg geran mailing *(127 subscribers)*

3GPP_TSG_GERAN_FUTURERAN
3gpp_tsg_geran_futureran : list for etsi tsg geran futureran mailing *(16 subscribers)*

3GPP_TSG_GERAN_TDOC
3gpp_tsg_geran_tdoc : list for etsi tsg geran temporary documents *(105 subscribers)*

3GPP_TSG_GERAN_WG1
3gpp_tsg_geran_wg1 : list for etsi tsg geran wg1 mailing *(83 subscribers)*

3GPP_TSG_GERAN_WG2
3gpp_tsg_geran_wg2 : list for etsi tsg geran wg2 mailing *(83 subscribers)*

3GPP_TSG_GERAN_WG3
3gpp_tsg_geran_wg3 : list for etsi tsg geran wg3 mailing *(146 subscribers)*

3GPP_TSG_GERAN_WG3_ELECTRONIC
3GPP_TSG_GERAN_WG3_ELECTRONIC *(51 subscribers)*

3GPP_TSG_GERAN_WG3_EMAIL_AGREEME
3GPP_TSG_GERAN_WG3_Email_Agreement list closed 9th June 2010 *(4 subscribers)*

3GPP_TSG_GERAN_WG4
3gpp_tsg_geran_wg4 : THIS LIST HAS BEEN CLOSED *(0 subscribers)*

3GPP_TSG_GERAN_WG4_EDGE
3gpp_tsg_geran_wg4_edge : THIS LIST HAS BEEN CLOSED *(3 subscribers)*

3GPP_TSG_GERAN_WG4_GPRS
3gpp_tsg_geran_wg4_gprs : THIS LIST HAS BEEN CLOSED *(3 subscribers)*

3GPP_TSG_GERAN_WG4_PCS1900
3gpp_tsg_geran_wg4_pcs1900 : THIS LIST HAS BEEN CLOSED *(3 subscribers)*

3GPP_TSG_GERAN_WG4_TTCN
3gpp_tsg_geran_wg4_ttcn : THIS LIST HAS BEEN CLOSED *(2 subscribers)*

3GPP_TSG_GERAN_WG5
3gpp_tsg_geran_wg5 : THIS LIST HAS BEEN CLOSED *(0 subscribers)*

3GPP_TSG_LEADERS
3gpp_tsg_leaders: tsg leaders group *(73 subscribers)*

3GPP_TSG_RAN
3gpp_tsg_ran: tsg radio access network group *(1,015 subscribers)*

3GPP_TSG_RAN3-SA5-RET
3GPP_TSG_RAN3-SA5-RET : Common RAN3/SA5 Work Item discussion for Remote List closed *(0 subscribers)*

3GPP_TSG_RAN_ADHOC
3gpp_tsg_ran_adhoc: tsg ran ad hoc meetings *(29 subscribers)*

3GPP_TSG_RAN_AHG1
3gpp_tsg_ran_ahg1: tsg ran ad-hoc group on itu co-ordination *(79 subscribers)*

3GPP_TSG_RAN_LTE_ADVANCED
3GPP_TSG_RAN_LTE_Advanced *(85 subscribers)*

3GPP_TSG_RAN_WG1
3gpp_tsg_ran_wg1: tsg ran working group 1 *(1,180 subscribers)*

3GPP_TSG_RAN_WG1_EUL_AH
3GPP_TSG_RAN_WG1_EUL_AH *(26 subscribers)*

3GPP_TSG_RAN_WG1_HSPA
3GPP_TSG_RAN_WG1_HSPA *(164 subscribers)*

3GPP_TSG_RAN_WG1_WCDMA_MIMO
3GPP_TSG_RAN_WG1_WCDMA_MIMO *(18 subscribers)*

3GPP_TSG_RAN_WG2
3GPP_TSG_RAN_WG2 list *(904 subscribers)*

3GPP_TSG_RAN_WG2_MBMS_RRC
3GPP_TSG_RAN_WG2_MBMS_RRC List list closed 26th August 2009 *(31 subscribers)*

3GPP_TSG_RAN_WG2_ROHC
3GPP_TSG_RAN_WG2_ROHC : 3GPP_TSG_RAN_WG2_ROHC List Closed 26th August 2009 *(37 subscribers)*

3GPP_TSG_RAN_WG2_UMTS_DRAFTS
3GPP_TSG_RAN_WG2_UMTS_DRAFTS *(51 subscribers)*

3GPP_TSG_RAN_WG3
3gpp_tsg_ran_wg3: tsg ran working group 3 *(693 subscribers)*

3GPP_TSG_RAN_WG4
3gpp_tsg_ran_wg4: tsg ran working group 4 *(820 subscribers)*

3GPP_TSG_RAN_WG4_AAS
3GPP_TSG_RAN_WG4_AAS *(73 subscribers)*

3GPP_TSG_RAN_WG4_BANDS

3GPP_TSG_RAN_WG4_Bands : New UMTS frequency bands list closed *(218 subscribers)*

3GPP_TSG_RAN_WG4_CELL_RESELECTION
3GPP_TSG_RAN_WG4_Cell_Reselection : List Closed *(0 subscribers)*

3GPP_TSG_RAN_WG4_CPC
3gpp_tsg_ran_wg4_CPC: tsg ran working group 4 CPC list closed *(0 subscribers)*

3GPP_TSG_RAN_WG4_DIVERSITY_OFF
3gpp_tsg_ran_wg4_DIVERSITY_OFF: tsg ran working group 4 Diversity off list closed *(23 subscribers)*

3GPP_TSG_RAN_WG4_EDCH
3GPP_TSG_RAN_WG4_EDCH : Enhanced Uplink Performance Requirements list closed *(0 subscribers)*

3GPP_TSG_RAN_WG4_EMEETING
3GPP_TSG_RAN_WG4_eMeeting *(21 subscribers)*

3GPP_TSG_RAN_WG4_HSDPA
3GPP_TSG_RAN_WG4_HSDPA : HSDPA PERFORMANCE REQUIREMENTS *(33 subscribers)*

3GPP_TSG_RAN_WG4_LTE
3GPP TSG RAN WG4 Long Term Evolution *(50 subscribers)*

3GPP_TSG_RAN_WG4_MBMS
3GPP_TSG_RAN_WG4_MBMS : List closed *(0 subscribers)*

3GPP_TSG_RAN_WG4_MIMO-OTA
3GPP_TSG_RAN_WG4_MIMO-OTA *(115 subscribers)*

3GPP_TSG_RAN_WG4_POWERCONTROL
3GPP_TSG_RAN_WG4_PowerControl : List closed *(0 subscribers)*

3GPP_TSG_RAN_WG4_TEM
3gpp_tsg_ran_wg4_tem : THIS LIST HAS NOW BEEN CLOSED *(0 subscribers)*

3GPP_TSG_RAN_WG4_UE_ANTENNA
3GPP_TSG_RAN_WG4_UE_Antenna: UE Antenna Performance list closed *(0 subscribers)*

3GPP_TSG_RAN_WG4_UE_TXPOW
UE Max Output Power back off : List closed *(0 subscribers)*

3GPP_TSG_RAN_WG5
3GPP_TSG_RAN_WG5 : Testing *(662 subscribers)*

3GPP_TSG_RAN_WG5_APPLICABILITY
3GPP_TSG_RAN_WG5_APPLICABILITY *(50 subscribers)*

3GPP_TSG_RAN_WG5_IMSCC
3GPP TSG RAN WG5 IMS Call Control mailing *(42 subscribers)*

3GPP_TSG_RAN_WG5_LTE-CDMA2000
3GPP_TSG_RAN_WG5_LTE-CDMA2000 *(17 subscribers)*

3GPP_TSG_RAN_WG5_RF
3GPP_TSG_RAN_WG5_RF : Radio Frequency *(114 subscribers)*

3GPP_TSG_RAN_WG5_SIG
3GPP_TSG_RAN_WG5_SIG: Signalling *(385 subscribers)*

3GPP_TSG_RAN_WGS_LONG_TERM_EVOLUTION
3GPP_TSG_RAN_WGS_LONG_TERM_EVOLUTION: UTRA/UTRAN Long Term Evolution *(17 subscribers)*

3GPP_TSG_RAN_WGS_LTE_UE_TRANSCEIVER
3gpp_tsg_ran_wgs_lte_ue_transceiver *(14 subscribers)*

3GPP_TSG_SA
3gpp_tsg_sa: tsg system aspects group *(413 subscribers)*

3GPP_TSG_SA_WG1
3gpp_tsg_sa_wg1: tsg sa services *(523 subscribers)*

3GPP_TSG_SA_WG1_AIPN
3GPP_TSG_SA_WG1_AIPN List *(21 subscribers)*

3GPP_TSG_SA_WG1_GLOBALTEXT
3gpp_tsg_sa_wg1_globaltext: THIS LIST HAS BEEN CLOSED *(0 subscribers)*

3GPP_TSG_SA_WG1_VOCABULARY
THIS LIST HAS BEEN CLOSED *(38 subscribers)*

3GPP_TSG_SA_WG1_WLAN
THIS LIST HAS BEEN CLOSED *(0 subscribers)*

3GPP_TSG_SA_WG2
3gpp_tsg_sa_wg2: tsg sa architecture *(956 subscribers)*

3GPP_TSG_SA_WG2_MTCE
3GPP_TSG_SA_WG2_MTCe *(113 subscribers)*

3GPP_TSG_SA_WG2_PROSE_GCSE_LTE
3GPP_TSG_SA_WG2_ProSe_GCSE_LTE *(221 subscribers)*

3GPP_TSG_SA_WG2_UPCON
3GPP_TSG_SA_WG2_UPCON *(156 subscribers)*

3GPP_TSG_SA_WG2_VCC
SA WG2 Voice Call Continuity discussion list: THIS LIST HAS BEEN CLOSED *(0 subscribers)*
3GPP_TSG_SA_WG3
3gpp_tsg_sa_wg3: tsg sa security *(230 subscribers)*
3GPP_TSG_SA_WG3_LI
3gpp_tsg_sa_wg3_li: (tsg sa wg3 lawful interception group) *(116 subscribers)*
3GPP_TSG_SA_WG4
3gpp_tsg_sa_wg4: tsg sa codec *(250 subscribers)*
3GPP_TSG_SA_WG4_MBS
3GPP_TSG_SA_WG4_MBS *(42 subscribers)*
3GPP_TSG_SA_WG5
3gpp_tsg_sa_wg 5: tsg sa5 telecoms management *(362 subscribers)*
3GPP_TSG_SA_WG5_CHARGING
3GPP_TSG_SA_WG5_Charging: Charging Management *(212 subscribers)*
3GPP_TSG_SA_WG5_OAM
3GPP_TSG_SA_WG5_OAM : OAM *(213 subscribers)*
3GPP_TSG_SA_WG5_SWGA
3GPP_TSG_SA_WG5_SWGA : Harmonization *(119 subscribers)*
3GPP_TSG_SA_WG5_SWGB
3GPP_TSG_SA_WG5_SWGB : Charging CLOSED 270407 *(221 subscribers)*
3GPP_TSG_SA_WG5_SWGC
3GPP_TSG_SA_WG5_SWGC : OAM&P Interface Definition Closed 270407 *(206 subscribers)*
3GPP_TSG_SA_WG5_SWGD
3GPP_TSG_SA_WG5_SWGD : OAM&P Data Definition CLOSED 270407 *(204 subscribers)*
3GPP_TSG_T
3gpp_tsg_t: tsg terminals group: THIS LIST HAS NOW BEEN CLOSED *(0 subscribers)*
3GPP_TSG_T_WG1
3gpp_tsg_t_wg1: THIS LIST HAS NOW BEEN CLOSED - 18.03.05 *(0 subscribers)*
3GPP_TSG_T_WG1_RF
3gpp_tsg_t_wg1_rf: THIS LIST HAS NOW BEEN CLOSED - 18.03.05 *(0 subscribers)*
3GPP_TSG_T_WG1_SIG
3gpp_tsg_t_wg1_sig: THIS LIST HAS NOW BEEN CLOSED - 18.03.05 *(0 subscribers)*
3GPP_TSG_T_WG2
3gpp_tsg_t_wg2: THIS LIST HAS NOW BEEN CLOSED 18.03.05 *(0 subscribers)*
3GPP_TSG_T_WG2_SWG1
3gpp_tsg_t_wg2_swg1 : execution environment LIST HAS BEEN CLOSED 12/07/2004 *(46 subscribers)*
3GPP_TSG_T_WG2_SWG2
3gpp_tsg_t_wg2_swg2 : terminal interfaces LIST HAS BEEN CLOSED 12/07/2004 *(106 subscribers)*
3GPP_TSG_T_WG2_SWG3
3gpp_tsg_t_wg2_swg3 : messaging LIST HAS BEEN CLOSED 12/07/2004 *(263 subscribers)*
3GPP_TSG_T_WG3
Smart Card Application Aspects: THIS LIST HAS NOW BEEN CLOSED 18.03.05 *(116 subscribers)*
3GPP_TSG_T_WG3_API
T3 API Sub-Working-Group discussion: THIS LIST HAS NOW BEEN CLOSED 18.03.05 *(0 subscribers)*
3GPP_TSG_T_WG3_TEST
T3 testing related discussion: THIS LIST HAS NOW BEEN CLOSED 18.03.05 *(117 subscribers)*
3GPP_TSG_T_WG3_UI
T3 USAT interpreter discussion: THIS LIST HAS NOW BEEN CLOSED 18.03.05 *(0 subscribers)*
3GPP_TSG_T_WG3_USAT
T3 USIM application toolkit discussion: THIS LIST HAS NOW BEEN CLOSED *(0 subscribers)*
3GPP_UE_POSITIONING
3GPP_UE_Positioning: 3GPP UE Positioning Reporting *(22 subscribers)*
3GPP_WORKSHOP_LTE_GSM_HANDOVERS
3GPP_WS *(5 subscribers)*
3GPP_WP_GROUP
3GPP_WP_GROUP: 3GPP Working Procedures Group list *(82 subscribers)*
ADMIN_GROUP
admin_group : admin_group list *(70 subscribers)*

AERO
aero : aeronautical *(44 subscribers)*
AERO_A_CDM
AERO_A_CDM *(14 subscribers)*
AERO_A_SMGCS
AERO_A_SMGCS *(17 subscribers)*
AERO_DLS
AERO_DLS *(19 subscribers)*
AFI_ISG
AFI_ISG *(21 subscribers)*
AMETIS
AMETIS : Ametis *(0 subscribers)*
ANSI_EU
ANSI_EU List Closed *(27 subscribers)*
ANTILOPE_ALL
ANTILOPE_All *(60 subscribers)*
ANTILOPE_COMMISSION
ANTILOPE_Commission *(0 subscribers)*
ANTILOPE_CORE
ANTILOPE_Core *(13 subscribers)*
ANTILOPE_SEP
ANTILOPE_SEP *(33 subscribers)*
ANTILOPE_SVP
ANTILOPE_SVP *(32 subscribers)*
ASIC_PLUGTESTS
asic_plugtests *(2 subscribers)*
AT
at: tc access & terminals - the etsi "home" for terminal matters CLOSED 170407 *(54 subscribers)*
AT-D
at-d: tc at working group for digital technologies close 170407 *(46 subscribers)*
AT-I
at-i: installation and cabling matters list closed 170407 *(21 subscribers)*
AT-N
at-n: at-n list Closed *(0 subscribers)*
AT1
AT1: tc ATTM working group for Analogue & Digital Terminals *(0 subscribers)*
AT2
at2: tc attm working group for Infrastructure, Physical Networks & Communication Systems *(35 subscribers)*
AT3
At3:tc attm working group for Integrated broadband cable and television networks *(15 subscribers)*
ATMOBILE
ATmobile STF 304 *(0 subscribers)*
ATTM
ATTM: Access, Terminals, Transmission and Multiplexing *(58 subscribers)*
ATTM_AH_EETNT
Energy Efficiencies Through Network Transmission closed 26-10-12 *(0 subscribers)*
ATTM_IC_CG
ATTM_IC_CG *(18 subscribers)*
B2B_PLUGTESTS
B2B_Plugtests *(0 subscribers)*
B2B_WORKSHOP
B2B_WORKSHOP : discussion list on B2B Workshop matters list closed *(0 subscribers)*
BOARD_GREEN_AGENDA
Board_Green_Agenda *(9 subscribers)*
BOARD_GSC
BOARD Board GSC Review ad hoc group *(48 subscribers)*
BOARD_IMT-A
BOARD_IMT-A (CLOSED)ETSI Board IMT-A ad hoc group *(82 subscribers)*
BOARD_M2M_PP
M2M Partnership Project starter group list closed 09/04/2013 *(43 subscribers)*
BOARD_SAP
Smart Appliances Team *(7 subscribers)*
BOARD_UICC_STRATEGY
Board_UICC_Strategy *(57 subscribers)*
BRAN

bran: broadband radio access networks mailing list *(100 subscribers)*

BRAN_HM
bran_hm: etsi bran hiperman (fwa below 11 ghz) *(28 subscribers)*

BRAN_RCWG
BRAN_RCWG : BRAN harmonized standards and related work *(60 subscribers)*

BROADCAST
BROADCAST: jtc broadcast official mailing list *(65 subscribers)*

BROADCAST_ANNOUNCE
broadcast announcement list closed 24/06/11 *(0 subscribers)*

BROADCAST_M331
BROADCAST_M331: Response to EC/EFTA Closed 17th February 2009 *(0 subscribers)*

CABLE
Cable *(35 subscribers)*

CADES_PLUGTESTS
cades_plugtests *(0 subscribers)*

CENELEC_ETSI_DIGITAL_DIVIDEND
CENELEC_ETSI_Digital_Dividend *(31 subscribers)*

CENELEC_ETSI_JWG_EMC
No title defined *(34 subscribers)*

CEPT_ETSI
ETSI liaison officers to CEPT ECC *(29 subscribers)*

CINQ-MARS
Cinq-Mars closed 24/07/09 - Neocase ref 81034 CHT *(147 subscribers)*

CLC-ETSI-JWG-PLTCOEX
clc-etsi-jwg-pltcoex:cenelec etsi joint working group closed 7th July 08 *(0 subscribers)*

CLOUD
CLOUD List: Open discussion on ETSI CLOUD Standardization *(39 subscribers)*

CLOUD_STANDARDS_COORDINATION
Cloud Standards Coordination *(209 subscribers)*

CLUBDEGOURMANDS
clubdegourmands List Closed *(3 subscribers)*

CONSULTATION_ETSI_SME_EXPERT_CTE
CONSULTATION_ETSI_SME_Expert_Ctee *(0 subscribers)*

CONSULTATION_IOT_STANDARDS
CONSULTATION_iot_standards *(5 subscribers)*

CONSULTATION_TR_M436_RFID
CONSULTATION_TR_M436_RFID *(4 subscribers)*

CSC_DATAPORT
Cloud Standards Coordination:Data Portability *(11 subscribers)*

CSC_INTEROP
Cloud Standards Coordination: Interoperability *(12 subscribers)*

CSC_REFERENCE
CSC_reference *(26 subscribers)*

CSC_REVERSE
Cloud Standards Coordination: Reversibility *(13 subscribers)*

CSC_SECPRIV
Cloud Standards Coordination: Security & Privacy *(14 subscribers)*

CSC_SLA
Cloud Standards Coordination: SLAs *(13 subscribers)*

DECT
DECT : DECT mailing list *(78 subscribers)*

DECT_A
dect_a : THIS LIST HAS BEEN CLOSED *(3 subscribers)*

DECT_ADVANCED
DECT_Advanced *(16 subscribers)*

DECT_INTEREST_GROUP
DECT_Interest_Group : DECT interest group closed *(0 subscribers)*

DECT_NEWGENERATION
DECT_NewGeneration : DECT_NewGeneration List *(83 subscribers)*

DECT_T
dect_t : THIS LIST HAS BEEN CLOSED *(3 subscribers)*

DECT_ULE
DECT_ULE *(39 subscribers)*

DELIVERABLE-NOTIFICATIONS
deliverable-notifications : deliverable notifications *(87 subscribers)*

DISTRIBUTIONS_INDEPT_DISTRIBUTORS
Distributions_Indept_Distributors: Distributions Indept Distributors list *(8 subscribers)*

E-SIGNATURES_COMMENTS

E-SIGNATURES_Comments: ETSI TC ESI (electronic signatures and infrastructures) *(4 subscribers)*

E-SIGNATURES_NEWS
E-SIGNATURES_NEWS: ETSI TC ESI (electronic signatures and infrastructures) *(540 subscribers)*

E2NA
E2NA *(255 subscribers)*

ECALL
eCall related issues *(29 subscribers)*

EDS-NEWS
eds-news: etsi documentation service news *(141 subscribers)*

EDS_PROMO_3GPP_COMMUNITY
EDS_Promo_3GPP_community *(232 subscribers)*

EDS_PROMO_EVENTS
EDS_Promo_Events *(0 subscribers)*

EDS_PROMO_FORA
EDS_Promo_Fora *(6 subscribers)*

EDS_PROMO_GUESTS
EDS_Promo_Guests *(2 subscribers)*

EDS_PROMO_MESA_COMMUNITY
EDS_Promo_MESA_community - Closed 2010-31-12 *(0 subscribers)*

EDS_PROMO_MISC
EDS_Promo_Misc *(27 subscribers)*

EDS_PROMO_NO_MORE_CUSTOMER
EDS_Promo_No_more_customer *(162 subscribers)*

EE
environmental engineering technical committee membership and mailing list *(58 subscribers)*

EE1
EE1 : (Environmental Conditions) membership and mailing list *(22 subscribers)*

EE1_ANNOUNCE
EE1 ANNOUNCE : THIS LIST HAS BEEN CLOSED *(0 subscribers)*

EE2
EE2 : (power supply) membership and mailing list *(47 subscribers)*

EE2_ANNOUNCE
EE2 Announce - list closed *(0 subscribers)*

EEPS
EE EEPS: Eco-Environmental Product Standards *(61 subscribers)*

EETNT
Energy Efficiencies Through Network Transmission *(0 subscribers)*

EE_ANNOUNCE
environmental engineering announce list - list closed *(0 subscribers)*

EF3
EF3 : EF3 list *(42 subscribers)*

EHEALTH
ETSI Project eHEALTH *(43 subscribers)*

EHEALTH_ANNOUNCE
eHealth_Announce closed 03/03/11 *(0 subscribers)*

EHEALTH_STARTER_GROUP
ehealth_starter_group: eHealth Starter Group Closed 11.04.07 *(3 subscribers)*

EMTEL
EMTEL : Emtel *(76 subscribers)*

EPDECT
epdect : THIS LIST HAS BEEN CLOSED *(113 subscribers)*

ERM
erm : emc and radio spectrum matters distribution *(170 subscribers)*

ERMCC
ermcc: erm co-ordination committee *(23 subscribers)*

ERM_ACEA
No title defined *(18 subscribers)*

ERM_ANNOUNCE
erm_announce : emc and radio spectrum matters distribution closed *(166 subscribers)*

ERM_EMC
ERM_EMC : erm wg on electromagnetic compatibility *(83 subscribers)*

ERM_EMC_ANNOUNCE
erm_emc_announce: erm_emc_announce list closed *(29 subscribers)*

ERM_FLX
ERM_FLX : Flexible Bands *(27 subscribers)*

ERM_ITU-R_WP8A

erm_itu-r_wp8a : preparation for itu-r wp8a closed 16th March 2010 *(0 subscribers)*

ERM_ITU-R_WP8A_P
erm_itu-r_wp8a_p : itu-r wp8a participants closed 16th March 2010 *(5 subscribers)*

ERM_JOINT_TG34_TG28
ERM_Joint_TG34_TG28: ERM TG34 TG28 work on RFID and SRD *(39 subscribers)*

ERM_JTFEA
ERM_JTFEA *(40 subscribers)*

ERM_JTFEA_A_SMGCS_HS_ASMR
ERM_JTFEA_A_SMGCS_HS_ASMR *(15 subscribers)*

ERM_JTFEA_A_SMGCS_HS_MLAT
ERM_JTFEA_A_SMGCS_HS_MLAT *(17 subscribers)*

ERM_JTFEA_GBAS
ERM_JTFEA_GBAS *(17 subscribers)*

ERM_JTFEA_HS_VDL_MODE2
ERM_JTFEA_HS_VDL_MODE2 *(15 subscribers)*

ERM_JTFER
ERM_JTFER *(33 subscribers)*

ERM_NEWS
ERM_NEWS *(17 subscribers)*

ERM_RM
erm_rm : radio matters *(73 subscribers)*

ERM_RM_ANNOUNCE
erm_rm_announce: radio matters list closed *(72 subscribers)*

ERM_TG04
erm_tg04 : automotive emc *(11 subscribers)*

ERM_TG11
erm_tg11 : radio lans *(67 subscribers)*

ERM_TG14
erm_tg14 : radio interfaces under article 4.2 of the r&tte directive *(1 subscriber)*

ERM_TG17
erm_tg17 : standards for broadcast and ancillary communications equipment *(22 subscribers)*

ERM_TG17_WG1
erm_tg17_wg1: erm_tg17 working group 1 *(7 subscribers)*

ERM_TG17_WG1_2_4
erm_tg17_wg1_2_4 : erm_tg17 working groups exploder list *(13 subscribers)*

ERM_TG17_WG3
erm_tg17_wg3 : working group 3 on radio microphones *(27 subscribers)*

ERM_TG17_WG5
erm_tg17_wg5 : active tv reception *(8 subscribers)*

ERM_TG21
erm_tg21 : co-ordination of etsi inputs to rast#10 *(2 subscribers)*

ERM_TG23
erm_tg23 : list closed 27042010 *(14 subscribers)*

ERM_TG25
erm_tg25 : aeronautical *(16 subscribers)*

ERM_TG25_A_CDM
ERM_TG25_A_CDM *(2 subscribers)*

ERM_TG25_A_SMGCS
ERM_TG25_A_SMGCS *(4 subscribers)*

ERM_TG25_DLS
ERM_TG25_DLS *(2 subscribers)*

ERM_TG26
erm_tg26 : maritime *(44 subscribers)*

ERM_TG27
erm_tg27 : radio site engineering *(18 subscribers)*

ERM_TG28
erm_tg28 : generic srd's *(99 subscribers)*

ERM_TG30
erm_tg30 : wireless medical services *(49 subscribers)*

ERM_TG31A
erm_tg31a : ultra wide band for short range devices list closed *(0 subscribers)*

ERM_TG31C
erm_tg31c: ultra wide band sensors list closed *(0 subscribers)*

ERM_TG32
erm_tg32 : pmr List closed *(0 subscribers)*

ERM_TG33
erm_tg33 : measurement methods and their uncertainties List closed *(0 subscribers)*

ERM_TG34

erm_tg34 : rf identification devices *(60 subscribers)*

ERM_TG37
ERM_TG37 : Intelligent Transport Systems *(40 subscribers)*

ERM_TG37_DSRC
ERM_TG37_DSRC : technical discussion on DSRC testing and updating *(12 subscribers)*

ERM_TG39
ERM_TG39 : Code Division Multiple Access (CDMA) *(8 subscribers)*

ERM_TG40
Broadband Disaster Relief *(1 subscriber)*

ERM_TGDMR
ERM_TGDMR : Digital Mobile Radio *(42 subscribers)*

ERM_TGRX
erm_tgrx: ERM Task Group on Receiver parameters list closed 27042010 *(0 subscribers)*

ERM_TGSRR
erm_tgsrr: Automotive and Surveillance Radar *(47 subscribers)*

ERM_TGTLPR
erm_tgtlpr : Tank Level Probing Radar LIST HAS BEEN CLOSED 01/02/2013 *(11 subscribers)*

ERM_TGUWB
Ultra Wide Band *(55 subscribers)*

ERM_WIRELESS_CHARGERS
ERM activity group on "Wireless chargers" *(22 subscribers)*

ESI
esi : etsi tc esi (electronic signatures and infrastructures) *(82 subscribers)*

ESI_ALGO
ESI_ALGO : TC ESI discussion list for maintenance of the ALGO paper *(33 subscribers)*

ESI_ANNOUNCE
esi_announce : etsi tc electronic signatures list closed 03/03/11 *(0 subscribers)*

ESI_ASIG
ESI_ASig *(24 subscribers)*

ESI_CSP_CONFORMANCE
ESI_CSP_Conformance list closed 19 may 2011 *(1 subscriber)*

ESI_TSL
TC ESI discussion list for TSL *(45 subscribers)*

ESP_SUPPORT_TESTING
ESP_SUPPORT_TESTING *(0 subscribers)*

ETSI-EVENTS
ETSI-EVENTS: information on events organized, hosted by ETSI *(1,554 subscribers)*

ETSI-MEDIA-LIST
etsi-media-list : etsi media mailing list for press releases *(96 subscribers)*

ETSI-NEWS
etsi-news: technical news, general news and press announcements from etsi list closed 7th Feb 2011 *(0 subscribers)*

ETSI_AHG_SMART_CHARGING
ETSI_AHG_Smart_Charging *(39 subscribers)*

ETSI_CDN
ETSI_CDN *(16 subscribers)*

ETSI_M441
ETSI M441 coordination group *(55 subscribers)*

ETSI_M462
ETSI_M462 *(11 subscribers)*

ETSI_M490
ETSI M490 List *(52 subscribers)*

ETSI_M493
ETSI_M493 *(73 subscribers)*

EUA_EU
Affairs ad hoc group (Strategic Topic 9) *(26 subscribers)*

FIT
FIT - Future Internet Of Things RFID Networks and Internet Of Things open discussions *(3 subscribers)*

FOE
Board/GA ad hoc group on Finance *(43 subscribers)*

GO4ITCHINA
GO4ITCHINA *(0 subscribers)*

GO4ITC_TECHNICAL
GO4ITC_Technical *(0 subscribers)*

GRID
GRID: Open discussion on ETSI GRID Standardization *(173 subscribers)*
GS
GS:Review of Governance Structure and procedures *(56 subscribers)*
GSC-COM
GSC Communications list *(44 subscribers)*
GSC-EAS
GSC-EAS: Radio Aspects of Electronic Article Surveillance *(21 subscribers)*
GSC-EM
GSC-EM: Emergency Communication *(52 subscribers)*
GSC-HOD
GSC-HoD: *(20 subscribers)*
GSC-IPR
Intellectual Property Rights WG *(30 subscribers)*
GSC-M2M
GSC-M2M: Machine to Machine communication *(76 subscribers)*
GSC-REFORM
GSC HoD ad hoc reform group *(30 subscribers)*
GSC-WPT
GSC Wireless Power Transmission/Transfer Task Force (WPT) *(3 subscribers)*
GSM_ONBOARD_PLANES
GSM_onboard_planes: GSM_onboard_planes list closed *(10 subscribers)*
GTM_1
GTM_1 *(4 subscribers)*
GTM_2
GTM_2 *(0 subscribers)*
HF
hf : etsi tc human factors (hf) *(39 subscribers)*
HF_ANNOUNCE
hf announcement list - List closed February 2011 *(0 subscribers)*
HF_MOBILE
HF_Mobile closed *(12 subscribers)*
HF_MULTICULTURAL_COMMUNICATION
HF_MULTICULTURAL_COMMUNICATION:
HF_MULTICULTURAL_COMMUNICATION STF 287 list closed *(0 subscribers)*
HF_SETUP
HF_SETUP: HF_SETUP STF 285 list *(0 subscribers)*
HF_TELECAREUX
Telecare User Experience closed *(0 subscribers)*
HF_UG
HF_UG: HF_UG STF 285 list *(0 subscribers)*
HF_USER_PROFILE_MANAGEMENT
HF_User_Profile_Management : STF 342 list *(0 subscribers)*
HIPERMAN_WIMAX_TESTING
HiperMAN_WiMAX_testing : HiperMAN WiMAX testing related mailing list closed 27th August 2009 *(0 subscribers)*
HLRG
HLRG: CLOSED + GA ad hoc High Level Review Group *(1 subscriber)*
IC-CG
IC-CG *(3 subscribers)*
ICT_MSP_BRIEFING
ICT_MSP_Briefing *(25 subscribers)*
IMPACT
impact : impact list *(46 subscribers)*
INS_ISG
INS_ISG: Identity and access management for Networks and Services *(8 subscribers)*
INT
IMS Network Testing *(31 subscribers)*
INTELLIGIBILITY-HEARING_IMPAIRED
Intelligibility-Hearing_Impaired *(5 subscribers)*
IPR
ipr: ETSI IPR Special Committee *(246 subscribers)*
ISI_ISG
ISI_ISG *(22 subscribers)*
ITS
ITS *(172 subscribers)*
ITS-NEWS
its-news *(892 subscribers)*
ITS_WG1

ITS_WG1 *(114 subscribers)*

ITS_WG2

ITS_WG2 *(98 subscribers)*

ITS_WG3

ITS_WG3 *(99 subscribers)*

ITS_WG4

ITS_WG4 *(100 subscribers)*

ITS_WG5

ITS_WG5 *(97 subscribers)*

LI

li : etsi tc li (lawful interception) *(120 subscribers)*

LIS_ISG

LIS_ISG: Localisation Industry Standards Industry Specification Group *(24 subscribers)*

LI_ANNOUNCE

li_announce : etsi tc lawful interception announce list: closed 7th june 10 *(39 subscribers)*

LTN_ISG

Low Throughput Networks Industry Specification Group *(25 subscribers)*

LTS

Long Term Vision LTS:(CLOSED) Board ad hoc group on Long Term Strategy *(1 subscriber)*

M2M

M2M *(444 subscribers)*

M2M_RAPPORTEURS

M2M_rapporteurs *(15 subscribers)*

M415_TF_DOSSIER4_CONSULTATION

M415 Task Force on Dossier 4 List *(0 subscribers)*

M436_RFID

M436_RFID list closed *(0 subscribers)*

M436_RFID_CG

M436_RFID_CG *(18 subscribers)*

M436_RFID_CONSULTATION

M436_RFID_CONSULTATION *(14 subscribers)*

M436_RFID_STF

M436_RFID_STF *(10 subscribers)*

MBT_UC_PARTICIPANTS

MBT_UC_participants *(114 subscribers)*

MCD

MCD: Media Content Distribution closed 08/03/2013 *(0 subscribers)*

MCD_CA_DRM_INTEROP

MCD_CA_DRM_INTEROP *(31 subscribers)*

MCD_CDN-I

MCD CDN-I: MCD_CDN_Interconnection list closed 13/11/12 *(0 subscribers)*

MCD_INTEREST_GROUP

MCD Interest Group: open to non ETSI members list closed 12/07/2013 *(0 subscribers)*

MCD_MANAGE

MCD_management_list list closed 12/07/2013 *(5 subscribers)*

MEMBER_SURVEY

MEMBER_SURVEY *(1,933 subscribers)*

MESA_ORGANIZATION

mesa_organization: main distribution list for all mesa related information - Closed 31-12-2010 *(54 subscribers)*

MESA_PS_MEM

EDS_Promo_MESA_community - Closed 31-12-2010 *(0 subscribers)*

MESA_SC

mesa_sc: mesa steering committee - Closed 31-12-2010 *(52 subscribers)*

MESA_SSG_SA

mesa_ssg_sa: mesa ssg services and applications - Closed 31-12-2010 *(74 subscribers)*

MESA_TSG_SYS

mesa_tsg_sys: mesa tsg system - Closed 31-12-2010 *(51 subscribers)*

MOI_ISG

MOI_ISG: Measurement Ontology for IP traffic *(11 subscribers)*

MSG

MSG : Mobile Standards Group *(65 subscribers)*

MTC

MTC *(0 subscribers)*

MTC_ISG

MTC_ISG: Mobile Thin Client *(1 subscriber)*

MTS-GEN
MTS_Gen *(58 subscribers)*
MTS-IPT-SIGTRAN
MTS-IPT-SIGTRAN :MTS-IPT-SIGTRAN closed 12thAug 09. Neocase ref 84185 *(0 subscribers)*
MTS-IPT-SIP
MTS-IPT-SIP : MTS-IPT-SIP closed 12th Aug 09 Neocase ref 84185 *(0 subscribers)*
MTS_TDL_SC
MTS_TDL_SC *(12 subscribers)*
MTS_TTCN-3_MAINTENANCE
MTS_TTCN-3_maintenance *(0 subscribers)*
NFV_AVINF_WG
NFV_AVINF_WG *(281 subscribers)*
NFV_E2E_ARCH
NFV_E2E_Architecture *(195 subscribers)*
NFV_ISG
Network Functions Virtualisation Industry Specification Group *(690 subscribers)*
NFV_MANO_WG
NFV_MANO_WG *(296 subscribers)*
NFV_NOC_ISG
Network Operator Council NFV *(47 subscribers)*
NFV_PER_EG
NFV_PER_EG *(106 subscribers)*
NFV_POC
NFV Proof of Concept Group *(117 subscribers)*
NFV_RELAV_WG
NFV_RELAV_WG *(206 subscribers)*
NFV_REQ
NFV Requirements Rapporteurs Group *(87 subscribers)*
NFV_SEC_EG
NFV_SEC_EG *(149 subscribers)*
NFV_SW_ARCH_WG
NFV_SW_ARCH_WG *(272 subscribers)*
NFV_TSC
NFV_TSC *(30 subscribers)*
NFV_USE_CASES
NFV_Use_Cases *(182 subscribers)*
NGN_IMS
NGN_IMS: Joint 3GPP-TISPAN open list *(77 subscribers)*
NGN_INTERCONNECT
NGN_Interconnect closed 12th Aug 09 neocase 83766 *(6 subscribers)*
NSO-CONTACTS
nso-contacts :nso voting contacts *(79 subscribers)*
NSOS_TRANSLATORS
NSOs_Translators *(24 subscribers)*
NSO_INFO
nso_info : distribution list for nso information *(84 subscribers)*
NSO_OFFICIAL_CONTACTS
NSO Official Contacts for OJEU *(22 subscribers)*
NTECH
NTECH *(161 subscribers)*
NUG
Nug *(19 subscribers)*
NWIOT_TESTBED
NWIOT_testbed *(22 subscribers)*
OCG
ocg: list of ocg members (ep and tc chairmen) *(206 subscribers)*
OCG_ECNS
OCG_ECNS: OCG ad hoc group on Electronic Communications Networks & Services List Closed 9/12/11 *(0 subscribers)*
OCG_IOP
OCG ad hoc group on Interoperability *(0 subscribers)*
OCG_MCP
OCG_MCP : OCG EC Mandate Coordination Processes *(23 subscribers)*
OCG_RTTED
ocg_rtted : steering committee on harmonised standards *(64 subscribers)*
OCG_SECURITY
ocg_security: ocg ad hoc group on security issues *(31 subscribers)*
OEU_ISG

OEU_ISG *(16 subscribers)*

ORI_ISG
Open Radio equipment Interface Industry Specification Group *(106 subscribers)*

OSG_ISG
Open Smart Grid Industry Specification Group *(8 subscribers)*

PLT
plt : etsi project powerline telecommunications *(33 subscribers)*

PLT_ANNOUNCE
etsi project powerline telecommunications announcement list - List Closed *(0 subscribers)*

PLT_INHOUSE
PLT_InHouse@list.etsi.org : In-House PLT closed 7th July 08 *(0 subscribers)*

PLT_SC_STF332
PLT_SC_STF332 : etsi powerline telecommunications STF 332 Steering Committee *(0 subscribers)*

PLT_WI_DISCUSSION
PLT_WI_DISCUSSION@list.etsi.org: list closed 18th Jan 2010 *(0 subscribers)*

PLUGTESTS-EBXML
Plugtests-ebxml: Discussion list on ebxml Interoperability matters *(0 subscribers)*

PLUGTESTS-FMCA
Plugtests-fmca : discussion list on FMCA interoperability matters *(0 subscribers)*

PLUGTESTS-PADES
plugtests-pades *(23 subscribers)*

PLUGTESTS-XADES
plugtests-xades *(33 subscribers)*

PLU_RFID_CHINA
PLU_RFID_CHINA *(1 subscriber)*

PORTAL-FEATURE-REQUESTS
Portal Feature Requests *(2 subscribers)*

PUBLICINTERNETACCESS
PublicInternetAccess List *(0 subscribers)*

QKD_ISG
QKD_ISG: Quantum Key Distribution Industry Specification Group *(25 subscribers)*

QKD_ISG_TECH
QKD_ISG_TECH *(8 subscribers)*

RADIO_BRIEFING
Radio Briefing *(108 subscribers)*

RCS_VOLTE_1_SLOVENIA
RCS_VOLTE_1_SLOVENIA *(20 subscribers)*

RRS
RRS: Reconfigurable Radio Systems *(118 subscribers)*

RRS_WG1
RRS WG1 : System Aspects *(74 subscribers)*

RRS_WG2
RRS WG2 : Reconfigurable Radio Equipment Architecture *(54 subscribers)*

RRS_WG3
RRS WG3 : Functional Architecture and Cognitive Pilot Channel *(52 subscribers)*

RRS_WG4
RRS WG4 : Public Safety *(52 subscribers)*

RT
RT Railway Telecommunications *(35 subscribers)*

RT_DMO
RT_DMO : RT Direct Mode Operation *(1 subscriber)*

S1_ANSI-41
s1_ansi-41: THIS LIST HAS NOW BEEN CLOSED *(0 subscribers)*

S1_CAMEL
s1_camel : THIS LIST HAS NOW BEEN CLOSED *(0 subscribers)*

S1_CHARGING
s1_charging : THIS LIST HAS NOW BEEN CLOSED *(0 subscribers)*

S1_DISCUSS
s1_discuss : THIS LIST HAS NOW BEEN CLOSED *(0 subscribers)*

S1_HANDOVER
s1_handover : THIS LIST HAS NOW BEEN CLOSED *(0 subscribers)*

S1_IP
s1_ip : THIS LIST HAS NOW BEEN CLOSED *(0 subscribers)*

S1_LCS
s1_lcs : THIS LIST HAS NOW BEEN CLOSED *(12 subscribers)*

S1_MM
smg1 : list for s1_mm : THIS LIST HAS NOW BEEN CLOSED *(0 subscribers)*

S1_MULTICALL
s1_multicall : THIS LIST HAS NOW BEEN CLOSED *(0 subscribers)*
S1_PRESENCE
s1_presence: THIS LIST HAS NOW BEEN CLOSED *(0 subscribers)*
S1_QOS
s1_qos : THIS LIST HAS NOW BEEN CLOSED *(0 subscribers)*
S1_SMS
s1_sms : THIS LIST HAS NOW BEEN CLOSED *(0 subscribers)*
S1_VHE
s1_vhe : THIS LIST HAS NOW BEEN CLOSED *(0 subscribers)*
SA1_OSA
sa1_osa : THIS LIST HAS NOW BEEN CLOSED *(0 subscribers)*
SAFETY
safety : etsi tc for telecommunications equipment safety *(29 subscribers)*
SCP_ANNOUNCE
ETSI Project Smart Card Platform - THIS LIST HAS NOW BEEN CLOSED *(0 subscribers)*
SCP_PLENARY
ETSI Project Smart Card Platform - Plenary discussion *(380 subscribers)*
SCP_REQUIREMENTS
SCP_REQUIREMENTS : REQUIREMENTS WORKING GROUP *(263 subscribers)*
SCP_TECHNICAL
SCP_TECHNICAL : Technical Working Group *(299 subscribers)*
SCP_TEST
SCP_TEST *(94 subscribers)*
SCP_WG1
THIS LIST HAS BEEN CLOSED *(10 subscribers)*
SCP_WG2
THIS LIST HAS BEEN CLOSED *(8 subscribers)*
SCP_WG3
THIS LIST HAS BEEN CLOSED *(11 subscribers)*
SES
ses : etsi tc satellite earth stations and systems (ses) *(35 subscribers)*
SESEI
SESEI *(14 subscribers)*
SES_AES
ses_aes : [List closed] etsi tc ses wg on aeronautical satellite earth stations *(2 subscribers)*
SES_ANNOUNCE
: etsi tc satellite earth stations and systems announcement list closed 21/03/11 *(0 subscribers)*
SES_BSM
ses_bsm : ses_bsm (broadband satellite multimedia) list closed 17//04/12 *(37 subscribers)*
SES_BSM_C2P
BSM C2P work items - list closed 29/09/11 *(0 subscribers)*
SES_ECAS
SES_ECAS:European Commission Activity support list closed 17/04/12 *(0 subscribers)*
SES_ECSS
SES WG on European Co-operation for Space Standardisation *(0 subscribers)*
SES_GMR
ses_gmr : etsi tc ses geo_mobile_radio (gmr) interface working group-Closed *(7 subscribers)*
SES_GMR_ANNOUNCE
ses gmr announce list list closed *(0 subscribers)*
SES_HARM
SES_HARM *(9 subscribers)*
SES_MAR_ESV
ses_mar_esv : SES working group on Maritime Earth Stations on Board Vessels *(16 subscribers)*
SES_MSS
ses_mss : etsi tc ses SES WG on Mobile Satellite Systems (mss) working group list closed 17/04/12 *(15 subscribers)*
SES_SATEC
SES_SatEC: Satellite Emergency Communications *(23 subscribers)*
SES_SCN
ses_ scn Satellite Communications and Navigation *(41 subscribers)*
SES_SDR
ses_sdr : ses_sdr satellite digital radio *(13 subscribers)*

SES_SUMTS
ses_sumts : working group on s-umts-Closed *(14 subscribers)*
SES_SUMTS_ANNOUNCE
ses s-umts announce list - List closed *(0 subscribers)*
SG_GNGN
Global NGN stakeholders group on future services and capabilities for NGN *(23 subscribers)*
SG_UCI
SG_UCI : UCI stakeholders group on UCI matters *(0 subscribers)*
SMARTBAN
SmartBAN : Smart Body Area Networks *(42 subscribers)*
SMART_GRIDS
Smart_Grids *(17 subscribers)*
SMG2
SMG2 Archives only *(0 subscribers)*
SMG2UMTS-L1
Smg2umts-l1 archives only *(1 subscriber)*
SMG2_ALPHA
SMG2_ALPHA Archives only *(0 subscribers)*
SMG_PLENARY
SMG_PLENARY Archives only *(0 subscribers)*
SMT_ISG
SMT_ISG *(44 subscribers)*
SOSINTEROP
SOSinterop: SOS Interoperability workshop series *(145 subscribers)*
STF386_ERM_PMSE
STF386_ERM_PMSE *(13 subscribers)*
STF397_TG34_RFID_DAA
STF397_TG34_RFID_Detect-And-Avoid closed *(1 subscriber)*
STF411_ERM_LDC
STF411_ERM_LDC *(10 subscribers)*
STF416_EACCESSIBILITY_PH2
STF416_eAccessibility_Ph2 *(12 subscribers)*
STF427_ESI_QF_ESIGN
STF427_ESI_QF_eSign list closed 15/03/2013 *(16 subscribers)*
STF427_QF1
STF427_QF1 *(7 subscribers)*
STF427_QF2
STF427_QF2 *(6 subscribers)*
STF427_QF3
STF427_QF3 *(9 subscribers)*
STF439_ENERGY_EFFICIENCY_KPI
STF439_Energy_Efficiency_KPI *(18 subscribers)*
STF440_ATTM_AT3_CABLE_NW_IPV6
STF440_ATTM_AT3_Cable_NW_IPv6 *(11 subscribers)*
STF440_CABLE_IPV6
STF440_CABLE_IPv6 *(11 subscribers)*
STF444_DECT_NG_ULE
STF444_DECT_NG_ULE *(8 subscribers)*
STF447_ITS_GN_DCC
STF447_ITS_GN_DCC *(7 subscribers)*
STF448_ITS_LDM
STF448_ITS_LDM *(11 subscribers)*
STF449_ITS_TEST_MAINT
STF449_ITS_Test_Maint *(7 subscribers)*
STF450_INT_VALID_DIAMETER
STF450_INT_Valid_Diameter list closed 15/03/13 *(9 subscribers)*
STF451_MTS_TTCN3_TOOLS_2012
STF451_MTS_TTCN3_tools_2012 *(13 subscribers)*
STF452_ITS5_SECURITY_TEST
STF452_ITS5_Security_Test *(16 subscribers)*
STF453_INT_TEST_3GR10
STF453_INT_Test_3GR10 *(9 subscribers)*
STF454_MTS_TDL
STF454_MTS_TDL *(9 subscribers)*
STF455_BSMD_VALID
STF455_BSMD_valid *(12 subscribers)*
STF456_MSG_ECALL
STF456_MSG_eCall *(7 subscribers)*

STF457
STF457 *(14 subscribers)*
STF457_T1
STF457_T1 *(12 subscribers)*
STF457_T2
STF457_T2 *(9 subscribers)*
STF457_T3
STF457_T3 *(6 subscribers)*
STF458
STF458 *(21 subscribers)*
STF458_A1
STF458_A1 *(18 subscribers)*
STF458_A2
STF458_A2 *(15 subscribers)*
STF459
STF459 *(10 subscribers)*
STF459_CONFORMITY
STF459_Conformity *(5 subscribers)*
STF459_FRAMEWORK
STF459_Framework *(10 subscribers)*
STF460
STF460 *(6 subscribers)*
STQ
STQ: Speech and multimedia Transmission Quality *(59 subscribers)*
STQ_AURORA
stq_aurora : etsi stq aurora project for distributed speech recognition List Closed *(72 subscribers)*
STQ_MOBILE
stq_mobile : QoS aspects of mobile telephony *(44 subscribers)*
SWCOPYRIGHT
IPR Software Copyright Drafting group *(24 subscribers)*
TBINFO
tbinfo : tbinfo list has been closed 09/03/2005 *(0 subscribers)*
TC106X-4
tc106x-4 : safety joint working group tc 106x wg4 *(14 subscribers)*
TC106X-7
tc106x-7 : safety joint working group tc 106x wg7 *(11 subscribers)*
TESTCOM_2003_AC
TESTCOM_2003_AC : Arï¿½a Coordinators *(0 subscribers)*
TESTCOM_2003_SC
TESTCOM_2003_SC : Steering Committee *(0 subscribers)*
TESTCOM_2003_TPC
TESTCOM_2003_TPC: TPC Technical Program Committee *(0 subscribers)*
TEST_DB
list for testing dbms feature *(0 subscribers)*
TET
TET *(11 subscribers)*
TETRA
TETRA : Technical Committee TETRA *(73 subscribers)*
TETRAWG1
TETRAWG1 : User Requirements / Services *(52 subscribers)*
TETRAWG1_ANNOUNCE
tetrawg1 announce list closed *(0 subscribers)*
TETRAWG3
TETRAWG3 : Network aspects *(51 subscribers)*
TETRAWG38
TETRAWG38 : PEI list closed 5th Jan 2011 *(0 subscribers)*
TETRAWG3_ANNOUNCE
tetra wg3announce list closed *(0 subscribers)*
TETRAWG4
TETRAWG4 : TETRA High Speed Data *(60 subscribers)*
TETRAWG4_ANNOUNCE
tetra wg4 announce list closed *(0 subscribers)*
TETRAWG5
TETRAWG5 : TETRA Voice coding *(27 subscribers)*
TETRAWG5_ANNOUNCE
tetrawg5_announce : tetrawg5_announce list closed *(0 subscribers)*
TETRAWG6
TETRAWG6 : TETRA Security *(44 subscribers)*

TETRAWG6_ANNOUNCE
tetra wg6 announce closed *(0 subscribers)*
TETRAWG8
TETRAWG8 : TETRA DMO (Direct Mode Operation) *(35 subscribers)*
TETRAWG8_ANNOUNCE
tetra wg8 announce list closed *(0 subscribers)*
TETRA_ANNOUNCE
etsi project tetra announcement list list closed *(0 subscribers)*
TETRA_WORKSHOP
TETRA_workshop List closed 7th June 2012 *(9 subscribers)*
TFES
TFES : Task Force for European Standards for IMT-2000 *(26 subscribers)*
TISPAN_EMTEL
TISPAN_EMTEL: TISPAN project EMTEL on Emergency communications *(0 subscribers)*
TISPAN_F-MMS
TISPAN_F-MMS: TISPAN project F-MMS *(0 subscribers)*
TISPAN_FORUM
TISPAN_FORUM: TISPAN open list *(0 subscribers)*
TISPAN_FUTURE_ACTIVITIES
TISPAN_Future_Activities list closed 19-10-12 *(2 subscribers)*
TISPAN_GEN
TISPAN_GEN: technical committee list closed 19-10-12 *(0 subscribers)*
TISPAN_NGN
TISPAN_NGN: technical committee list dealing with NGN Project matters closed 19-10-12 *(0 subscribers)*
TISPAN_STF328_SG
TISPAN_STF328_SG: IMS NNI Interop Closed *(0 subscribers)*
TISPAN_WG1
TISPAN_WG1: Services done by CT on the request of Helene Schmidt *(155 subscribers)*
TISPAN_WG2
TISPAN_WG2: Architecture *(59 subscribers)*
TISPAN_WG2_IPTV
TISPAN_WG2_IPTV list closed 19-10-12 *(0 subscribers)*
TISPAN_WG3
TISPAN_WG3: Protocols closed 19-10-12 *(56 subscribers)*
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oneM2M_members *(0 subscribers)*

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# LISTSERV Archives

## LIST.ETSI.ORG

This LISTSERV server is located at LIST.ETSI.ORG. Below you will find all lists that have been configured for public archiving. To access a specific list, simply click on the name of the list in the table. To find confidential or unlisted lists, type in the list name in the search box to the right. For lists that have been configured with an HTML description, you can get more information about the list by hovering the mouse over the list name.

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[Previous] [3GPP] [3GPP] [3GPP] [3GPP–AT1] [AT2–CONS] [CONS–EHEA] [EHEA–ERM_] [ERM_–FI] [FO–ISG_] [ISG_–MESA] [MESA–NSO-] [NSOS–RC] [RE–SE] [SF–STF5] [STF_–TISP] [TISP–Z] [Next]

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# Appendix 29

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## RAN1-NR#2 - Meeting information

Share this meeting:

| | |
|---|---|
| Meeting identifier : | 18512 |
| Meeting Contacts : | Mr. Patrick Merias |
| Meeting Reference : | 3GPPRAN1-NR#2 |
| Meeting Type : | Ad Hoc |
| Location : | Qingdao , CN |
| Start Date : | 27 Jun 2017 09:00 (GMT+08:00) Beijing, Chongqing, Hong Kong, Urumqi |
| End Date : | 30 Jun 2017 20:00 (GMT+08:00) Beijing, Chongqing, Hong Kong, Urumqi |
| Check-In starts at : | 08:30 (GMT+08:00) Beijing, Chongqing, Hong Kong, Urumqi |

More options

Meeting's contributions (Tdocs)
Agenda
Report
Invitation

List of 2138 Tdocs
Contribution not available
Download TDoc list (Excel)

List of participants: 556 registered, 394 attended

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# Appendix 30



# 3GPP_TSG_RAN_WG1 Archives

December 1998

## 3GPP_TSG_RAN_WG1@LIST.ETSI.ORG

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Subject: Inv. to UMTS-L1 & 3GPP TSG RAN WG1/WG4
From: "Toskala Antti (NTC/Espoo)" <[log in to unmask]>
Reply To: Toskala Antti (NTC/Espoo)
Date: Wed, 23 Dec 1998 10:56:00 +0200
Content-Type: multipart/mixed
Parts/Attachments: text/plain (638 bytes) , INVIT.DOC (174 kB)

Dear All,

Nokia has the pleasure to invite you to the next SMG2 UMTS-L1 Expert Group meeting 18.-20.1.1999 and the first 3GPP TSG RAN WG1/4 meeting 21.-22.1.1999,
both to be arranged at Hotel Serena Korpilampi, Espoo, Finland.

Please find attached the meeting inviation.

I would like you to notice the document submission deadlines in terms of copying as there will be several meetings happening here during the week of starting 18th, and our copying service will be really occupied.

Also I want to wish you all on the behalf of Nokia UMTS-L1 & RAN WG1/WG4 team:

Merry Christmas and A Happy New Year!

Antti Toskala
Nokia Telecommunications

<<INVIT.DOC>>

ATOM RSS1 RSS2

# Appendix 31

**3GPP TSG RAN meeting #76** **RP-171409**
**West Palm Beach, USA, June 5 – 8, 2017**

Agenda Item: 3

Source: ETSI MCC

Title: Report of 3GPP TSG RAN meeting #75,
Dubrovnik, Croatia, March 6 – 9, 2017

Document for: Approval

# Report of 3GPP TSG RAN meeting #75

# held in Dubrovnik, Croatia
# March 6 - 9, 2017



The present document has been developed within the 3rd Generation Partnership Project (3GPP ™) and it has not been subject to any approval process by the 3GPP Organizational Partners.

Keywords

RAN, UTRA, LTE, NR, 5G

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# Meeting Organisation

| | | |
|---|---|---|
| Meeting: | 3GPP TSG RAN #75 | |
| Meeting location: | Dubrovnik, Croatia | |
| | Rixos hotel, room Mistral A & B | |
| Scheduled: | Monday 06.03.2017 (9am) - Thursday 09.03.2017 (8pm) | |
| Host: | European Friends of 3GPP (EF3) | |
| TSG RAN Chairman: | Dino Flore (Qualcomm, ATIS) | email: oflore@qti.qualcomm.com |
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| TSG RAN MCC Support: | Joern Krause (ETSI MCC) | email: Joern.Krause@etsi.org |
| Email reflector: | 3GPP_TSG_RAN@LIST.ETSI.ORG | |
| Technical documents: | ftp://ftp.3gpp.org/tsg_ran/TSGR_75/Docs | |

| | | | | |
|---|---|---|---|---|
| next meetings: | TSG RAN #76 | 05.06. - 08.06.2017 | West Palm Beach, USA | host: NAF3 |
| | TSG RAN #77 | 11.09. - 14.09.2017 | Sapporo, Japan | host: ARIB & TTC |

# Executive Summary

3GPP TSG RAN meeting #75 was held in Dubrovnik, Croatia, March 6-9, 2017, hosted by the European Friends of 3GPP (EF3). The meeting had 355 participants (see Annex A) and 855 Technical Documents (see Annex B).

Main topics/decisions:

- **block approval**: RAN #75 continued to use "block approval process" for agreed CR packages from WGs and WI/SI status reports, i.e. these contributions were only discussed on request (flag) otherwise the CRs were considered approved and the % complete and target date of the status reports were considered approved.

- **time budget analysis**: RAN #75 assessed the modified time budget requests in WI/SI status reports for already approved WIs/SIs relative to the time budget status endorsed by RAN #74 in RP-162530; the RAN WG chairmen provided their estimates of remaining time budgets in their WGs (see e.g. WG status reports); new WIs/SIs provided their time budget requests in the WI/SI descriptions; the resulting endorsed time budget allocations for all approved WIs/SIs after RAN #75 was endorsed by email in **RP-170822** (1 time unit (TU) ~ 2h). RAN5 WIs/SIs are excluded from this time budget handling.

- **elections** for a new RAN leadership (1 chairman and 3 vice-chairmen) were carried out (see AI 17) with 4 votings (274 companies entitled to vote): elected were:
  - RAN chairman: Mr. Balázs Bertényi, Nokia Corporation / ETSI
  - RAN vice-chairman: Mr. Vince Spatafora, AT&T / ATIS
  - RAN vice-chairman: Dr. Xiaodong Xu, China Mobile Com. Corporation / CCSA
  - RAN vice-chairman: Mr. Satoshi Nagata, NTT DOCOMO INC. / ARIB

- **REL-13**: Apart from open REL-13 RAN5 testing WIs the only open REL-13 WI/SI in RAN is: REL-13 RAN4 SI: FS_LTE_LAA_multinode_test (special handling like a testing WI of RAN5).

- **REL-14 freeze**: REL-14 was frozen with 18 granted REL-14 Core part exceptions (see below). REL-14 ASN.1 freeze is planned for June 17.



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- **working agreement:** "Both the new work items in RP-170732 and RP-170852 (plus attachment in RP-170836) are approved" can be challenged until 29.05.2017; if challenged a voting would take place at RAN #76 (for details about working agreements see 3GPP Working Procedures Annex G and http://www.3gpp.org/specifications-groups/working-agreements ).

- **5G**:
  - An **updated REL-15 workplan** for eMBB was endorsed (RP-170741) completing stage 3 for Non-Standalone (NSA) 5G-NR eMBB (incl. low latency support) with architecture option 3 by Dec.17 and an intermediate implementable version with frozen ASN.1 for Non-Standalone 5G NR eMBB by March 18. The schedule for Standalone (SA) 5G-NR in Rel-15 is maintained: stage 3 completion: June 2018; ASN.1 freeze Sep. 2018.
  - **REL-14 SI** FS_NR_newRAT was completed with TR 38.912. Also a TR 38.805 about 60 GHz Unlicensed Spectrum and a TR 38.901 on channel model for frequencies from 0.5 to 100 GHz were approved under this SI.
  - A new **REL-15 WI** NR_newRAT (RP-170855) plus 8 NR related SIs (on non-terrestrial networks, CU-DU lower layer split, unlicensed spectrum, NOMA, integrated access and backhaul, test methods, evaluation methodology of new V2X use cases, self-evaluation towards IMT-2020 submission) were started.
    Note: A separate REL-15 WI was started for LTE connectivity to 5G-CN ("option 5", RP-170840).
  - RAN #76 also endorsed some **RAN4 specific guidance for NR**: for NR RAN4 work (RP-170754), to have another RAN4 NR ad hoc in Sep. 17 in Nagoya, Japan (RP-170755) and a process for NR bands, LTE/NR band combinations and CA for NR/NR band combination specification work (RP-170826).

- A **joint RAN-SA session** was held on Wed evening (see agenda RP-170778 and minutes RP-170784) addressing topics like 5G forward compatibility, 5G RAN & SA WID, updated 5G RAN timeplan, N2/N3 termination, LTE light connection.

- **RAN6**: RAN #75 approved updated terms of reference (ToR) for RAN1 (RP-170521), RAN2 (RP-170522) and RAN6 (RP-170523) which will become effective after RAN #76 in June 2017 and which transfer the handling of UMTS of RAN1 and RAN2 to RAN6.

- **WI summary**: At RAN #75, WI summaries (a descriptive summary of the features actually included in the specs) were presented for the following 12 REL-14 WIs:
  - LTE_V2X-Core: RP-170237
  - LTE_eLAA-Core: RP-170269
  - LTE_eFDMIMO-Core: RP-170173
  - LTE_eMob-Core: RP-170369
  - LTE_UL_CAP_enh-Core: RP-170115
  - LTE_VoLTE_ViLTE_enh-Core: RP-170323
  - LTE_FNBID-Core: RP-170478
  - LTE_WLAN_aggr-Core: RP-170330
  - LTE_WLAN_eLWIP-Core: RP-170706
  - eDECOR-UTRA_LTE-Core: RP-170547
  - UMTS_QMC_Streaming-Core: RP-170259
  - DECOR_GERAN-Core: RP-170194 (was actually already completed in Sep.16)

  Note: The rapporteur has to provide a WI summary to the RAN meeting at which a Core part WI is declared to be 100% complete; this WI summary has to be reviewed by the leading WG of the WI beforehand to check the technical correctness. Spectrum related Core part WI are excluded from this activity.

- **ITU-R** (see AI 8)**:**
  - frequency sharing/interference analysis in the frequency range between 24.25 GHz and 86 GHz: LSout RP-170021 (in reply to RP-161966) with parameters was approved by email and sent directly to ITU-R WP5D;
  - proposals for candidate radio interface technologies for IMT-2020: LSin RP-170044 and RP-170045 (ITU-R WP5D workshop on 04.10.17) from ITU-R WP5D were answered in LSout RP-170761 (for SA & PCG review); email discussion until RAN #76 to verify if any ITU-R requirement need to be added to TR 38.913;
  - ITU-R M.1457: LSin RP-170046 received from ITU-R WP5D, reply LSout RP-170762 provided to SA/PCG for review; 3GPP will contribute based on REL-13/14 specs (by 24.01.18);
  - Intelligent Transport Systems: LSout RP-170763 about V2V/V2X in reply to RP-171979 was provided to SA/PCG for review
  - visible light for broadband communications: LSin RP-170028 was noted
  - Smart Grid utility management systems: LSin RP-170029 from ITU-R WP1A was answered in LSout RP-170802 which is provided to SA/PCG for review



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  - integration of satellite in IMT2020: LSout RP-170850 in reply to RP-161971 & RP-161965 was provided to SA & PCG for review

- Incoming Liaison Statements/Letters to ITU: 33, see Annex C

- Outgoing Liaison Statements/Letters to ITU: 12, see Annex D

- 21 closed work items (WI) in March 2017 (15 Core, 1 Perf., 5 Testing):

  - 4 RAN1 REL-14 Core part WIs:
    - Core part: Enhanced LAA for LTE (700160, LTE_eLAA-Core)
    - Core part: Enhancements on Full-Dimension (FD) MIMO for LTE (710177, LTE_eFDMIMO-Core)
    - Core part: Uplink Capacity Enhancements for LTE (710179, LTE_UL_CAP_enh-Core)
    - Core part: LTE-based V2X Services (720190, LTE_V2X-Core)
  - 4 RAN2 REL-14 Core part WIs:
    - Core part: Enhanced LTE-WLAN Aggregation (LWA) (710175, LTE_WLAN_aggr-Core)
    - Core part: Further mobility enhancements in LTE (710178, LTE_eMob-Core)
    - Core part: Voice and Video Enhancement for LTE (730178, LTE_VoLTE_ViLTE_enh-Core)
    - Core part: Quality of Experience (QoE) Measurement Collection for streaming services in UTRAN (730179, UMTS_QMC_Streaming-Core)
  - 3 RAN3 REL-14 Core part WIs:
    - Core part: Flexible eNB-ID and Cell-ID in E-UTRAN (730180, LTE_FNBID-Core)
    - Core part: Enhanced LTE WLAN Radio Level Integration with IPsec Tunnel (eLWIP) (730186, LTE_WLAN_eLWIP-Core)
    - Core part: Enhancements of Dedicated Core (DECOR) Networks for UMTS and LTE (740167, eDECOR-UTRA_LTE-Core)
  - 3 RAN4 REL-14 Core part WIs (which have no Perf. part):
    - Core part: Addition of 1.4 and 3 MHz Channel Bandwidth to E-UTRA operating band 65 for CGC (Complementary Ground Component) operations in Region 1 (740173, LTE_1980_2170_REG1_addBWs-Core)
    - Core part: Addition of band 25 and 26 to LTE MTC cat.0 (740178, LC_MTC_LTE_cat0_B25_B26-Core)
    - Core part: Addition of bands 25 and 40 to LTE MTC cat.1 (740179, LTE_MTCe2_L1_cat1_B25_B40-Core)
  - 1 RAN4 REL-14 feature with Core & Perf. part WI:
    - LTE Advanced inter-band Carrier Aggregation Rel-14 for 3DL/3UL (700x72, LTE_CA_R14_3DL3UL)
  - 5 RAN5 UE Conformance Test Aspects for:
    - REL-7, Multimedia Telephony Services for IMS (MTSI) over fixed access (690069, MTSI_FIXED_ACCESS-UEConTest)
    - REL-12, Network-Assisted Interference Cancellation and Suppression for LTE (690070, LTE_NAICS-UEConTest)
    - REL-13, Indoor Positioning Enhancement Support for LTE and UMTS (720099, UTRA_LTE_iPos_enh-UEConTest)
    - REL-13, Further Enhancements of Minimization of Drive Tests for E-UTRAN (721000, LTE_eMDT2-UEConTest)
    - REL-14, LTE Band 41 UE power class 2 operation (730076, LTE_B41_UE_PC2-UEConTest)

  Note: REL-15 WI LTE700_Europe_PPDR-Perf was stopped as not needed.

- 4 closed REL-14 study items (SI) in March 2017:
  - RAN1: Study on New Radio (NR) Access Technology (710062, FS_NR_newRAT)
  - RAN1: Study on further enhancements to Coordinated Multi-Point (CoMP) Operation for LTE (710061, FS_feCOMP_LTE)
  - RAN3: Study on Context Aware Service Delivery in RAN for LTE (710060, FS_LTE_context)
  - RAN4: Feasibility Study on LTE Advanced Carrier Aggregation of Band 3 and Band 39 (710059 FS_LTE_CA_B3_B39)

  Note: RAN4 REL-15 SI FS_LTE_BW_flex was stopped, topic may be addressed under WI NR_newRAT.

- 18 granted REL-14 Core part exceptions in order to complete these WIs by RAN #76 still in REL-14:

  - 3 RAN1 REL-14 Core part WIs:
    - eMBMS enhancements for LTE (710181, MBMS_LTE_enh2-Core) RP-170201



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  - Further enhanced MTC for LTE (720192, LTE_feMTC-Core) RP-170463
  - Enhancements of NB-IoT (720193, NB_IOTenh-Core) RP-170842

- 13 RAN4 REL-14 Core part WIs:
  - LTE Advanced intra-band CA for xDL/yUL including contiguous and non-contiguous spectrum (700175, LTE_CA_R14_intra-Core) RP-170190
  - LTE Adv. inter-band CA Rel-14 for 2DL/1UL (700170, LTE_CA_R14_2DL1UL-Core) RP-170125
  - LTE Adv. inter-band CA Rel-14 for 3DL/1UL (700176, LTE_CA_R14_3DL1UL-Core) RP-170310
  - LTE Adv. inter-band CA Rel-14 for 4DL/1UL (700174, LTE_CA_R14_4DL1UL-Core) RP-170191
  - LTE Adv. inter-band CA Rel-14 for 5DL/1UL (700169, LTE_CA_R14_5DL1UL-Core) RP-170142
  - LTE Adv. inter-band CA Rel-14 for 2DL/2UL (700171, LTE_CA_R14_2DL2UL-Core) RP-170313
  - LTE Adv. inter-band CA Rel-14 for xDL/2UL with x=3,4,5 (700173, LTE_CA_R14_xDL2UL-Core) RP-170152
  - Radiated performance requirements for the verification of multi-antenna reception of UEs in LTE (710176, LTE_MIMO_OTA-Core) RP-170277
  - LTE UE TRP and TRS and UTRA Hand Phantom related UE TRP and TRS Requirements (580137, LTE_UTRA_TRP_TRS-Core) RP-170222
  - LTE Measurement Gap Enhancement (710183, LTE_meas_gap_enh-Core) RP-170275
  - Requirements for a new UE category with single receiver based on Category 1 for LTE (730185, LTE_UE_cat_1RX-Core) RP-170768
  - New band support for Rel-14 Narrowband Internet of Things (NB-IOT) (730183, NB_IOT_R14_bands-Core) RP-170141
  - Introduction of new band support for 4Rx antenna ports for LTE (740171, LTE_4Rx_AP_DL_bands-Core) RP-170306

- 2 RAN6 REL-14 Core part WIs:
  - Positioning Enhancements for GERAN (721103, ePOS_GERAN-Core) RP-170057
  - Radio Interface Enhancements for Extended Coverage GSM for support of Cellular Internet of Things (730177, CIoT_EC_GSM_radio_enh-Core) RP-170058

- 1 WI shifted from REL-14 to REL-15:
  - Core part: Signalling reduction to enable light connection for LTE (710173, LTE_LIGHT_CON-Core)

- 39 new approved work items (WI) in March 2017 (18 Core, 13 Perf., 8 Testing):

- 8 RAN1 REL-15 Core part WIs:
  - New Radio Access Technology RP-170855
  - V2X phase 2 based on LTE RP-170798
  - Even further enhanced MTC for LTE ** RP-170732
  - Further NB-IoT enhancements ** RP-170852
  - Enhancements to LTE operation in unlicensed spectrum RP-170848
  - Further enhancements to Coordinated Multi-Point (CoMP) Operation for LTE RP-170750
  - Highly Reliable Low Latency Communication for LTE RP-170796
  - Enhancements for high capacity stationary wireless link and introduction of 1024 QAM for LTE DL RP-170838

  Note: **: approved by working agreement.

- 6 RAN2 REL-15 Core part WIs:
  - LTE connectivity to 5G-CN * RP-170840
  - Enhancing LTE CA Utilization RP-170805
  - UE Positioning Accuracy Enhancements for LTE RP-170813
  - Further video enhancements for LTE * RP-170781
  - Quality of Experience Measurement Collection for streaming services in E-UTRAN * RP-170786
  - DL interference mitigation for UMTS * RP-170703

  *: WIs without Perf. part

- 17 RAN4 WIs (4 Core, 13 Perf.):

  1 REL-15 Core part only WI:
  - V2X new band combinations for LTE RP-170752

  3 REL-15 features with Core & Performance part WIs:
  - 450 MHz Band for LTE in Region 3 RP-170159
  - US 600 MHz Band for LTE RP-170740



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- LAA/eLAA for the CBRS 3.5GHz band in the United States RP-170804

10 REL-15 Perf. part WIs (for Core parts of other WGs):
- New Radio Access Technology RP-170855
- V2X phase 2 based on LTE RP-170798
- Even further enhanced MTC for LTE RP-170732
- Further NB-IoT enhancements RP-170852
- Enhancements to LTE operation in unlicensed spectrum RP-170848
- Further enhancements to Coordinated Multi-Point (CoMP) Operation for LTE RP-170750
- Highly Reliable Low Latency Communication for LTE RP-170796
- Enhancements for high capacity stationary wireless link and introduction of 1024 QAM for LTE DL RP-170838
- Enhancing LTE CA Utilization RP-170805
- UE Positioning Accuracy Enhancements for LTE RP-170813

- 8 RAN5 UE Conformance Test Aspects WIs for:
  - REL-13, Interference Mitigation for Downlink Control Channels of LTE RP-170121
  - REL-14, LTE 2.6 GHz FDD SDL band (2570-2620 MHz) and LTE CA (2DL/1UL) with Band 3 for Region 1 (Band 69) RP-170193
  - REL-14, RAT Independent Further Indoor Positioning Enhancements for LTE RP-170234
  - REL-14, SRS (sounding reference signal) switching between LTE component carriers RP-170355
  - REL-14, Quality of Experience (QoE) Measurement Collection for streaming services in UTRAN RP-170356
  - REL-14, Performance enhancements for high speed scenario in LTE RP-170367
  - REL-14, New band support for Rel-14 NB-IoT RP-170495
  - REL-14, 4 Rx antenna ports with CA for LTE DL RP-170704

- 12 new approved study items (SI) for REL-15 in March 2017:
  - RAN1: Study on NR to support non-terrestrial networks RP-170717
  - RAN1: Study on NR-based access to unlicensed spectrum RP-170828
  - RAN1: Study on Non-Orthogonal Multiple Access (NOMA) for NR RP-170829
  - RAN1: Study on evaluation methodology of new V2X use cases for LTE and NR RP-170837
  - RAN1: Study on scheduling enhancements with carrier aggregation for UMTS RP-170719
  - RAN1: Study on a simplified HS-SCCH for UMTS RP-170725
  - RAN2: Study on enhanced LTE Support for Aerial Vehicles RP-170779
  - RAN2: Study on integrated access and backhaul for NR RP-170831
  - RAN3: Study on CU-DU lower layer split for New Radio RP-170818
  - RAN3: Study on Architecture Evolution for E-UTRAN RP-170843
  - RAN4: Study of test methods for New Radio RP-170824
  - ITU-R AH: Study on self-evaluation towards IMT-2020 submission RP-170832
- 0 new approved Technical Specifications (TS), i.e. now under CR control
- 11 new approved Technical Reports (TR), i.e. now under CR control:
  - -- RAN Rel-14 TR 38.805** FS_NR_newRAT RP-170738
  - RAN Rel-14 TR 38.912 FS_NR_newRAT RP-170854
  - RAN1 Rel-14 TR 36.741 FS_feCOMP_LTE RP-170446
  - RAN1 Rel-14 TR 38.802 FS_NR_newRAT RP-170377
  - RAN1 Rel-14 TR 38.901** FS_NR_newRAT RP-170737
  - RAN2 Rel-14 TR 38.804 FS_NR_newRAT RP-170477
  - RAN3 Rel-14 TR 36.933 FS_LTE_context RP-170362
  - RAN3 Rel-14 TR 38.801 FS_NR_newRAT RP-170490
  - RAN4 Rel-14 TR 36.714-03-03 LTE_CA_R14_3DL3UL-Core RP-170494
  - RAN4 Rel-14 TR 36.786 LTE_V2X-Core RP-170127
  - RAN4 Rel-14 TR 38.803 FS_NR_newRAT RP-170439

  **: TR was created during RAN #75 via SID RP-170379
- 0 new Technical Specifications (TS) provided for information
- 2 new Technical Reports (TR) provided for information:
  - RAN3 Rel-14 TR 36.742 FS_LTE_SON_eCOMP RP-170204



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- RAN4 Rel-14 TR 36.766 FS_LTE_IC_BS RP-170160

- Change request statistics (see also Annex E): 1495 CRs handled with 1476 approved CRs.

| Phase | Cat | all CRs | Approved CRs | approved RAN1 | approved RAN2 | approved RAN3 | approved RAN4 | approved RAN5 | approved RAN6 | approved RAN |
|---|---|---|---|---|---|---|---|---|---|---|
| Rel-9 | F | 5 | 5 | 5 | 0 | 0 | 0 | 0 | 0 | 0 |
| Rel-11 | F | 3 | 3 | 1 | 0 | 0 | 2 | 0 | 0 | 0 |
| Rel-12 | A | 3 | 3 | 1 | 0 | 0 | 2 | 0 | 0 | 0 |
| Rel-12 | D | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| Rel-12 | F | 48 | 48 | 13 | 3 | 0 | 8 | 24 | 0 | 0 |
| Rel-13 | A | 10 | 10 | 0 | 3 | 0 | 7 | 0 | 0 | 0 |
| Rel-13 | B | 31 | 31 | 0 | 4 | 0 | 4 | 23 | 0 | 0 |
| Rel-13 | D | 6 | 6 | 0 | 1 | 0 | 0 | 5 | 0 | 0 |
| Rel-13 | F | 496 | 494 | 23 | 45 | 0 | 104 | 313 | 9 | 0 |
| Rel-14 | A | 165 | 165 | 21 | 47 | 0 | 93 | 0 | 5 | 0 |
| Rel-14 | B | 236 | 220 | 28 | 68 | 42 | 68 | 0 | 14 | 0 |
| Rel-14 | C | 6 | 6 | 0 | 3 | 2 | 0 | 0 | 1 | 0 |
| Rel-14 | D | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| Rel-14 | F | 484 | 483 | 12 | 25 | 2 | 27 | 415 | 0 | 1 |
| **sum** | | 1495 | 1476 | 104 | 199 | 46 | 317 | 780 | 29 | 1 |

*: 102 of them from R5s



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# 1 Opening of the meeting (Monday 9 am)

TSG RAN chairman Mr. Dino Flore (Qualcomm) opened the meeting 3GPP TSG RAN #75 on Monday March 6th, 2016 at 9am.

On behalf of the host, the European Friends of 3GPP, Lorenzo Casaccia (Qualcomm) welcomed the delegates to Dubrovnik, Croatia and explained organisational issues of the meeting.

NOTE: The TSG meetings #75 will be carried out in the 1 week TSG set up (see RP-131328, RAN/CT at the beginning and SA at the end of the week).

# 2 Reminders for usage of IT resources, IPR declaration and antitrust compliance

The TSG RAN chairman made the following three announcements to remind the delegates of this meeting:

RAN chair's reminder regarding **responsible behaviour regarding IT resources of the meeting**:

Delegates are reminded that they share the meeting IT resources with their fellow delegates. You should not abuse the service by using bandwidth-hogging applications such as movie downloads, streaming video, web-based gaming, etc during the meeting. Use the internet service in your hotel rooms for this!

Delegates must respect the law of the hosting country, and should not visit prohibited internet sites.
In cases of persistent abuse of the internet bandwidth, MCC may restrict individual's use of the service.
In particular, the PCG has laid down the following network usage conditions:
1. Users shall not use the network to engage in illegal activities. This includes activities such as copyright violation, hacking, espionage or any other activity that may be prohibited by local laws.
2. Users shall not engage in non-work related activities that are consume excessive bandwidth or cause significant degradation of the performance of the network.

Since the network is a shared resource, users should exercise some basic etiquette when using the 3GPP network at a meeting. It is understood that high bandwidth applications such as downloading large files or video streaming might be required for business purposes, but delegates should be strongly discouraged in performing these activities for personal use. Downloading a movie or doing something in an interactive environment for personal use essentially wastes bandwidth that others need to make the meeting effective. The meeting chairman should remind end users that the network is a shared resource; the more one user grabs, the less there is for another. Email and its attachments already take up significant bandwidth (certain email programs are not very bandwidth efficient). In case of need the chair can ask the delegates to restrict IT usage to things that are essential for the meeting itself.

1. DON'T place your WiFi device in ad-hoc mode
2. DON'T set up a personal hotspot in the meeting room
3. DO try 802.11a if your WiFi device supports it
4. DON'T manually allocate an IP address
5. DON'T be a bandwidth hog by streaming video, playing online games, or downloading huge files
6. DON'T use packet probing software which clogs the local network (e.g., packet sniffers or port scanners)

Based on the report of the PCG ad hoc group on IT improvements:
http://www.3gpp.org/ftp/PCG/PCG_27/DOCS/PCG27_13r1.zip
see also http://www.3gpp.org/Delegates-Corner#outil_sommaire_14

RAN chair's reminder regarding **IPRs**:
The attention of the delegates to the meeting of this Technical Specification Group was drawn to the fact that 3GPP Individual Members have the obligation under the IPR Policies of their respective Organizational Partners to inform their respective Organizational Partners of Essential IPRs they become aware of.
The delegates were asked to take note that they were thereby invited:
- to investigate whether their organization or any other organization owns IPRs which were, or were likely to become Essential in respect of the work of 3GPP.
- to notify their respective Organizational Partners of all potential IPRs, e.g., for ETSI, by means of the IPR Information Statement and the Licensing declaration forms
Based on http://www.3gpp.org/3gpp-calendar/89-call-for-ipr-meetings


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RAN chair's reminder regarding **antitrust and competition law**:

The attention of the delegates to the meeting was drawn to the fact that 3GPP activities were subject to all applicable antitrust and competition laws and that compliance with said laws was therefore required by any participant of the meeting, including the Chairman and Vice-Chairmen and were invited to seek any clarification needed with their legal counsel. The leadership would conduct the present meeting with impartiality and in the interests of 3GPP. Delegates were reminded that timely submission of work items in advance of TSG/WG meetings was important to allow for full and fair consideration of such matters.

Based on http://www.3gpp.org/about-3gpp/legal-matters/21-3gpp-calendar/1616-statement-of-antitrust-compliance

# 3 Approval of the agenda

NOTE: Agreed CR packages of RAN WGs (if not flagged for discussion) will be approved without presentation. % complete and target dates of WI/SI status reports (if not flagged for discussion) will be approved without presentation.

**RP-170001** **Agenda for RAN #75 held in Dubrovnik, Croatia, 05.03.-08.03.2017**
*Source: RAN chairman (Qualcomm)*

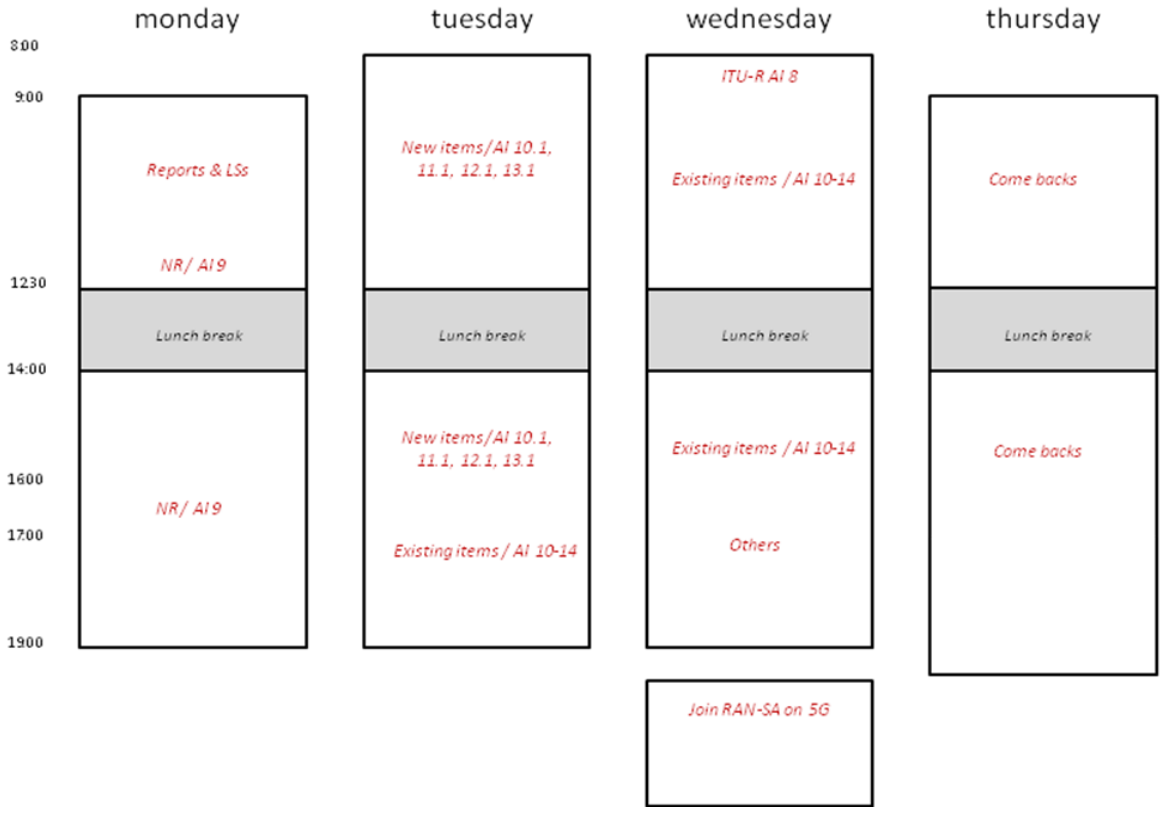
**Decision:** The document was **revised to RP-170533**.

**RP-170533** **Revised agenda for RAN #75 held in Dubrovnik, Croatia, 05.03.-08.03.2017**
*Source: RAN chairman (Qualcomm)*

(Replaces RP-170001)

**Decision:** The document was **approved**.

A tentative meeting schedule was distributed by the RAN chair on 05.03.2017 over the RAN reflector:




For the joint RAN-SA session on Wednesday see agenda RP-170778 and minutes in RP-170784.



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# 4 Approval of the meeting report of TSG-RAN #74

**RP-170002** **Draft report of RAN #74 held in Vienna, Austria, 05.12.-08.12.2016**
*Source: ETSI MCC*

**Discussion:**

no comments, final report will be in RP-170690

**Decision:** The document was **revised to RP-170690**.

**RP-170690** **Report of RAN #74 held in Vienna, Austria, 05.12.-08.12.2016**
*Source: ETSI MCC*

(Replaces RP-170002)

**Decision:** The document was **approved**.

# 5 RAN WG reports

## 5.1 TSG RAN WG1

**RP-170003** **Status Report RAN WG1**
*Source: RAN1 chairman (NTT DOCOMO)*

**Abstract:**

RAN1 specs for both LTE and HSPA up to and including Rel-13 are stable
Almost all Rel-14 LTE SI/WIs can be closed
All Rel-14 LTE RAN1 parts can be closed
Rel-14 NR SI can be closed

**Discussion:**

no questions/comments

**Decision:** The document was **noted**.

**RP-170004** **List of CRs from RAN WG1**
*Source: ETSI MCC*

**Decision:** The document was **noted**.

## 5.2 TSG RAN WG2

**RP-170005** **Status Report RAN WG2**
*Source: RAN2 chairman (Intel)*

**Abstract:**

Very busy Q1 2017 and anticipating being heavily loaded for rest of year with the start of NR WI, but scope to start some REl-15 LTE WIs in Q2 2017
NR Study Item complete from RAN2 point of view
LTE Rel-14 WIs complete from RAN2 point of view (apart from one aspect of eNB-IoT)
UMTS Rel-14 WIs complete from RAN2 point of view
LTE and UMTS ASN.1 reviews planned for Q2 2017 to enable ASN.1 freeze in June 2017

**Discussion:**

LG: slide 51: 3 parallel streams in RAN2, what does the text in parenthesis mean?



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Huawei: page 29, RAN1 sent an LS and we have a RAN2 company CR to RAN #75 to complete the work

**Decision:** The document was **noted**.

**RP-170006** **List of CRs from RAN WG2**
*Source: ETSI MCC*

**Decision:** The document was **noted**.

**RP-170659** **Proposal for RAN2 meeting organization in 2Q**
*Source: LG Electronics*

**Abstract:**

late input

**Discussion:**

proposal for RAN2 meeting organization in 2Q:
- Three parallel sessions for 4 days
Two parallel sessions for NR (CP/UP)
1.5-day CP/UP common topics
2-day CP/UP specific topics
0.5-day NR phase II study
One parallel session for LTE
1.5-day ASN.1 review
1.5-day LTE Rel-14 corrections
1-day ongoing LTE Rel-15 items
- Recommendation
Do not approve a new LTE Rel-15 items related to RAN2.
Alternatively, do not allocate meeting time for new LTE Rel-15 items in 2Q, if approved.

RAN2 chairman: we discussed whether we should reduce LTE capacity in LTE REL-15 and the answer was a clear no but we can discuss this more during this meeting

**Decision:** The document was **noted**.

## 5.3 TSG RAN WG3

**RP-170007** **Status Report RAN WG3**
*Source: RAN3 chairman (Huawei)*

**Decision:** The document was **noted**.

**RP-170008** **List of CRs from RAN WG3**
*Source: ETSI MCC*

**Decision:** The document was **noted**.

## 5.4 TSG RAN WG4

**RP-170009** **Status Report RAN WG4**
*Source: RAN4 chairman (Samsung)*

**Discussion:**

Telecom Italia: when is it planned to introduce REL-15 specifications?

RAN4 chair: earliest in Sep.17 but we can endorse the TR already

CableLabs: increasing TUs for LAA planned to finish the work?



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RAN chair: we will discuss it later this week and completing with 0.5TUs will be difficult

**Decision:** The document was **noted**.

**RP-170010** **List of CRs from RAN WG4**
*Source: ETSI MCC*

**Decision:** The document was **noted**.

## 5.5 TSG RAN WG5

**RP-170011** **Status Report RAN WG5**
*Source: RAN5 chairman (Motorola Mobility)*

**Decision:** The document was **noted**.

**RP-170012** **List of CRs from RAN WG5**
*Source: ETSI MCC*

**Decision:** The document was **noted**.

**RP-170013** **Status Report MCC TF160 (for approval)**
*Source: ETSI MCC TF160 Leader*

**Discussion:**

RAN5 chairman: nothing to approve here this time

note: It was confirmed by MCC TF160 leader that this Tdoc requires approval

**Decision:** The document was **approved**.

## 5.6 TSG RAN WG6

**RP-170014** **Status Report RAN WG6**
*Source: RAN6 chairman (Nokia)*

**Decision:** The document was **noted**.

**RP-170015** **List of CRs from RAN WG6**
*Source: ETSI MCC*

**Abstract:**

MCC: CR R6-170138 has WI code ePOS_GERAN-Perf and does not belong to CRpack RP-170061; it is therefore resubmitted in RP-170551

**Decision:** The document was **noted**.

# 6 Other Reports

## 6.1 Report on TSG SA activities

**RP-170016** **TSG SA Report to TSG RAN - Questions for Advice and Requests**
*Source: SA chairman (Samsung)*

**Discussion:**



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RAN chair: we will  have a joint session on Wed to address the isssues indicated by the SA chairman

Huawei: we are waiting for an SA3 reply on NB-IOT enhancements

SA chairman: will with SA3 chairman

**Decision:** The document was **noted**.

## 6.2 Report from PCG

The last PCG meeting #37 took place 20.10.2016 in London, UK. The next PCG meeting #38 is on 25.04.2017 in West Palm Beach, USA.

## 6.3 Report from MCC

**RP-170017** **3GPP Support Team Report**
*Source: ETSI MCC*

**Discussion:**

Telecom Italia: The awards are a bit hidden on the web page and there could be also a ceremony at the TSG for it

Specs manager: will provide these ideas to the Marcom Officer of 3GPP

**Decision:** The document was **noted**.

## 6.4 Reports from other groups/activities

Nothing to report

# 7 Liaison activity of TSG RAN

NOTE: This agenda item will only handle LSs not handled elsewhere.

**RP-170025** **LS on KPIs for mobile services (ITU_T_SG12_COM12-LS11-E; to: CT, RAN, SA; cc: ETSI TC STQ MOBILE; contact: ITU-T SG12 chairman)**
*Source: ITU-T SG12*

**Abstract:**

no explicit RAN action requested

**Discussion:**

conclusion: no LS answer from RAN

**Decision:** The document was **noted**.

**RP-170026** **LS on Requesting status and technical information on radio-level integration between 3GPP and 802.11 systems (IEEE802.11-16_1573r4; to: RAN, SA; cc: IEEE 802 Executive Committee; contact: Interdigital)**
*Source: IEEE 802.11 WG*

**Abstract:**

related to RP-161804 and 3GPP/PCG#37(16)40; RAN action requested

**Discussion:**

Intel:this LS diserves an answer

RAN chair: Ok, Intel will collect comments and we will come back to the answer at the end of the week



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**Decision:** The document was **replied to**.

**RP-170699** **Draft reply LS to IEEE802.11-16_1573r4 = RP-170026 to on Requesting status and technical information on radio-level integration between 3GPP and 802.11 systems (to: IEEE 802.11 WG; cc:-; contact: Intel)**

*Source: Intel*

**Discussion:**

problems to download this file

**Decision:** The document was **revised to RP-170849**.

**RP-170849** **Draft reply LS to IEEE802.11-16_1573r4 = RP-170026 to on Requesting status and technical information on radio-level integration between 3GPP and 802.11 systems (to: IEEE 802.11 WG; cc:-; contact: Intel)**

*Source: Intel*

(Replaces RP-170699)

**Decision:** The document was **revised to RP-170853**.

**RP-170853** **Reply LS to IEEE802.11-16_1573r4 = RP-170026 on Requesting status and technical information on radio-level integration between 3GPP and 802.11 systems (to: IEEE P802.11; cc: SA, IEEE 802 Executive Committee; contact: Intel)**

*Source: RAN*

(Replaces RP-170849)

**Decision:** The document was **approved**.

**RP-170043** **LS on Harmonised Standard under Directive 2014/53/EU for "Broadband radio equipment used for Public Protection and Disaster Relief below 1 GHz" (ERM(17)61034r1; to: RAN, RAN4, CEPT ECC, ETSI TC TCCE WG4; cc: ETSI TC TCCE, ETSI TC MSG/ERM; contact: BMWi)**

*Source: ETSI TC ERM*

**Abstract:**

no RAN action requested

**Discussion:**

conclusion: no LS answer to ETSI TC ERM from RAN

**Decision:** The document was **noted**.

**RP-170048** **LS on NGMN Recommendations regarding the Transparency of SEP Disclosures (NGMN_LS_170127; to: RAN, CT, SA, ATIS, ITU, ISO, IEC, ETSI, CEN/CENELEC, IEEE, BBF, TMF, MEF; cc: -; contact: Orange)**

*Source: NGMN*

**Abstract:**

no RAN action requested; note: The reference document "5G White Paper" cannot be attached ("No part of this document may be reproduced or transmitted in any form or by any means without prior written permission from NGMN Ltd.")

**Discussion:**

presented by Telecom Italia;



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conclusion: no LS answer to NGMN from RAN

**Decision:** The document was **noted**.

**RP-170050** **LS on Test of Technology Building Blocks phase of the Trial and Testing Initiative (NGMN_LS_170227b; to: RAN, SA; cc: -; contact: KT)**
*Source: NGMN*

**Abstract:**

no RAN action requested

**Discussion:**

conclusion: no LS answer to NGMN from RAN

**Decision:** The document was **noted**.

**RP-170479** **Draft reply LS to ITU-T SG15/COM 15-LS405-E = RP-161984 on Requirements for mobile backhaul/fronthaul in a G.fast Deployment Environment (to: ITU-T SG15; cc: -; contact: Nokia)**
*Source: Nokia Germany*

**Abstract:**

LSin RP-161984 was received at RAN #74

**Discussion:**

Nokia: this is feedback from WGs which we can hopefully send as reply to LSin ITU-T SG15/COM 15-LS405-E = RP-161984

Ericsson: was this text approved?

Nokia: yes, was in an LS from RAN1 to RAN

**Decision:** The document was **revised to RP-170700**.

**RP-170700** **Reply LS to ITU-T SG15/COM 15-LS405-E = RP-161984 on Requirements for mobile backhaul/fronthaul in a G.fast Deployment Environment (to: ITU-T SG15; cc: -; contact: Nokia)**
*Source: RAN*

(Replaces RP-170479)

**Decision:** The document was **approved**.

**RP-170792** **LS requesting support for defining next generation protocol (NGP(17)000038; to: RAN, CT, SA, IETF; cc: -; contact: Vodafone)**
*Source: ETSI ISG NGP*

**Abstract:**

LS arrived on 08.03.2017

**Discussion:**

note: As CT #75 is already over and this LS has CT impact, it was decided to postpone its treatment also in RAN and SA to TSG #76.

**Decision:** The document was **postponed**.



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# 8 ITU-R ad hoc

## 8.1 Status report

**RP-170018** **Status Report ITU-R Ad hoc**
*Source: ITU-R Ad hoc Contact (Telecom Italia)*

**Discussion:**

RAN chair: we will come back on Wed for other Tdocs of this agenda item

Huawei: there seem to be two points in ITU-R WP5D TR which are different from our TR 38.913

ITU-R ad hoc convener: should ITU-R ad hoc check the requirements from ITU-R vs. our TR 38.913?

Qualcomm: not clear what we would check

ITU-R ad hoc convener: we have to make sure that we fulfill all ITU-R requirements; if 3GPP has more requirements that's no problem

conclusion: email discussion on RAN reflector until RAN #76 to check if some ITU-R requirements are not met and a corresponding CR has then to be brought to RAN #76 to TR 38.913

**Decision:** The document was **noted**.

## 8.2 Documents related to IMT-2020

***frequency sharing/interference analysis in the frequency range between 24.25 GHz and 86 GHz:***

**RP-170020** **LS for a proposed reply to ITU-R WP5D/TEMP/182(Rev.1) = RP-161966 = R4-1609014 on Characteristics of terrestrial IMT systems for frequency sharing/interference analysis in the frequency range between 24.25 GHz and 86 GHz (R4-1700305; to: RAN; cc: RAN1; contact: Ericsson)**
*Source: RAN4*

**Abstract:**

RAN action requested; LS is a proposed reply to ITU-R WP5D/TEMP/182(Rev.1) = RP-161966 = R4-1609014 and it was handled by email in RAN after RAN4 AH in Jan.17 in Spokane

**Decision:** The document was **noted**.

**RP-170021** **Reply LS to ITU-R WP5D/374 (Attachment 4.13) = ITU-R WP5D/TEMP/182(Rev.1) = RP-161966 on Characteristics of terrestrial IMT systems for frequency sharing/interference analysis in the frequency range between 24.25 GHz and 86 GHz (to: ITU-R WP5D; cc: -; contact: Ericsson)**
*Source: RAN*

**Discussion:**

LSout RP-170021 is based on RAN4 LS RP-170020 = R4-1700305 and it was approved by email on 30.01.2017 via the RAN reflector (sent out without SA/PCG review)

**Decision:** The document was **approved**.

***proposals for candidate radio interface technologies for IMT-2020:***

**RP-170044** **LS on Further information on the inviation for submission of proposals for candidate radio interface technologies for the terrestrial components of the radio interface(s) for IMT-2020 and invitation to participate in their subsequent evaluation (ITU-R WP5D/TEMP/279; to: RAN, CT, SA, 3GPP2, ARIB, ATIS, CCSA, ETSI, IEEE, ITRI, TIA, TSDSI, TTA, TTC, WiMAX Forum, EBU, WWRF, 4G Americas, CDG, GSMA,**



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**UMTS Forum, Wi-Fi Alliance, Wireless Innovation Forum, XGP Forum, EU METIS Project, NGMN, 5G Innovation Centre, 5GMF, IMT 2020 Promotion Group, APT Wireless Group, 5G Infrastructure Public Private Partnership, NYU Wireless, 5GAA; cc: -; contact: Counselor ITU-R SG5)**

*Source: ITU-R WP5D*

**Abstract:**

RAN action requested; note: The link "further relevant information including the availability of Document IMT-2020/2" does not work;

**Decision:** The document was **replied to**.

**RP-170045** **LS on ITU-R WORKING PARTY 5D workshop on IMT-2020 (ITU-R WP5D/TEMP/287; to: RAN, CT, SA, 3GPP2, ARIB, ATIS, CCSA, ETSI, IEEE, ITRI, TIA, TSDSI, TTA, TTC, WiMAX Forum, EBU, WWRF, 4G Americas, CDG, GSMA, UMTS Forum, Wi-Fi Alliance, Wireless Innovation Forum, XGP Forum, EU METIS Project, NGMN, 5G Innovation Centre, 5GMF, IMT 2020 Promotion Group, APT Wireless Group, 5G Infrastructure Public Private Partnership, NYU Wireless, 5GAA; cc: -; Counselor ITU-R SG5)**

*Source: ITU-R WP5D*

**Abstract:**

RAN action requested

**Discussion:**

ITU-R ad hoc convener: suggests that new RAN chairman or another representative of 3GPP will present the 3GPP status for IMT-2020 at the workshop in Oct.2017 (probably in Canada)

**Decision:** The document was **replied to**.

**RP-170757** **Draft Reply LTI to ITU-R WP5D 5D/TEMP/279 = RP-170044 and ITU-R WP5D 5D/TEMP/287 = RP-170045 on Further information on the invitation for submission of proposals for candidate radio interface technologies for the terrestrial components of the radio interface(s) for IMT-2020 and invitation to participate in their subsequent evaluation (to: SA; cc:-; contact: Telecom Italia)**

*Source: Telecom Italia*

**Decision:** The document was **revised to RP-170761**.

**RP-170761** **Draft Reply LTI to ITU-R WP5D 5D/TEMP/279 = RP-170044 and ITU-R WP5D 5D/TEMP/287 = RP-170045 on Further information on the invitation for submission of proposals for candidate radio interface technologies for the terrestrial components of the radio interface(s) for IMT-2020 and invitation to participate in their subsequent evaluation (to: SA; cc:-; contact: Telecom Italia)**

*Source: RAN*

(Replaces RP-170757)

**Discussion:**

conclusion: LS is sent to SA for review and from there to PCG for review before it is sent from PCG to ITU-R WP5D

**Decision:** The document was **agreed**.

## 8.3 Other documents from/to ITU-R WP5D

***ITU-R M.1457:***

**RP-170046** **LS on the schedule for updating Recommendation ITU-R M.1457 to revision 14 (ITU-R WP5D/TEMP/255r1; to: RAN, CT, SA, 3GPP2, ARIB, ATIS, CCSA, ETSI, IEEE, TIA, TSDSI, TTA, TTC, WiMAX Forum; cc: -; contact: Counselor ITU-R SG5)**



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*Source: ITU-R WP5D*

**Abstract:**

note: The link "The procedure outlined in Document IMT-2000/3(Rev.2)" does not work.

**Discussion:**

conclusions: agreements:

- we will contribute

- 3 inputs

RAN75: first input, see RP-170734

RAN #78: 2nd input

RAN #79: final input

- REL-13/REL-14 specifications will be provided

**Decision:** The document was **replied to**.

**RP-170734** **Draft Reply to ITU-R WP5D/TEMP/255r1 = RP-170046 on the schedule for updating Recommendation ITU-R M.1457 to revision 14 (to: SA; cc: -; contact: Telecom Italia)**
*Source: Telecom Italia*

**Decision:** The document was **revised to RP-170762**.

**RP-170762** **Draft Reply to ITU-R WP5D/TEMP/255r1 = RP-170046 on the schedule for updating Recommendation ITU-R M.1457 to revision 14 (to: SA; cc: -; contact: Telecom Italia)**
*Source: RAN*

(Replaces RP-170734)

**Discussion:**

conclusion: LS is sent to SA for review and from there to PCG for review before it is sent from PCG to ITU-R WP5D

**Decision:** The document was **agreed**.

## 8.4 Other documents from/to ITU-R WP5A

***Intelligent Transport Systems:***

**RP-170047** **Draft reply LTI to ITU-R WP5A/TEMP/131(Rev.1) = RP-161979 on Intelligent Transport Systems (ITS) (RT-170005; to: RAN; cc: -; contact: Telecom Italia)**
*Source: 3GPP ITU-R ad hoc*

**Abstract:**

RT-170005 = RP-170047 is preparing a reply LS to ITU-R WP5A 5A/TEMP/131(Rev.1) = RP-161979; RAN action requested; result from RAN has to be send to SA for review and from there to PCG for review and PCG will send it out to: ITU-R WP5A; cc: ITU-R WP5D, CCSA

**Discussion:**

conclusion: noted, no LS answer to ITU-R ad hoc but RP-170047 is used as a basis for the LSout RP-170763

**Decision:** The document was **noted**.



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**RP-170763** **Draft reply LTI to ITU-R WP5A/TEMP/131(Rev.1) = RP-161979 on Intelligent Transport Systems (ITS) (to: SA; cc: -; contact: Telecom Italia)**
*Source: RAN*

**Discussion:**

conclusion: LS is sent to SA for review and from there to PCG for review before it is sent from PCG to ITU-R WP5A (cc: ITU-R WP5D, CCSA)

**Decision:** The document was **agreed**.

## 8.5 Documents from/to other ITU-R groups

***visible light for broadband communications:***

**RP-170028** **LS on Characteristics for use of visible light* for broadband communications (ITU-R WP1A/TEMP/41; to: RAN, SA, ARIB, TTC, ETSI, TTA, CCSA, IEEE; cc: -; contact: Counselor ITU-R SG1)**
*Source: ITU-R WP1A*

**Abstract:**

no explicit RAN action requested

**Discussion:**

conclusion: no LS answer from RAN

**Decision:** The document was **noted**.

***Smart Grid utility management systems:***

**RP-170029** **LS on Preliminary draft revision of report ITU-R SM.2351-1 on Smart Grid utility management systems (ITU-R WP1A/TEMP/45; to: RAN, SA, 3GPP2, ARIB, ATIS, CCSA, CDG, ETSI, IEEE, ITRI, GSMA, TIA, TTA, Wi-Fi Alliance; cc: -; contact: Counselor ITU-R SG1)**
*Source: ITU-R WP1A*

**Abstract:**

no explicit RAN action requested; but compare RP-161330 sent from RAN #72 via SA and PCG; see a related input in RP-170513 from Ericsson

**Decision:** The document was **replied to**.

**RP-170513** **Input to LS reply on Smart grid communications to ITU-R WP1A**
*Source: Ericsson LM*

**Abstract:**

related to LSin RP-170029

**Discussion:**

Huawei: we had a comment to correct a sentence

Ericsson: we covered this

**Decision:** The document was **noted**.



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**RP-170764** **Draft reply to ITU-R WP1A/TEMP/45 = RP-170029 on Preliminary draft revision of report ITU-R SM.2351-1 on Smart Grid utility management systems (to: SA; cc: -; contact: Telecom Italia)**
*Source: Telecom Italia*

**Discussion:**

Tdoc will include RP-170513

will require SA and PCG review;

cc: WP5D, WP5A

**Decision:** The document was **revised to RP-170802**.

**RP-170802** **Draft reply to ITU-R WP1A/TEMP/45 = RP-170029 on Preliminary draft revision of report ITU-R SM.2351-1 on Smart Grid utility management systems (to: SA; cc: -; contact: Telecom Italia)**
*Source: RAN*

(Replaces RP-170764)

**Discussion:**

conclusion: LS is sent to SA for review and from there to PCG for review before it is sent from PCG to ITU-R WP1A (cc: ITU-R WP5A, ITU-R WP5D)

**Decision:** The document was **agreed**.

## *integration of satellite in IMT2020:*

**RP-170548** **Draft response LS to ITU-R WP4B/TEMP/17 = RP-161971 on the integration of satellite in IMT2020 (to: ITU-R WP4B; cc: ETSI TC SES, ITU-R WP5D, ITU-T SG13; contact: Thales)**
*Source: THALES*

(Replaces RP-170371)

**Abstract:**

integration of satellite solutions into IMT-2020 networks

**Discussion:**

moved from AI 7 to AI 8.5

RAN chair: can be handled in the ITU-R session on Wed;

Qualcomm: The sentences "3GPP encourages ..." was requested to be removed on the ITU-R ad hoc reflector.

ITU-R ad hoc convener: as there is a SI under approval this week should we wait until the end of the meeting?

conclusion: we come back to RP-170765 on Thu

**Decision:** The document was **revised to RP-170765**.

**RP-170765** **Draft response LS to ITU-R WP4B/TEMP/17 = RP-161971 on the integration of satellite in IMT2020 (to: SA; cc: -; Telecom Italia)**
*Source: Telecom Italia*

(Replaces RP-170548)

**Discussion:**

will have to go to SA and PCG;



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pending approval of the SI

**Decision:** The document was **revised to RP-170850**.

**RP-170850** **Draft response LS to ITU-R WP4B/TEMP/17 = RP-161971 and ITU-R 5D/TEMP/218 = RP-161965 on the integration of satellite-based solutions into IMT-2020 networks (to: SA; cc: -; Telecom Italia)**
*Source: RAN*

(Replaces RP-170765)

**Discussion:**

error in RP-170850: The title shown in the LS is wrong;

conclusion: LS is sent to SA for review and from there to PCG for review before it is sent from PCG to ITU-R WP4B (cc: ITU-R WP5A, ITU-R WP5D, ETSI TC/SES, ITU-T SG 13);

**Decision:** The document was **agreed**.

# 9 New Radio

**RP-170226** **NR planning**
*Source: Nokia*

**Abstract:**

The document presents fundamental aspects of planning NR work for Release 15.

**Discussion:**

moved from AI 9.1 to AI 9

proposals for RAN#75:

1. Define the clear initial priorities within the normative Release-15 WID. Limit lower layer options and architecture options in line with planned initial deployments and forward compatibility requirements.
2. Identify available time left for phase-2 study work (on top of phase-1 normative work), approve study items accordingly.
3. WGs should strongly prioritize NR normative work over NR study work in the upcoming cycle.
4. RAN WG chairs and rapporteurs to outline a detailed plan how 1. and 2. will be delivered given the timeline commitments. This plan should be endorsed and maintained by TSG-RAN.
5. The plan shall ensure paralell progress of both non-standalone and standalone NR components (especially in RAN2) as much as possible.
6. The detailed plan should also be coordinated and followed up regularly with TSG-SA. Officials and rapporteurs should take an active role here.

**Decision:** The document was **noted**.

**RP-170360** **Scope of Rel-15 work on NR**
*Source: Huawei, HiSilicon*

**Discussion:**

moved from AI 9.1 to AI 9

proposal:

This document highlighted the goals in Rel-15 for NR to support eMBB services up to 52.6 GHz as well as URLLC services meeting the URLLC requirements, and the goal to continue the study on non-orthogonal multiple access schemes in Rel-15 targeting specification in Rel-16. This document also highlighted more detailed aspects on specific features that we believe are important for the success of the first release of NR, including LTE/NR coexistence with



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sharing of uplink spectrum, and native support for flexible duplex. Views on the specification work plan were also provided.

Samsung: COMP can be supported from the start of NSA

Huawei: some more work will be needed after Dec.17

ZTE: bandwidth package related to what we discussed in Athens?

RAN chair: we will see some more documents for bands for NR

**Decision:** The document was **noted**.

**RP-170385** **Discussion on overall WI and SI of R15**
*Source: ZTE Corporation*

**Discussion:**

moved from AI 9.1 to AI 9

**Decision:** The document was **revised to RP-170669**.

**RP-170669** **Discussion on overall WI and SI of R15**
*Source: ZTE Corporation*

(Replaces RP-170385)

**Discussion:**

moved from AI 9.1 to AI 9

ATT: MIMO is not important?

ZTE: we have already a lot of work in NR

**Decision:** The document was **noted**.

**RP-170391** **Principle for Planning NR SIs**
*Source: Samsung*

**Discussion:**

moved from AI 9.1 to AI 9

Panasonic: agrees with Samsung and Intel first we need to define the channels and then we can look at higher reliabiliy

**Decision:** The document was **noted**.

**RP-170472** **5G NR Phase 1 Scope**
*Source: MediaTek Inc.*

**Discussion:**

moved from AI 9.1 to AI 9

**Decision:** The document was **noted**.

**RP-170473** **TU Allocation for Rel-15 NR Works**
*Source: MediaTek Inc.*

**Discussion:**



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proposal: in both RAN1 and RAN2 more time be dedicated to NR work as follows:

- RAN1: an additional parallel session should be introduced for NR i.e. totaling at least 36TUs per week for NR without increasing the overall number of parallel sessions in RAN1.

- RAN2: 2 full joint CP/UP sessions and 2x full parallel CP/UP sessions should be scheduled i.e. totaling at least 24TUs per week for NR.

- A joint session shall always be scheduled after all parallel sessions are concluded, in order to provide visibility to the entire WG on the progress made in these sessions, to review this progress and eventually reach, when applicable, WG enforcement of the decisions made.

Sprint: has a problem with this proposal as you take time from LTE

Qualcomm: we are not supporting Mediatek's proposal to take massive time budget from LTE

Mediatek: we have to review the

**Decision:** The document was **noted**.

**RP-170790** **Way Forward on 5G NR TU Allocation**
*Source: MediaTek*

**Abstract:**

related to RP-170473

**Decision:** The document was **withdrawn**.

**RP-170196** **On the overall 5G-NR workplan**
*Source: Qualcomm*

**Discussion:**

moved from AI 9.1 to AI 9

**Decision:** The document was **revised to RP-170531**.

**RP-170531** **On the overall 5G-NR workplan**
*Source: Qualcomm*

(Replaces RP-170196)

**Abstract:**

late input

**Discussion:**

moved from AI 9.1 to AI 9

**Decision:** The document was **noted**.

**RP-170384** **Discussion on NR WI and time line**
*Source: ZTE Corporation*

**Discussion:**

moved from AI 9.1 to AI 9

**Decision:** The document was **revised to RP-170670**.



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**RP-170670** **Discussion on NR WI and time line**
*Source: ZTE Corporation*

(Replaces RP-170384)

**Discussion:**

moved from AI 9.1 to AI 9

**Decision:** The document was **noted**.

**RP-170230** **Confirming the Date for Milestone Box 4**
*Source: AT&T*

**Abstract:**

Rationale in Support of Milestone 4 Date

**Discussion:**

moved from AI 9.4 to AI 9

**Decision:** The document was **noted**.

**RP-170412** **SK Telecom's view on 5G NR acceleration**
*Source: SK Telecom*

**Abstract:**

This contribution describes SK Telecom's view on 5G NR schedule

**Discussion:**

moved from AI 9.4 to AI 9

**Decision:** The document was **noted**.

**RP-170476** **Essential aspects on NR acceleration**
*Source: KT Corporation*

**Abstract:**

In this contribution, KT presents our view for NR acceleration

**Discussion:**

moved from AI 9.4 to AI 9

**Decision:** The document was **noted**.

**RP-170320** **Principles for harmonizing specification of NSA and SA**
*Source: China Mobile Com. Corporation*

**Abstract:**

this contribution presents some basic principles for heath development of NSA and SA if NSA is accelerated.

**Discussion:**

moved from AI 9.2.1 to AI 9

**Decision:** The document was **noted**.



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**RP-170491** **Two-step RRC ASN.1 freezing for Rel-15 5G New Radio**
*Source: Nokia, Alcatel-Lucent Shanghai Bell*

**Abstract:**

The document discusses RRC ASN.1 freezing options and related maintenance for Rel-15

**Discussion:**

moved from AI 9.1 to AI 9

**Decision:** The document was **noted**.

**RP-170334** **Principle for_x00B_NR Phase-1 Work Plan**
*Source: Samsung*

**Discussion:**

moved from AI 9.1 to AI 9

**Decision:** The document was **withdrawn**.

**RP-170453** **Additional rationale for NR acceleration**
*Source: VODAFONE Group Plc*

**Discussion:**

moved from AI 9.1 to AI 9

**Decision:** The document was **withdrawn**.

**RP-170666** **Way Forward on the overall 5G NR workplan**
*Source: Alcatel-Lucent Shanghai-Bell, Alibaba, Apple, AT&T, British Telecom, Broadcom, Convida Wireless, Deutsche Telekom, DOCOMO, Ericsson, Etisalat, Huawei, Intel, KDDI, KT, LG Electronics, LGU+, NEC, Nokia, Ooredoo, Qualcomm, Samsung, Sierra Wireless, SK Telec*

**Abstract:**

late input

**Discussion:**

Telecom Italia: this Tdoc is for eMBB and not for URLLC

RAN chair: yes, this will happen separately

Samsung: we consider low latency as part of eMBB

Orange: we are in general ok with it but we have to consider bands and URLLC as a whole

NTT DOCOMO: our workplan is in line with this proposal, we consider common parts until Dec.17

Qualcomm: what the proposal is looking for is the baseline and no enhancements

Fujitsu: how can bands for standalone and non-standalone separately?

Mediatek: it seems companies are not fully agreeing to the proposal

ZTE: understands that by Dec.17 RAN1 work for standalone and non-standalone needs to be completed

LG: what is clear now is that we will have further work on L1 MIMO after Jan.17

Sprint: what is intermediate freeze of ASN.1, got different answers



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Samsung: L1/L2 should be really frozen in Dec.17

RAN4 chair: are bands discussed in RAN4

RAN chair: no, we have some Tdocs on this and will come back to the bands for NR

**Decision:** The document was **revised to RP-170710**.

**RP-170710** **Way Forward on the overall 5G NR workplan**
*Source: Alcatel-Lucent Shanghai-Bell, Alibaba, Apple, AT&T, British Telecom, Broadcom, Convida Wireless, Deutsche Telekom, DOCOMO, Ericsson, Etisalat, Huawei, Intel, KDDI, KT, LG Electronics, LGU+, NEC, Nokia, Ooredoo, Qualcomm, Samsung, Sierra Wireless, SK Telec*

(Replaces RP-170666)

**Discussion:**

Mediatek: prefers version instead of freeze

Ericsson: prefers to keep "freeze" as this is a well-defined process

RAN chair: what about "implementable version with frozen ASN.1"

Mediatek: would like to go offline

Qualcomm: then we should see a Tdoc from Mediatek to see what the proposal is

Vodafone, RAN1 chair: would prefer to decide now to avoid further offline discussion

Mediatek: we had no agreement in the offline discussion and we were surprised that this Tdoc is treated now (Tue morning)

Qualcomm: so offline discussion in the morning coffee break of Tue

RAN chair: we will come back on Tue evening

**Decision:** The document was **revised to RP-170741**.

**RP-170741** **Way Forward on the overall 5G NR workplan**
*Source: Alcatel-Lucent Shanghai-Bell, Alibaba, Apple, AT&T, British Telecom, Broadcom, Convida Wireless, Deutsche Telekom, DOCOMO, Ericsson, Etisalat, Huawei, Intel, KDDI, KT, LG Electronics, LGU+, NEC, Nokia, Ooredoo, Qualcomm, Samsung, Sierra Wireless, SK Telec*

(Replaces RP-170710)

**Discussion:**

RAN chair: will be sent to joint RAN-SA session on Wed

**Decision:** The document was **endorsed**.

**RP-170675** **Way Forward on 5G Time Plan**
*Source: MediaTek Inc.*

**Abstract:**

late input

**Discussion:**

RAN2 chair: we allowed non-backward compatible changes after a freeze of a RELin the past but it requires wide consensus on this

Qualcomm: Could we integrate the following bullets:



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- may only apply to NSA deployment scenario Options 3

- shall not apply to any of the 5GS deployment scenario Options 2, 4, 5, 7

- shall not apply to any Rel-15 feature other than NR Ph1 WID (version approved @RAN#75) and Option 3 enablers. This applies across RAN/SA/CT.

of RP-170675 into RP-170666 and then everybody

should able to agree to the modified RP-170666

OPPO: UE capability part is also essential

RAN chair: proponents are not so far from each other so work offline to produce a synthesis meeting

**Decision:** The document was **noted**.

**RP-170034** **LS on interworking and migration for 5GS and EPS (including Option 3) (S2-171591; to: SA, RAN; cc: RAN2, RAN3, CT; contact: NTT DOCOMO)**
*Source: SA2*

**Abstract:**

no explicit RAN action requested; previous LS S2-166288 = RP-161961 was received at RAN #74

**Discussion:**

moved from AI 9.2.1 to AI 9

conclusion: no LS answer from RAN but we will treat this LS also in joint SA-RAN session on Wed

**Decision:** The document was **noted**.

**RP-170208** **On NR forward compatibility**
*Source: QUALCOMM CDMA Technologies*

**Discussion:**

moved from AI 9.4 to AI 9

RAN chair: system aspect we will discuss in joint session with SA on Wed (architecutre/migration options)

**Decision:** The document was **noted**.

## 9.1 New WI/SI proposals for New Radio

***eMBB***

**RP-170380** **New WID on New Radio Access Technology**
*Source: NTT DOCOMO, INC.*

**Abstract:**

new WI for NR only; leading WG: RAN1

**Discussion:**

RAN chair: we do not have a final WID but it would be good if we have a draft for joint session with SA; try to converge offline

MCC: duplicated versions of RP-170380 exist



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**Decision:** The document was **revised to RP-170745**.

**RP-170745** **New WID on New Radio Access Technology**
*Source: NTT DOCOMO, INC.*

(Replaces RP-170380)

**Abstract:**

new WI for NR only; leading WG: RAN1

**Decision:** The document was **revised to RP-170777**.

**RP-170777** **New WID on New Radio Access Technology**
*Source: NTT DOCOMO, INC.*

(Replaces RP-170745)

**Abstract:**

new WI for NR only; leading WG: RAN1

**Discussion:**

MCC: multiple versions of RP-170777 exist

**Decision:** The document was **revised to RP-170793**.

**RP-170793** **New WID on New Radio Access Technology**
*Source: NTT DOCOMO, INC.*

(Replaces RP-170777)

**Abstract:**

new WI for NR only; leading WG: RAN1

**Discussion:**

Ericsson: would prefer to remove references to SA2 specs

Deutsche Telekom: did we fail on the reduction of the number of architecture options

RAN chair: suggests that operators come with a proposal to next WG meeting to downselect

**Decision:** The document was **revised to RP-170812**.

**RP-170812** **New WID on New Radio Access Technology**
*Source: NTT DOCOMO, INC.*

(Replaces RP-170793)

**Abstract:**

new WI for NR only; leading WG: RAN1

**Decision:** The document was **revised to RP-170823**.

**RP-170823** **New WID on New Radio Access Technology**
*Source: NTT DOCOMO, INC.*

(Replaces RP-170812)



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**Abstract:**

new WI for NR only; leading WG: RAN1

**Discussion:**

RAN4 chair: different companies have different interpretations of the table which should be discussed in RAN4

RAN chair: will be done

Vodafone: LTE Band 1/3/7/20 as LTE 4CC in combination with NR in freq. 3.3-4.2GHz was proposed at the last RAN4 meeting and included in the WF from RAN4, although due to an open issue on the "more than 1 CC for LTE" it was not captured accurately in the table (due to the way the table was defined), and now that combination seems to have been removed from the WID attachment just before final submission.

**Decision:** The document was **revised to RP-170847**.

**RP-170847** **New WID on New Radio Access Technology**
*Source: NTT DOCOMO, INC.*

(Replaces RP-170823)

**Abstract:**

new WI for NR only; leading WG: RAN1

**Decision:** The document was **revised to RP-170855**.

**RP-170855** **New WID on New Radio Access Technology**
*Source: NTT DOCOMO, INC.*

(Replaces RP-170847)

**Abstract:**

new WI for NR only; leading WG: RAN1

**Decision:** The document was **approved**.

**RP-170756** **Process for NR bands and LTE-NR band combinations specification work**
*Source: NTT DOCOMO*

**Abstract:**

related to RP-170380

**Discussion:**

Huawei: one band for NR-LTE coexistence should be defined as new NR band; guidance should cover whole REL-15 for NR;

NTT DOCOMO: not aware of such an agreement

RAN chair: but it seems the rest is stable?

CMCC: would like to add another note

RAN4 chair: we could have a placeholder for the band and discuss this then further

Deutsche Telekom: revealing business plans is not useful on slide 3

RAN4 chair: was agreed in the past



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RAN chair: but it says "taking into account deployment plan, spectrum holding possibility, regional/national regulatory requirements, global harmonization and implementation feasibility"

T-Mobile USA: agrees with Deutsche Telekom

TeliaSonera: "based on operator needs and requirements" would be better

Telecom Italia: supports TeliaSonera

Vodafone: also worried about the sentence as in some countries an exchange of deployment plans may have legal implications

RAN chair: maybe we better remove the whole bullet

RAN4 chair: do not remove the bullet but just "deployment plan" otherwise the rest has no sense

Deutsche Telekom: we cannot accept based on market needs but we could accept based on operator needs

RAN chair: pref

**Decision:** The document was **revised to RP-170826**.

**RP-170826** **Process for NR bands and LTE-NR band combinations specification work**
*Source: NTT DOCOMO*

(Replaces RP-170756)

**Decision:** The document was **endorsed**.

**RP-170825** **Proposals on frequency range of a set of NR paired bands**
*Source: Huawi, Telefonica, CMCC, China Telecom*

**Abstract:**

related to RP-170756

**Decision:** The document was **not treated**.

**RP-170444** **Deprioritization of eAAS WI compared to BS RF in NR WI**
*Source: NTT DOCOMO INC.*

**Decision:** The document was **withdrawn**.

**RP-170758** **Uplink Coverage Analysis of LTE and NR**
*Source: Qualcomm*

**Abstract:**

related to RP-170444

**Decision:** The document was **not treated**.

**RP-170381** **Work plan for Rel-15 New Radio access technology WI**
*Source: NTT DOCOMO, INC.*

**Decision:** The document was **revised to RP-170667**.

**RP-170667** **Work plan for Rel-15 New Radio access technology WI**
*Source: NTT DOCOMO, INC.*



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(Replaces RP-170381)

**Discussion:**

RAN2 chiar: we need to clarify when majority of RRC parameters are coming from RAN1

Huawei: workplan is informative but we should get it correct

**Decision:** The document was **revised to RP-170794**.

**RP-170794** **Work plan for Rel-15 New Radio access technology WI**
*Source: NTT DOCOMO, INC.*

(Replaces RP-170667)

**Decision:** The document was **noted**.

***URLCC***

**RP-170117** **Motivation for SID on Ultra-Reliable and Low Latency Communications with New Radio**
*Source: Ericsson LM*

**Discussion:**

Mediatek: unclear what it means for the SI, some duplication?

**Decision:** The document was **noted**.

**RP-170116** **New SID on Study on Ultra-Reliable and Low Latency Communications with New Radio**
*Source: Ericsson LM*

**Abstract:**

new SI for NR; leading WG: RAN1

**Decision:** The document was **revised to RP-170693**.

**RP-170693** **New SID on Study on Ultra-Reliable and Low Latency Communications with New Radio**
*Source: Ericsson LM*

(Replaces RP-170116)

**Decision:** The document was **postponed**.

**RP-170229** **Motivation for new Study Item on Ultra Reliable Low Latency Communication Enhancements for NR**
*Source: Nokia, Alcatel-Lucent Shanghai Bell*

**Decision:** The document was **noted**.

**RP-170228** **New SI: Study on Ultra Reliable Low Latency Communication Enhancements for NR**
*Source: Nokia, Alcatel-Lucent Shanghai Bell*

**Abstract:**

new SI for NR; leading WG: RAN1; studying enhancements of URLLC compared to REL-15 NR WI

**Decision:** The document was **postponed**.



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**RP-170358** **Support of URLLC in NR Rel-15**
*Source: Huawei, HiSilicon*

**Decision:** The document was **noted**.

**RP-170492** **URLLC in Rel 15**
*Source: TELECOM ITALIA S.p.A.*

**Decision:** The document was **noted**.

***CU-DU split***

**RP-170251** **New WID on CU-DU lower layer split for New Radio**
*Source: NTT DOCOMO, INC.*

**Abstract:**

new WI for NR only; leading WG: RAN3

**Decision:** The document was **revised to RP-170818**.

**RP-170818** **New SID on Study on CU-DU lower layer split for New Radio**
*Source: NTT DOCOMO, INC.*

(Replaces RP-170251)

**Abstract:**

new SI for NR only; leading WG: RAN3;

**Discussion:**

changed from WI to SI

**Decision:** The document was **approved**.

**RP-170252** **Motivation for WI on CU-DU lower layer split for New Radio**
*Source: NTT DOCOMO, INC.*

**Abstract:**

related to WID in RP-170251

**Decision:** The document was **noted**.

**RP-170454** **Intra-RAN network interface scope for Rel-15 NR WI**
*Source: VODAFONE Group Plc*

**Decision:** The document was **noted**.

**RP-170386** **Discussion on further study of CU-DU lower layer split**
*Source: ZTE Corporation*

**Decision:** The document was **noted**.

**RP-170435** **Justification & vision of NR low layer split**
*Source: TELEFONICA S.A.*



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**Abstract:**

Requirements and needs for taking advantage of NR low layer split towards a C-RAN approach

**Decision:** The document was **noted**.

**RP-170705** **Outcomes of RAN3 discussions on RAN Low Layer Splits for NR**
*Source: Ericsson, Huawei, Nokia , HiSilicon, Alcatel Lucent Shanghai Bell, InterDigital*

**Discussion:**

NTT DOCOMO: this was a late paper and we should not treat it

ZTE: disagrees with this Tdoc

RAN3 chair: as some companies are strongly against a WI we should discuss a SI

**Decision:** The document was **noted**.

*Non-Terrestrial Networks*

**RP-170371** **Draft reply LS to ITU-R WP4B/TEMP/17 = RP-161971 on the integration of satellite in IMT2020 (to: ITU-R WP4B; cc: ETSI TC SES, ITU-R WP5D, ITU-T SG13; contact: Thales)**
*Source: THALES*

**Abstract:**

LSin RP-161971 was received at RAN #74

**Discussion:**

moved from AI 7 to AI 9.1

**Decision:** The document was **revised to RP-170548**.

**RP-170133** **Motivation for a study on 5G to support non-terrestrial networks**
*Source: THALES*

**Abstract:**

Motivation paper identifying the non terrestrial network use cases in 5G and the rational to use NR in Non-terrestrial networks

**Decision:** The document was **noted**.

**RP-170132** **New SI: Study on NR to support Non-Terrestrial Networks**
*Source: THALES*

**Abstract:**

new SI for NR; leading WG: RAN1;

define channel models, study NR radio interface impacts for operation in non-terrestrial networks (airborne and spaceborne based)

**Decision:** The document was **revised to RP-170689**.

**RP-170689** **New SI: Study on NR to support Non-Terrestrial Networks**
*Source: THALES*

(Replaces RP-170132)



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**Abstract:**

new SI for NR; leading WG: RAN1;

**Decision:** The document was **revised to RP-170709**.

**RP-170709** **New SI: Study on NR to support Non-Terrestrial Networks**
*Source: THALES*

(Replaces RP-170689)

**Abstract:**

new SI for NR; leading WG: RAN1;

**Discussion:**

Qualcomm: not sure what should be the outcome apart from a new channel model

Ericsson: not so clear what the deployment scenario is (BS in the air, mobile on the ground?)

RAN chair: can be a first bullet to study the deployment scenarios

Fujitsu: link budgets expected as outcome of SI

**Decision:** The document was **revised to RP-170717**.

**RP-170717** **New SI: Study on NR to support Non-Terrestrial Networks**
*Source: THALES*

(Replaces RP-170709)

**Abstract:**

new SI for NR; leading WG: RAN1;

**Decision:** The document was **approved**.

***Multiple Access***

**RP-170382** **Motivation for the Study on 5G Non-Orthogonal Multiple Access**
*Source: ZTE Corporation*

**Decision:** The document was **noted**.

**RP-170383** **New SI: Study on 5G Non-Orthogonal Multiple Access**
*Source: ZTE Corporation*

**Abstract:**

new SID for NR; leading WG: RAN1

**Decision:** The document was **revised to RP-170681**.

**RP-170681** **New SI: Study on 5G Non-Orthogonal Multiple Access**
*Source: ZTE Corporation*

(Replaces RP-170383)

**Abstract:**



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new SID for NR; leading WG: RAN1

**Decision:** The document was **revised to RP-170829**.

**RP-170829** **New SI: Study on 5G Non-Orthogonal Multiple Access**
*Source: ZTE Corporation*

(Replaces RP-170681)

**Abstract:**

new SID for NR; leading WG: RAN1

**Decision:** The document was **approved**.

**RP-170359** **Motivation for study on non-orthogonal multiple access for NR**
*Source: Huawei, HiSilicon*

**Decision:** The document was **not treated**.

**RP-170407** **Motivation for Study Item on Non-orthogonal Multiple Access for NR**
*Source: CATT*

**Abstract:**

motivation contribution on new SI proposal on Non-orthogonal Multiple Access for NR

**Decision:** The document was **not treated**.

**RP-170424** **Studies on UL NOMA for NR in Rel-15**
*Source: Intel Corporation*

**Decision:** The document was **not treated**.

***Unlicensed/Shared Spectrum***

**RP-170205** **New SI: Study on NR-based Access to Unlicensed Spectrum**
*Source: QUALCOMM CDMA Technologies*

**Abstract:**

new SI for NR; leading WG: RAN1

**Decision:** The document was **revised to RP-170820**.

**RP-170820** **New SI: Study on NR-based Access to Unlicensed Spectrum**
*Source: QUALCOMM CDMA Technologies*

(Replaces RP-170205)

**Abstract:**

new SI for NR; leading WG: RAN1

**Discussion:**

Qualcomm: DT, ZTE, ZTE Microelectronics are supporting this Tdoc as well

Telecom Italia: lack of basic NR functionality should not block the start of a SI



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**Decision:** The document was **revised to RP-170828**.

**RP-170828** **New SI: Study on NR-based Access to Unlicensed Spectrum**
*Source: QUALCOMM CDMA Technologies*

(Replaces RP-170820)

**Abstract:**

new SI for NR; leading WG: RAN1

**Discussion:**

Brocade is also supporting this SI

**Decision:** The document was **approved**.

**RP-170166** **Motivation for new SI: Shared Spectrum Access (SSA) for NR**
*Source: Samsung*

**Decision:** The document was **noted**.

**RP-170165** **New SID Proposal: Study on Shared Spectrum Access (SSA) for NR**
*Source: Samsung*

**Abstract:**

new SI for NR; leading WG: RAN1

**Discussion:**

only one supporting company

**Decision:** The document was **postponed**.

**RP-170342** **Specification handling of 3GPP-based access to unlicensed spectrum from Rel-15 onwards**
*Source: Huawei, HiSilicon*

**Decision:** The document was **noted**.

***Broadcast***

**RP-170546** **Motivation for SI Study on MBMS for NR**
*Source: EBU*

**Abstract:**

related to RP-170131; late input

**Decision:** The document was **noted**.

**RP-170131** **New SI: Study on MBMS for NR**
*Source: EBU*

**Abstract:**

new SI for NR; leading WG: RAN1

**Decision:** The document was **postponed**.



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**RP-170164** **Motivation for new SI: MBMS for NR**
*Source: Samsung*

**Decision:** The document was **noted**.

**RP-170163** **New SID Proposal: Study on MBMS for NR**
*Source: Samsung*

**Abstract:**

new SI for NR; leading WG: RAN1

**Decision:** The document was **postponed**.

**RP-170774** **Way Forward on multicast/broadcast specifications**
*Source: Qualcomm*

**Abstract:**

related to RP-170164

**Discussion:**

proposal to add 1 objective to NR WI: "Specify features to ensure forward compatibility with multicast / broadcast services"

NTT DOCOMO: seems to be redundant to what we have

**Decision:** The document was **noted**.

**RP-170449** **Motivation for new Study Item on MBMS in NR**
*Source: Qualcomm Incorporated*

**Decision:** The document was **noted**.

**RP-170448** **New SID: Study on MBMS in NR**
*Source: Qualcomm Incorporated*

**Abstract:**

new SID for NR; leading WG: RAN1

**Decision:** The document was **postponed**.

***V2X/self evaluation***

**RP-170239** **Motivation for new SI : Study on 3GPP V2X phase 3**
*Source: LG Electronics*

**Decision:** The document was **noted**.

**RP-170238** **New SI proposal: Study on 3GPP V2X phase 3 for LTE & NR**
*Source: LG Electronics*

**Abstract:**

new SI for LTE and NR; leading WG: RAN1;



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**Decision:** The document was **revised to RP-170680**.

**RP-170680** **New SI proposal: Study on 3GPP V2X phase 3 for LTE & NR**
*Source: LG Electronics*

(Replaces RP-170238)

**Abstract:**

new SI for LTE and NR; leading WG: RAN1;

**Decision:** The document was **revised to RP-170753**.

**RP-170753** **New SI proposal: Study on 3GPP V2X phase 3 for LTE & NR**
*Source: LG Electronics*

(Replaces RP-170680)

**Decision:** The document was **withdrawn**.

**RP-170526** **New SID: Study on Self Evaluation towards IMT-2020 submission**
*Source: Huawei, Ericsson*

**Abstract:**

moved from AI 10.1.1 to AI 9.1; new SI for NR and LTE; leading WG: RAN1;

**Decision:** The document was **revised to RP-170832**.

**RP-170832** **New SID: Study on Self Evaluation towards IMT-2020 submission**
*Source: Huawei, Ericsson*

(Replaces RP-170526)

**Abstract:**

new SI for NR; leading: ITU-R AH

**Discussion:**

note: After RAN #75, rapporteur clarified that target date should rather be June 18 than Sep.18, keeping the SI in REL-15.

**Decision:** The document was **approved**.

**RP-170162** **Motivation for new SI: NR-based V2X services**
*Source: Samsung*

**Decision:** The document was **noted**.

**RP-170161** **New SID Proposal: Study on NR-based V2X services**
*Source: Samsung*

**Abstract:**

new SI for NR; leading WG: RAN1

**Discussion:**

see RP-170837 instead



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**Decision:** The document was **rejected**.

**RP-170181** **On evolution of V2X**
*Source: Qualcomm Incorporated*

**Decision:** The document was **noted**.

**RP-170198** **V2X Evolution: Timeline and Scope**
*Source: Qualcomm*

**Decision:** The document was **noted**.

**RP-170361** **Views on 3GPP-based V2X evolution**
*Source: Huawei, HiSilicon*

**Decision:** The document was **withdrawn**.

**RP-170387** **Considerations on the future eV2X study**
*Source: ZTE Corporation*

**Decision:** The document was **noted**.

**RP-170493** **How to manage V2X in RAN**
*Source: TELECOM ITALIA S.p.A.*

**Decision:** The document was **noted**.

**RP-170420** **New SID: Study on NR vehicular services**
*Source: Intel Corporation*

**Abstract:**

new SID for NR; leading WG: RAN1

**Decision:** The document was **revised to RP-170701**.

**RP-170701** **New SID: Study on NR vehicular services**
*Source: Intel Corporation*

(Replaces RP-170420)

**Discussion:**

see RP-170837 instead

**Decision:** The document was **rejected**.

**RP-170421** **Motivation for New SI: Study on NR vehicular services**
*Source: Intel Corporation*

**Decision:** The document was **noted**.

**RP-170450** **Way Forward for 3GPP V2X evolution**
*Source: VODAFONE Group Plc*

**Abstract:**



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Way forward for V2X evolution towards full 5G requirements fulfillment in 3GPP

**Discussion:**

moved from AI 10.1.1 to AI 9.1

**Decision:** The document was **noted**.

*NR/WLAN*

**RP-170333** **Motivation paper for the new SID on NR/non-3GPP integration, interworking and aggregation**
*Source: Intel Corporation*

**Decision:** The document was **noted**.

**RP-170332** **New SID on Study on NR/non-3GPP integration, interworking and aggregation**
*Source: Intel Corporation*

**Abstract:**

new SI for NR only; leading WG: RAN2

**Decision:** The document was **revised to RP-170692**.

**RP-170692** **New SID on Study on NR/non-3GPP integration, interworking and aggregation**
*Source: Intel Corporation*

(Replaces RP-170332)

**Decision:** The document was **postponed**.

*Positioning*

**RP-170210** **Motivation to study high accuracy positioning of NR**
*Source: ESA*

**Abstract:**

related to RP-170513; preliminary discussion on the capabilities of various positioning technologies and their hybridisation

**Decision:** The document was **noted**.

**RP-170211** **High accuracy positioning of NR - presentation of the motivation**
*Source: ESA*

**Abstract:**

related to RP-170513; presentation (ppt) associated to SI proposal

**Decision:** The document was **noted**.

**RP-170209** **Study on high accuracy positioning of NR**
*Source: ESA*

**Abstract:**

see RP-170530 instead



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**Decision:** The document was **withdrawn**.

**RP-170213** **Study on high accuracy positioning of NR**
*Source: ESA, Deutsche Telekom, Fraunhofer IIS*

(Replaces RP-170209)

**Abstract:**

see RP-170530 instead

**Decision:** The document was **withdrawn**.

**RP-170530** **New SI: Study on high accuracy positioning of NR**
*Source: ESA, Deutsche Telekom, Fraunhofer IIS*

**Abstract:**

new SI for NR; leading WG: RAN2?; adressing hybrid positioning technologies and subsequent impact on NR positioning

**Decision:** The document was **postponed**.

**RP-170178** **Motivation for Study Item on Positioning support for NR**
*Source: Qualcomm Incorporated*

**Decision:** The document was **noted**.

**RP-170177** **New SI: Study on Positioning support for NR**
*Source: Qualcomm Incorporated*

**Abstract:**

new SID for NR; leading WG: RAN1

**Decision:** The document was **postponed**.

**RP-170405** **Motivation for new Study Item on NR UE Positioning**
*Source: CATT*

**Abstract:**

motivation contribution on new SI proposal on NR UE positioning

**Decision:** The document was **noted**.

**RP-170406** **New SID: Study on NR UE Positioning**
*Source: CATT*

**Abstract:**

new SID for NR; leading WG: RAN1

**Decision:** The document was **revised to RP-170671**.

**RP-170671** **New SID: Study on NR UE Positioning**
*Source: CATT*

(Replaces RP-170406)



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**Abstract:**

new SID for NR; leading WG: RAN1

**Decision:** The document was **postponed**.

**RP-170423** **Motivation for New SI: Study on NR positioning technologies**
*Source: Intel Corporation*

**Decision:** The document was **noted**.

**RP-170422** **New SID: Study on NR positioning technologies**
*Source: Intel Corporation*

**Abstract:**

new SID for NR; leading WG: RAN1

**Decision:** The document was **revised to RP-170702**.

**RP-170702** **New SID: Study on NR positioning technologies**
*Source: Intel Corporation*

(Replaces RP-170422)

**Decision:** The document was **revised to RP-170743**.

**RP-170743** **New SID: Study on NR positioning support**
*Source: Intel Corporation*

(Replaces RP-170702)

**Decision:** The document was **postponed**.

***Flexible/full duplex***

**RP-170318** **Motivation for new SI on enhanced duplexing for NR**
*Source: China Telecom, Huawei, HiSilicon*

**Decision:** The document was **revised to RP-170664**.

**RP-170664** **Motivation for new SI on enhanced duplexing for NR**
*Source: China Telecom, Huawei, HiSilicon*

(Replaces RP-170318)

**Decision:** The document was **noted**.

**RP-170317** **New SI: Enhanced duplexing for NR**
*Source: China Telecom, Huawei, HiSilicon*

**Abstract:**

new SI for NR; leading WG: RAN1;

**Decision:** The document was **revised to RP-170663**.



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**RP-170663** **New SI: Study on enhanced duplexing for NR**
*Source: China Telecom, Huawei, HiSilicon*

(Replaces RP-170317)

**Abstract:**

new SI for NR; leading WG: RAN1;

**Decision:** The document was **postponed**.

**RP-170241** **Motivation for new SI : Study on flexible and full duplex for NR**
*Source: LG Electronics*

**Decision:** The document was **noted**.

**RP-170240** **New SI proposal: Study on flexible and full duplex for NR**
*Source: LG Electronics*

**Abstract:**

new SI for NR; leading WG: RAN1;

**Decision:** The document was **revised to RP-170707**.

**RP-170707** **New SI proposal: Study on flexible and full duplex for NR**
*Source: LG Electronics*

(Replaces RP-170240)

**Decision:** The document was **postponed**.

***High Speed***

**RP-170260** **Motivation for New SI on NR support for high speed scenario**
*Source: ETRI*

**Decision:** The document was **noted**.

**RP-170261** **New SID: Study on NR support for high speed scenario**
*Source: ETRI*

**Abstract:**

new SI for NR; leading WG: RAN1

**Decision:** The document was **revised to RP-170815**.

**RP-170815** **New SID: Study on NR support for high speed scenario**
*Source: ETRI*

(Replaces RP-170261)

**Decision:** The document was **postponed**.

***Integrated Backhaul & Access, Relays***



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**RP-170148** **New SI: Study on Integrated Access and Backhaul for NR**
*Source: AT&T*

**Abstract:**

new SI for NR; leading WG: RAN2; compare RP-170175

**Decision:** The document was **revised to RP-170688**.

**RP-170688** **New SI: Study on Integrated Access and Backhaul for NR**
*Source: AT&T*

(Replaces RP-170148)

**Decision:** The document was **not treated**.

**RP-170217** **Motivation for SI on integrated access and backhaul (IAB) for NR**
*Source: AT&T*

**Abstract:**

wrong Tdoc type SIDnew in Tdoc request

**Decision:** The document was **not treated**.

**RP-170746** **Way forward for Integrated access and Backhaul**
*Source: ATT*

**Abstract:**

related to RP-170148, RP-170688, RP-170217

**Decision:** The document was **revised to RP-170760**.

**RP-170760** **Way forward for Integrated access and Backhaul**
*Source: ATT*

(Replaces RP-170746)

**Discussion:**

will be part of an offline discussion

**Decision:** The document was **noted**.

**RP-170218** **Time Budget Request for SI on IAB**
*Source: AT&T*

**Abstract:**

Provide proposed TU allocation in RAN1, RAN2, and RAN3

**Decision:** The document was **withdrawn**.

**RP-170147** **New SI: Study on Integrated Access and Backhaul for NR**
*Source: AT&T*

**Abstract:**

new SI for NR; leading WG: RAN1



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**Discussion:**

moved from AI 9.3 to AI 9.1

**Decision:** The document was **withdrawn**.

**RP-170167** **New SID proposal: Study on NR Integrated Backhaul and Access**
*Source: Samsung*

**Abstract:**

new SI for NR; leading WG: RAN1

**Decision:** The document was **not treated**.

**RP-170168** **Motivation for new SI: NR Integrated Backhaul and Access**
*Source: Samsung*

**Decision:** The document was **not treated**.

**RP-170176** **Motivation for new Study Item on mmWave backhaul and relay for NR**
*Source: Qualcomm Incorporated*

**Decision:** The document was **withdrawn**.

**RP-170175** **New SI: Study on mmWave backhaul and relay for NR**
*Source: Qualcomm Incorporated*

**Abstract:**

new SI for NR; leading WG: RAN2; compare RP-170148

**Decision:** The document was **withdrawn**.

***Sidelink***

**RP-170408** **Motivation for Study on NR Sidelink Framework**
*Source: CATT*

**Abstract:**

motivation contribution on new SI proposal on NR sidelink framework

**Decision:** The document was **noted**.

**RP-170409** **New SID: Study on NR Sidelink Framework**
*Source: CATT*

**Abstract:**

new SID for NR; leading WG: RAN1

**Decision:** The document was **revised to RP-170672**.

**RP-170672** **New SID: Study on NR Sidelink Framework**
*Source: CATT*

(Replaces RP-170409)



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**Abstract:**

new SID for NR; leading WG: RAN1

**Decision:** The document was **postponed**.

**RP-170197** **Considerations on Sidelink**
*Source: Qualcomm*

**Decision:** The document was **noted**.

**RP-170357** **Discussion on NR sidelink**
*Source: Huawei, Huawei Device*

**Decision:** The document was **noted**.

*Others / Voice & emergency services*

**RP-170033** **LS on PWS support in 5G System (S2-171310; to: CT1; cc: CT, RAN, SA; contact: KDDI)**
*Source: SA2*

**Abstract:**

no RAN action requested

**Discussion:**

moved from AI 9.2.1 to AI 9.1

conclusion: no LS answer to SA2 but will clarify the support in the WID

**Decision:** The document was **noted**.

**RP-170155** **IMS voice and public warning system support for NR**
*Source: NTT DOCOMO, INC.*

**Decision:** The document was **noted**.

*Spectrum & Bands*

**RP-170041** **LS to RAN on RAN4 recommendation for NR spectra (R4-1702510; to: RAN; cc: -; contact: NTT DOCOMO)**
*Source: RAN4*

**Abstract:**

no explicit RAN action requested;

**Discussion:**

no LS answer

**Decision:** The document was **noted**.

**RP-170442** **Specctum handling procedure for New Radio WI**
*Source: NTT DOCOMO INC.*

**Abstract:**



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How to handle spectrum in New Radio WI is proposed.

**Decision:** The document was **noted**.

**RP-170443** **Way forward on how to handle RAN4 NR workload**
*Source: NTT DOCOMO INC.*

**Abstract:**

How to handle potentially large amount of workload due to large number of options such as SCS and significant number of potential NR bands/DC combinations.

**Discussion:**

multiple versions of RP-170443 exist

**Decision:** The document was **noted**.

**RP-170754** **Guideline for RAN4 work for NR bands/band combinations**
*Source: NTT DOCOMO INC.*

**Abstract:**

related to RP-170443

**Decision:** The document was **endorsed**.

**RP-170488** **Discussion on 5G spectrum workplan in Rel-15**
*Source: Huawei, HiSilicon*

**Discussion:**

ZTE: no agreement about band package in RAN4, so why do we discuss it?

Dish: NR WI has bands in WI, was this agreed in RAN4?

**Decision:** The document was **noted**.

**RP-170695** **Way forward on UL spectrum sharing of LTE and NR**
*Source: Huawei, Telefonica, CMCC, China Telecom, China Unicom, Orange, Coolpad*

**Abstract:**

related to RP-170488

**Discussion:**

Sprint: we are against this for REL-15

**Decision:** The document was **noted**.

**RP-170749** **Way forward on Uplink channel sharing NR-LTE in Rel-15**
*Source: Vodafone*

**Abstract:**

related to RP-170695

**Decision:** The document was **withdrawn**.



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**RP-170451** **Highest priority frequency bands and band combinations for NR**
*Source: VODAFONE Group Plc*

**Decision:** The document was **withdrawn**.

**RP-170452** **View on structure of band-specific work for NR**
*Source: VODAFONE Group Plc*

**Discussion:**

DT: we support the 2nd proposal

**Decision:** The document was **noted**.

**RP-170392** **NR Spectrum Related Work**
*Source: Qualcomm Japan Inc*

**Abstract:**

This paper discusses how to organize the work on new bands for NR

**Decision:** The document was **noted**.

**RP-170480** **Consideration for NR band specification in Rel 15**
*Source: KT Corporation*

**Abstract:**

In this contribution, KT presents our view for NR band specification in Rel 15.

**Discussion:**

moved from AI 9.4 to AI 9.1

**Decision:** The document was **noted**.

**RP-170053** **Spectrum needs for NR Release 15**
*Source: T-Mobile USA Inc.*

**Abstract:**

Initial spectrum needed to be developed into bands for NR in Release 15 including discussion on refarming LTE bands for NR support.

**Discussion:**

moved from AI 9.4 to AI 9.1

**Decision:** The document was **withdrawn**.

**RP-170154** **K-ICT Spectrum Plan for 5G services in the Republic of Korea**
*Source: TTA*

**Abstract:**

Information on the spectrum plan for 5G services in Korea to take into consideration the regulatory aspect in Rel.15 NR WI

**Discussion:**

moved from AI 9.4 to AI 9.1



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**Decision:** The document was **noted**.

**RP-170440** **Necessity of additional RAN4 NR AH meetings**
*Source: NTT DOCOMO INC.*

**Abstract:**

Necessity of RAN4 NR AH is proposed.

**Discussion:**

Qualcomm: supports NTT DOCOMO paper

Proposal: At least the following RAN4 NR AH meetings shall be held.

- 18-20th September in 2017
- 7-9th November in 2017

**Decision:** The document was **noted**.

**RP-170755** **Way forward on RAN4 NR Ad Hoc meetings**
*Source: NTT DOCOMO INC.*

**Abstract:**

related to RP-170440

**Decision:** The document was **endorsed**.

*less than 4 supporters/treat if time allows*

**RP-170365** **Motivation for new Study Item on Multi Antenna Enhancements for NR**
*Source: Nokia, Alcatel-Lucent Shanghai Bell*

**Decision:** The document was **not treated**.

**RP-170364** **New SID: Study on Multi Antenna Enhancements for NR**
*Source: Nokia, Alcatel-Lucent Shanghai Bell*

**Abstract:**

new SID for NR; leading WG: RAN1

**Decision:** The document was **not treated**.

**RP-170751** **Way forward on on new Study Item on multi**

**antenna enhancements for NR**
*Source: Mitsubishi Electric, Nokia, Alcatel-Lucent Shanghai Bell, Telefonica, IITH, CEWiT, IITM, Tejas Networks, Reliance Jio*

**Abstract:**

related to RP-170364

**Decision:** The document was **not treated**.

**RP-170180** **Motivation for Study Item on NR eMBB UE Power Saving**
*Source: Qualcomm Incorporated*



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**Decision:** The document was **withdrawn**.

**RP-170179** **New Study Item on NR eMBB UE Power Saving**
*Source: Qualcomm Incorporated*

**Decision:** The document was **withdrawn**.

**RP-170410** **Motivation for Study on UE Wakeup Mechanism in NR**
*Source: CATT*

**Abstract:**

motivation contribution on new SI proposal on UE wakeup mechanism in NR

**Decision:** The document was **not treated**.

**RP-170206** **New SI: Study on NR eMBB enhancements**
*Source: QUALCOMM CDMA Technologies*

**Abstract:**

new SI for NR; leading WG: RAN1

**Decision:** The document was **not treated**.

**RP-170411** **New SID: Study on UE Wakeup Mechanism in NR**
*Source: CATT*

**Abstract:**

new SID for NR; leading WG: RAN1

**Decision:** The document was **revised to RP-170673**.

**RP-170673** **New SID: Study on UE Wakeup Mechanism in NR**
*Source: CATT*

(Replaces RP-170411)

**Abstract:**

new SID for NR; leading WG: RAN1

**Decision:** The document was **not treated**.

**RP-170441** **Phase 2 study on nonlinear spatial multiplexing for NR**
*Source: Mitsubishi Electric Co.*

**Decision:** The document was **not treated**.

**RP-170388** **Considerations on LTE-NR uplink sharing**
*Source: ZTE Corporation*

**Decision:** The document was **not treated**.



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**RP-170214** **New SI: Study on non-linear precoding for MIMO and Centralized RAN/COMP Coherent Joint Transmission for NR**
*Source: IITH*

**Abstract:**

new SI for NR; leading WG: RAN1

**Decision:** The document was **not treated**.

**RP-170274** **Coverage extension for NR Rel-15**
*Source: China Telecommunications*

**Abstract:**

discussion on NR WI scope

**Decision:** The document was **noted**.

**RP-170335** **New Study Item Proposal: Study on Self-Organising Networks in New Radio**
*Source: China Mobile Com. Corporation*

**Abstract:**

new SI for NR only; leading WG: RAN3

**Decision:** The document was **revised to RP-170696**.

**RP-170697** **Motivation for new SI Study on Self-Organising Networks in New Radio**
*Source: CMCC*

**Abstract:**

related to RP-170697

**Decision:** The document was **noted**.

**RP-170696** **New Study Item Proposal: Study on Self-Organising Networks in New Radio**
*Source: China Mobile Com. Corporation*

(Replaces RP-170335)

**Decision:** The document was **postponed**.

***Testing***

**RP-170283** **Motivation for Study of test methods for New Radio**
*Source: Intel Corporation*

**Decision:** The document was **noted**.

**RP-170282** **New SID: Study of test methods for New Radio**
*Source: Intel Corporation*

**Abstract:**

new SID for NR; leading WG: RAN4



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**Decision:** The document was **revised to RP-170714**.

**RP-170714** **New SID: Study of test methods for New Radio**
*Source: Intel Corporation*

(Replaces RP-170282)

**Decision:** The document was **revised to RP-170748**.

**RP-170748** **New SID: Study of test methods for New Radio**
*Source: Intel Corporation*

(Replaces RP-170714)

**Decision:** The document was **revised to RP-170817**.

**RP-170770** **Way forward on NR testability SI**
*Source: Intel*

**Abstract:**

related to RP-170748

**Discussion:**

MCC: multiple versions of RP-170770 exist

**Decision:** The document was **revised to RP-170789**.

**RP-170817** **New SID: Study of test methods for New Radio**
*Source: Intel Corporation*

(Replaces RP-170748)

**Abstract:**

new SI for NR only; leading WG: RAN4;

**Decision:** The document was **revised to RP-170824**.

**RP-170824** **New SID: Study of test methods for New Radio**
*Source: Intel Corporation*

(Replaces RP-170817)

**Abstract:**

new SI for NR only; leading WG: RAN4;

**Decision:** The document was **approved**.

**RP-170789** **Way forward on NR testability SI**
*Source: Intel*

(Replaces RP-170770)

**Decision:** The document was **not treated**.



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*IMT-2020 submission*

**RP-170527** **Workplan for Self Evaluation towards IMT-2020 submission**
*Source: Huawei*

**Abstract:**

moved from AI 10.1.1 to AI 9.1;

**Discussion:**

RAN chair: so we start self-evaluation in Sep.2017

Qualcomm: there should be also tasks for RAN and RAN2

Telecom Italia: evaluation can also be carried out in ITU-R ad hoc

**Decision:** The document was **noted**.

*Way forwards/come backs*

**RP-170772** **Way forward on REL-15 WIs/SIs**
*Source: Ericssson*

**Discussion:**

Mediatek: this is another fish market approach which tiny unrealistic TUs

Telecom Italia: agrees that we need to know what we take out if we put further topics into the workplan

ATT: we should ask the people who buy the features, i.e. the operators, and not just look at long lists of supporters

RAN4 chair: do not forget RAN4 in TU considerations

RAN chair: asks the new chairman to organize an offline discussion to come up with a joint way forward (considering RP-170760, RP-170772, RP-170774), preferred with an LTE way forward and an NR way forward

See RP-170810 for NR and RP-170819 for LTE.

**Decision:** The document was **noted**.

**RP-170797** **New SI proposal: Study on evaluation methodology of new V2X use cases for LTE and NR**
*Source: LG Electronics*

**Abstract:**

new SI for LTE and NR; leading WG: RAN1; related to RP-170680

**Decision:** The document was **revised to RP-170837**.

**RP-170837** **New SI proposal: Study on evaluation methodology of new V2X use cases for LTE and NR**
*Source: LG Electronics*

(Replaces RP-170797)

**Decision:** The document was **approved**.

**RP-170810** **REL-15 NR SIDs**
*Source: Nokia*

**Discussion:**



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Telecom Italia: evaluation is usually done in a RAN ad hoc and it was suggested to have it in the ITU-R ad hoc

RAN chair: will be corrected in RP-170827 (evaluation will be done under RAN responsibility in ITU-R ad hoc)

**Decision:** The document was **revised to RP-170827**.

**RP-170827** **REL-15 NR SIDs**
*Source: Nokia*

(Replaces RP-170810)

**Decision:** The document was **endorsed**.

**RP-170811** **Way forward on new RAN3 REL-15 (LTE & NR)**
*Source: RAN3 chairman (Huawei)*

**Discussion:**

Telecom Italia: suggest to have one day of parallel session in RAN3

Intel: what about light connection TUs?

RAN3 chair: will keep them, if not needed (depending on SA) we will use them for NR

**Decision:** The document was **revised to RP-170816**.

**RP-170816** **Way forward on new RAN3 REL-15 (LTE & NR)**
*Source: RAN3 chairman (Huawei)*

(Replaces RP-170811)

**Discussion:**

Telecom Italia: first topic has high priority for us

RAN3 chair: The WI "CA utilization" should have 0 TUs in RAN3 #95bis and RAN #96

**Decision:** The document was **noted**.

**RP-170821** **New SI: Integrated access and backhaul for NR**
*Source: AT&T*

**Abstract:**

related to RP-170760; new SI for NR only; leading WG: RAN2

**Discussion:**

ATT: RAN1 TUs were missed, will start in Q1/2018

RAN chair: in case of inconsistency the endorsed Nokia slides take precedence

**Decision:** The document was **revised to RP-170831**.

**RP-170831** **New SI: Study on Integrated access and backhaul for NR**
*Source: AT&T*

(Replaces RP-170821)

**Abstract:**

new SI for NR only; leading WG: RAN2



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**Decision:** The document was **approved**.

## 9.2 Open REL-14 New Radio SIs

### 9.2.1 Study on New Radio (NR) Access Technology [FS_NR_newRAT]

**RP-170024** **LS on the completion of ITU-T Focus Group on IMT-2020 and start of normative work in ITU-T Study Group 13 (ITU_T_SG13_fgIMT2020-LS004-E; to: CT, RAN, SA, ITU-R WP5D, IEEE 802.1/802.3, IEEE SA, ETSI ISG NFV, ARIB, ATIS, CCSA, TTA, TTC, OIF, ONF, IETF/IRTF, NGMN Alliance, GSMA; cc: -; contact: Huawei)**
*Source: ITU-T SG13 Focus Group IMT-2020*

**Abstract:**

no RAN action requested

**Discussion:**

conclusion: no LS answer from RAN

**Decision:** The document was **noted**.

**RP-170037** **Reply LS to R4-1610994 on Suitability of technical conditions of ECC DEC (11) 06 for 5G (ECC_PT1_LS_170120b; to: RAN4; cc: RAN; contact: Ofcom)**
*Source: ECC PT1*

**Abstract:**

note: R4-1610994 was not sent to/cc RAN; no RAN action requested

**Discussion:**

conclusion: no LS answer from RAN

**Decision:** The document was **noted**.

*Technology study*

**RP-170376** **Status Report of Study on New Radio Access Technology**
*Source: NTT DOCOMO, INC.*

**Abstract:**

wrong Tdoc type "report" in Tdoc request

**Discussion:**

approved: 100%, March 17, SI is completed

**Decision:** The document was **noted**.

**RP-170378** **pCR for TR38.912**
38.912 v0.0.2
*Source: NTT DOCOMO, INC.*

**Abstract:**

TR 38.912 v0.0.2 was agreed by RAN #73

**Discussion:**



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RAN4 part needs to be revised

**Decision:** The document was **revised to RP-170735**.

**RP-170735** **pCR for TR38.912**
38.912 v0.0.2
*Source: NTT DOCOMO, INC.*

(Replaces RP-170378)

**Decision:** The document was **approved**.

**RP-170433** **TP for TR 38.912: Radio transmission/reception**
38.912 v0.0.2
*Source: NTT DOCOMO INC.*

**Abstract:**

TR 38.912 v0.0.2 was agreed by RAN #73; text proposal on UE/BS RF feasibility

**Decision:** The document was **revised to RP-170736**.

**RP-170736** **TP for TR 38.912: Radio transmission/reception**
38.912 v0.0.2
*Source: NTT DOCOMO INC.*

(Replaces RP-170433)

**Discussion:**

withdrawn as captured in RP-170735

**Decision:** The document was **withdrawn**.

**RP-170854** **TR 38.912 v1.0.0 on Study on New Radio (NR) access technology**
38.912 v1.0.0
*Source: NTT DOCOMO*

**Abstract:**

RAN TR for 1-step approval

**Discussion:**

note: TR was handled by email after RAN #75;

conclusion: approved as REL-14 TR

**Decision:** The document was **approved**.

**RP-170377** **TR 38.802 v2.0.0 on Study on New Radio (NR) Access Technology Physical Layer Aspects; for approval**
38.802 v2.0.0
*Source: NTT DOCOMO, INC.*

**Abstract:**

RAN1 TR 38.802 is provided for approval

**Discussion:**



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conclusion: approved as REL-14 TR

**Decision:** The document was **approved**.

**RP-170477** **TR 38.804 v1.0.0 on Study on New Radio Access Technology; Radio Interface Protocol Aspects**
38.804 v1.0.0
*Source: NTT DOCOMO, INC. (Rapporteur)*

**Abstract:**

RAN2 TR 38.804 is provided for 1-step approval

**Discussion:**

conclusion: approved as REL-14 TR

**Decision:** The document was **approved**.

**RP-170490** **TR 38.801 v2.0.0 on Study on New Radio Access Technology; Radio Access Architecture and Interfaces**
38.801 v2.0.0
*Source: NTT DOCOMO, INC. (Rapporteur)*

**Abstract:**

RAN3 TR 38.801 is provided for approval

**Discussion:**

conclusion: approved as REL-14 TR

**Decision:** The document was **approved**.

**RP-170439** **TR 38.803 v2.0.0 on Study on New Radio Access Technology: RF and co-existence aspects**
38.803 v2.0.0
*Source: NTT DOCOMO INC.*

**Abstract:**

RAN4 TR 38.803 is provided for approval

**Discussion:**

conclusion: approved as REL-14 TR

**Decision:** The document was **approved**.

**RP-170379** **Revision of SI: Study on New Radio Access Technology**
*Source: NTT DOCOMO, INC.*

(Replaces RP-162469)

**Abstract:**

last approved SID: RP-162469

**Decision:** The document was **approved**.

***Channel Modeling***



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**RP-170394** **TR 38.9xx v1.0.0 Study on channel model for frequencies from 0.5 to 100 GHz**
38.901 v1.0.0
*Source: Samsung*

**Abstract:**

RAN1 TR 38.9XX is provided for 1-step approval; note: Based on TR 38.900 (including aspects below 6GHz, and also some aspects from TR 36.873) this new TR is created under SI FS_NR_newRAT and a corresponding SID revision in RP-170379 has to be approved first in order to allocate a TR number

**Decision:** The document was **revised to RP-170737**.

**RP-170737** **TR 38.901 v1.0.1 Study on channel model for frequencies from 0.5 to 100 GHz**
38.901 v1.0.0
*Source: Samsung*

(Replaces RP-170394)

**Abstract:**

RAN1 TR 38.901 is provided for 1-step approval;

**Discussion:**

conclusion: approved as REL-14 TR

**Decision:** The document was **approved**.

**RP-170489** **Discussion on channel models for 5G evaluations**
*Source: Huawei, HiSilicon*

**Discussion:**

Samsung, Ericsson: suggests to bring this proposal to next RAN1 meeting

NTT DOCOMO: we have discussed this already in RAN1

**Decision:** The document was **noted**.

***60 GHz***

**RP-170137** **Skeleton TR 38.805 v0.0.1 "Study on New Radio Access Technology; 60 GHz Unlicensed Spectrum"**
38.805 v0.0.1
*Source: Nokia Corporation*

**Abstract:**

TR 38.805 is under RAN control; skeleton TR to capture requirements on the unlicensed bands of initial interest based on RAN reflector email discussion survey on 60 GHz regulatory landscape.

**Decision:** The document was **agreed**.

**RP-170138** **pCR for TR 38.805 on regulatory landscape of the 60GHz band**
38.805 v0.0.1
*Source: Nokia Corporation*

**Abstract:**

Skeleton TR 38.805 v0.0.1 is submitted in RP-170137; it is proposed to approve the pCR to TR 38.805 v0.0.1 covering information related to different regions.



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**Decision:** The document was **approved**.

**RP-170249** **TP for TR38.805: Regulations for 60GHz in Korea**
38.805 v0.0.1
*Source: KT Corp.*

**Abstract:**

Skeleton TR 38.805 v0.0.1 is submitted in RP-170137; this contribution is a text proposal to TR 38.805 on Regulations for 60GHz in Korea.

**Decision:** The document was **approved**.

**RP-170738** **TR 38.805 v1.0.0 "Study on New Radio Access Technology; 60 GHz Unlicensed Spectrum"**
38.805 v1.0.0
*Source: Nokia Corporation*

**Abstract:**

RAN TR for 1-step approval

**Discussion:**

conclusion: approved as REL-14 TR

**Decision:** The document was **approved**.

**RP-170207** **Proposal for new TR for unlicensed spectrum**
*Source: QUALCOMM CDMA Technologies*

**Discussion:**

moved from AI 9.4 to AI 9.2.1

BT: no example for Europe

Telecom Ialia: TR 38.805 was specifically for 60GHz

Huawei, Orange: new SI should be brought

conclusion: title of TR 38.805 will not be changed, new TR would be needed and new SI

**Decision:** The document was **noted**.

*N2/N3 reference points*

**RP-170035** **LS on N2 and N3 reference points for 5G system (S2-171611; to: RAN, SA; cc: CT, RAN3, CT4, CT1, SA3, RAN2; contact: Nokia)**
*Source: SA2*

**Abstract:**

no explicit RAN action requested;

**Discussion:**

conclusion: no LS answer, will discuss this in joint session SA-RAN on Wed evening

**Decision:** The document was **noted**.



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**RP-170503** **Decision on N2 and N3 reference points for 5G system**
*Source: Nokia, Alcatel-Lucent Shanghai Bell*

**Abstract:**

Related to LSin in RP-170035 and RAN WG3 Status Report in RP-170007

**Discussion:**

ATT: we support this Nokia proposal and ask to take a decision for it

Nokia: do we make it access-agnostic is the question

PST: this topic is also important for regulators

RAN chair: maybe we can discuss this in the joint session

SA chair: who defines the access-independent procedures needs to clear

RAN3 chair: we will have a problem to define what an access-specific; we cannot take "agnostic" for any new thing that will be brought up

RAN chair: try to have an input for the joint RAN-SA session

**Decision:** The document was **noted**.

**RP-170771** **RAN WF on N2 and N3 reference points for 5G system**
*Source: RAN3 chairman*

**Abstract:**

related to RP-170035

**Discussion:**

Will be a RAN3 chairman's input to joint session SA-RAN

**Decision:** The document was **noted**.

**RP-170515** **On Access Agnostic Design Principles for NG-C**
*Source: Ericsson*

**Discussion:**

Broadcom: SI is completed and SA2 is in normative phase

Intel: we do not discuss when to do it but who should do it and we agree with Nokia that RAN3 should do it

Telecom Italia: there are access-specific and access-agnostic procedures and we should not simply copy-and-past

SA chair: SA2 has finished work for REL-15 but they will discuss trusted accesses in the future

**Decision:** The document was **noted**.

***NR terminology***

**RP-170227** **NR terminology - summary of email discussion**
*Source: Nokia (Convenor)*

**Abstract:**

Summary and proposal on NR terminology based on email discussion conducted on the RAN exploder

**Discussion:**



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moved from AI 9.1 to AI 9.2.1

NTT DOCOMO: wants to have NG-RAN

China Unicom, Qualcomm: support this

conclusion: We will use NG-RAN and communicate this to SA in the joint RAN-SA session

**Decision:** The document was **noted**.

## 9.3 Closed REL-14 New Radio WIs/SIs

### 9.3.1 Study on channel model for frequency spectrum above 6 GHz [FS_6GHz_CH_model]

### 9.3.2 Study on Scenarios and Requirements for Next Generation Access Technologies [FS_NG_SReq]

**RP-170287** **Appending some missed abbreviations for 38.913**
38.913 CR-0008 Cat: F (Rel-14) v14.1.0
*Source: China Mobile Com. Corporation*

**Abstract:**

CR to RAN TR; some missed abbreviations are appended for 38.913

**Discussion:**

MCC: wrong rev 1 on CR cover;

Telecom Italia: there will be some alignments needed with ITU-R requirements

**Decision:** The document was **approved**.

## 9.4 Other inputs

# 10 LTE

## 10.1 New WI/SI proposals for LTE

**RP-170250** **KT's perspective on 3GPP Release-15 for LTE-Advanced Pro.**
*Source: KT Corp.*

**Abstract:**

This contribution presents KT's perspective on 3GPP Release-15 for LTE-Advanced Pro.

**Discussion:**

moved from AI 10 to AI 10.1

**Decision:** The document was **noted**.

**RP-170455** **Rel-15 LTE work/studies on 5G-related verticals**
*Source: VODAFONE Group Plc*



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**Decision:** The document was **noted**.

**RP-170819** **New LTE REL-15 WIDs/SIDs**
*Source: Nokia*

**Discussion:**

Mediatek: concerned about having LAA evolution

Telecom Italia: yesterday, it was close to be taken out and not it's back, we have a problem with this

ATT: autononmous UL still needs a grant from the network

Telecom Italia: can we consider autonomous UL only from June 17 onwards?

conclusion: autonomous UL will only start in June 17

**Decision:** The document was **revised to RP-170834**.

**RP-170834** **New LTE REL-15 WIDs/SIDs**
*Source: Nokia*

(Replaces RP-170819)

**Decision:** The document was **endorsed**.

## 10.1.1 led by RAN1

***IOT/NBIOT/MTC***

**RP-170465** **New WI: Even further enhanced MTC for LTE**
*Source: Ericsson*

**Abstract:**

new WI for LTE; leading WG: RAN1; WI code to be used: LTE_eMTC4; compare RP-170149 and RP-170678

**Decision:** The document was **revised to RP-170732**.

**RP-170732** **New WI: Even further enhanced MTC for LTE**
*Source: Ericsson*

(Replaces RP-170465)

**Abstract:**

new WI for LTE; leading WG: RAN1; WI code to be used: LTE_eMTC4

**Discussion:**

Huawei: has a problem with this proposal, there 2 technologies which are optimized for their areas; we could approve both MTC and NB-IOT WIs with removing a sentence

ATT: MTC will still not cover the whole NB-IOT use cases

Nokia: prefers to enhance both technologies

RAN chair: the 732 & 836

Huawei: sustains objection on approval of 732

RAN chair: then we do not approve both



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Nokia: can we have a working agreement?

conclusion: RP-170732 & revised RP-170836 (to clarify rapporteur) in RP-170852 are approved with one working agreement

**Decision:** The document was **approved**.

**RP-170839** **New WI: Even further enhanced MTC for LTE**
*Source: Ericsson*

(Replaces RP-170732)

**Discussion:**

note: RP-170732 was supposed to be revised in RP-170839, however at the end RP-170839 was withdrawn and RP-170732 was considered

**Decision:** The document was **withdrawn**.

**RP-170466** **Motivation for New WI on Even further enhanced MTC for LTE**
*Source: Ericsson*

**Abstract:**

Motivation paper for New WI on Even further enhanced MTC for LTE

**Decision:** The document was **revised to RP-170733**.

**RP-170733** **Motivation for New WI on Even further enhanced MTC for LTE**
*Source: Ericsson*

(Replaces RP-170466)

**Decision:** The document was **withdrawn**.

**RP-170337** **Motivation for new WI proposal on further NB-IoT enhancements**
*Source: Huawei, HiSilicon*

**Decision:** The document was **noted**.

**RP-170336** **New WI proposal: Further NB-IoT enhancements**
*Source: Huawei, HiSilicon*

**Abstract:**

new WI for LTE only; leading WG: RAN1; WI code to be used: NB_IOTenh2; compare RP-170507

**Decision:** The document was **revised to RP-170744**.

**RP-170744** **New WI proposal: Further NB-IoT enhancements**
*Source: Huawei, HiSilicon*

(Replaces RP-170336)

**Abstract:**

new WI for LTE only; leading WG: RAN1; WI code to be used: NB_IOTenh2;

**Decision:** The document was **revised to RP-170836**.



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**RP-170836** **New WI proposal: Further NB-IoT enhancements**
*Source: Huawei, HiSilicon*

(Replaces RP-170744)

**Abstract:**

new WI for LTE only; leading WG: RAN1; WI code to be used: NB_IOTenh2;

**Decision:** The document was **revised to RP-170852**.

**RP-170852** **New WI proposal: Further NB-IoT enhancements**
*Source: Huawei, HiSilicon*

(Replaces RP-170836)

**Abstract:**

new WI for LTE only; leading WG: RAN1; WI code to be used: NB_IOTenh2;

**Discussion:**

approved with working agreement (see RP-170732)

note: TU attachment is missing but acc. to Huawei the same as in previous RP-170836

**Decision:** The document was **approved**.

**RP-170795** **QoS enhancements for groups of UEs in NB-IoT**
*Source: Huawei*

**Abstract:**

related to RP-170744

**Decision:** The document was **not treated**.

**RP-170508** **Motivation for Work item on Further enhancements of NB-IoT**
*Source: Ericsson LM*

**Decision:** The document was **noted**.

**RP-170507** **New WI: Further enhancements of NB-IoT**
*Source: Ericsson LM*

**Abstract:**

new WI for LTE only; leading WG: RAN1; WI code to be used: NB_IOTenh2; compare RP-170336

**Decision:** The document was **revised to RP-170718**.

**RP-170718** **New WI: Further enhancements of NB-IoT**
*Source: Ericsson LM; Qualcomm*

(Replaces RP-170507)

**Decision:** The document was **withdrawn**.



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**RP-170172** **Motivation for new WI: Further enhancements on NB-IoT and eMTC**
*Source: Samsung*

**Abstract:**

see RP-170677 and RP-170679 instead

**Decision:** The document was **withdrawn**.

**RP-170171** **New WID Proposal: Further enhancements on NB-IoT and eMTC**
*Source: Samsung*

**Abstract:**

new WI for LTE only; leading WI: RAN1; finally split into 2 WIs: see RP-170676 for NB-IoT and RP-170678 for eMTC

**Decision:** The document was **withdrawn**.

**RP-170677** **Motivation for new WI: Further enhancements of NB-IoT**
*Source: Samsung*

**Abstract:**

based on RP-170172

**Decision:** The document was **noted**.

**RP-170676** **New WID: Further enhancements of NB-IoT**
*Source: Samsung*

**Abstract:**

based on RP-170171; new WI for LTE only; leading WI: RAN1

**Discussion:**

see RP-170852 instead

**Decision:** The document was **rejected**.

**RP-170679** **Motivation for new WI: Even further enhanced MTC for LTE**
*Source: Samsung*

**Abstract:**

based on RP-170172

**Decision:** The document was **noted**.

**RP-170678** **New WID: Even further enhanced MTC for LTE**
*Source: Samsung*

**Abstract:**

based on RP-170171; new WI for LTE only; leading WI: RAN1; compare RP-170465

**Discussion:**

see RP-170732 instead



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**Decision:** The document was **rejected**.

**RP-170372** **Motivation for new WI: Further enhancements on NB-IoT and eMTC for LTE**
*Source: ZTE Corporation*

**Abstract:**

wrong Tdoc type WIDnew in Tdoc request; see RP-170684 and RP-170686 instead

**Decision:** The document was **withdrawn**.

**RP-170373** **New WI: Further enhancements on NB-IoT and eMTC for LTE**
*Source: ZTE Corporation*

**Abstract:**

new WI for LTE; leading WG: RAN1; finally split into 2 WIs: see RP-170676 for NB-IoT and RP-170678 for eMTC

**Decision:** The document was **withdrawn**.

**RP-170684** **Motivation for new WI: Further enhancements on NB-IoT**
*Source: ZTE Corporation*

**Abstract:**

based on RP-170372

**Decision:** The document was **noted**.

**RP-170685** **New WI: Further enhancements on NB-IoT**
*Source: ZTE Corporation*

**Abstract:**

based on RP-170373; new WI for LTE; leading WG: RAN1

**Discussion:**

see RP-170852 instead

**Decision:** The document was **rejected**.

**RP-170686** **Motivation for new WI: Even further enhanced MTC for LTE**
*Source: ZTE Corporation*

**Abstract:**

based on RP-170372

**Decision:** The document was **noted**.

**RP-170687** **New WI: Even further enhanced MTC for LTE**
*Source: ZTE Corporation*

**Abstract:**

based on RP-170373; new WI for LTE; leading WG: RAN1

**Discussion:**



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see RP-170732 instead

**Decision:** The document was **rejected**.

**RP-170153** **Proposal for NB-IoT TDD support**
*Source: KDDI Corporation*

**Decision:** The document was **noted**.

**RP-170429** **On further evolution of eMTC and NB-IoT in Rel-15 LTE**
*Source: Intel Corporation*

**Decision:** The document was **noted**.

**RP-170469** **On Rel-15 NB-IoT Scope**
*Source: MediaTek Inc.*

**Decision:** The document was **noted**.

**RP-170458** **Motivation for proposed WI on NB-IoT further evolution**
*Source: VODAFONE Group Plc*

**Decision:** The document was **withdrawn**.

**RP-170459** **Proposed WI on NB-IoT further evolution**
*Source: VODAFONE Group Plc*

**Abstract:**

new WI for LTE only; leading WG: RAN1

**Decision:** The document was **withdrawn**.

**RP-170149** **New WI proposal: Even further enhanced MTC for LTE**
*Source: Sierra Wireless, S.A.*

**Abstract:**

new WI for LTE; leading WG: RAN1; WI code to be used: LTE_eMTC4; compare RP-170465

**Decision:** The document was **withdrawn**.

**RP-170150** **Motivation for new WI: Even Further Enhanced MTC for LTE**
*Source: Sierra Wireless, S.A.*

**Decision:** The document was **withdrawn**.

**RP-170549** **Discussion on the evolution of IOT for LTE**
*Source: Qualcomm*

**Abstract:**

late input

**Decision:** The document was **noted**.



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**RP-170604** **New Work Item on Further enhancements of NB-IoT**
*Source: Qualcomm*

**Abstract:**

new WID for LTE; leading WG: RAN1; late input

**Discussion:**

was merged with Ericsson

**Decision:** The document was **withdrawn**.

**RP-170662** **Positioning enhancements for IoT**
*Source: Sequans*

**Abstract:**

late input

**Discussion:**

Telecom Italia, Deutsche Telekom: we need to avoid competitiion between NB-IOT and eMTC

**Decision:** The document was **noted**.

**RP-170511** **On eMTC 5G mMTC requirement fulfilment**
*Source: Ericsson LM*

**Decision:** The document was **noted**.

**RP-170512** **On NB-IoT 5G mMTC requirement fulfilment**
*Source: Ericsson LM*

**Decision:** The document was **noted**.

**RP-170460** **Motivation for SI on fulfilling mMTC requirements with NB-IoT**
*Source: VODAFONE Group Plc*

**Abstract:**

note: mMTC requirements are taken from NR TR 38.913

**Decision:** The document was **withdrawn**.

**RP-170461** **SI on fulfilling mMTC requirements with NB-IoT**
*Source: VODAFONE Group Plc*

**Abstract:**

new SI for LTE only; leading WG: RAN1; note: mMTC requirements are taken from NR TR 38.913

**Decision:** The document was **withdrawn**.

**RP-170510** **Motivation for Work Item on NB-IoT operation in unlicensed spectrum**
*Source: Ericsson LM*

**Decision:** The document was **noted**.



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**RP-170509** **New Work Item on NB-IoT operation in unlicensed spectrum**
*Source: Ericsson LM*

**Abstract:**

new WI for LTE only; leading WG: RAN1

**Discussion:**

only 2 supporting companies

RAN chair: does not have 4 supporters

**Decision:** The document was **not treated**.

**RP-170339** **Motivation for new SI on licensed-downlink-assisted IoT**
*Source: Huawei, HiSilicon*

**Decision:** The document was **noted**.

**RP-170338** **New SI proposal: Study on licensed-downlink-assisted IoT**
*Source: Huawei, HiSilicon*

**Abstract:**

new SI for LTE only; leading WG: RAN1;

**Discussion:**

3 supporting companies

RAN chair: does not have 4 supporters

**Decision:** The document was **not treated**.

*CoMP*

**RP-170426** **Motivation for New WI: Further enhancements to Coordinated Multi-Point (CoMP) Operation for LTE**
*Source: Intel Corporation, ZTE*

**Decision:** The document was **noted**.

**RP-170425** **New WID: Further enhancements to Coordinated Multi-Point (CoMP) Operation for LTE**
*Source: Intel Corporation, ZTE*

**Abstract:**

new WI for LTE only; leading WG: RAN1; follow-up WI of SI FS_feCOMP_LTE

**Decision:** The document was **revised to RP-170682**.

**RP-170682** **New WID: Further enhancements to Coordinated Multi-Point (CoMP) Operation for LTE**
*Source: Intel Corporation, ZTE*

(Replaces RP-170425)

**Abstract:**

new WI for LTE only; leading WG: RAN1; follow-up WI of SI FS_feCOMP_LTE



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**Decision:** The document was **revised to RP-170750**.

**RP-170750** **New WID: Further enhancements to Coordinated Multi-Point (CoMP) Operation for LTE**
*Source: Intel Corporation, ZTE*

(Replaces RP-170682)

**Abstract:**

new WI for LTE only; leading WG: RAN1; follow-up WI of SI FS_feCOMP_LTE

**Decision:** The document was **approved**.

*1024 QAM & fixed access*

**RP-170525** **Motivation for new WI on Enhancements for high capacity stationary wireless link and introduction of 1024 QAM for LTE**
*Source: Huawei, HiSilicon*

**Decision:** The document was **noted**.

**RP-170524** **New WI proposal: Enhancements for high capacity stationary wireless link and introduction of 1024 QAM for LTE**
*Source: Huawei, HiSilicon*

**Abstract:**

new WI for LTE only; leading WG: RAN1;

**Discussion:**

Hauwei: has more supporting companies now

**Decision:** The document was **revised to RP-170801**.

**RP-170801** **New WI proposal: Enhancements for high capacity stationary wireless link and introduction of 1024 QAM for LTE**
*Source: Huawei, HiSilicon*

(Replaces RP-170524)

**Abstract:**

new WI for LTE only; leading WG: RAN1;

**Decision:** The document was **revised to RP-170830**.

**RP-170830** **New WI proposal: Enhancements for high capacity stationary wireless link and introduction of 1024 QAM for LTE**
*Source: Huawei, HiSilicon*

(Replaces RP-170801)

**Abstract:**

new WI for LTE only; leading WG: RAN1;

**Decision:** The document was **revised to RP-170838**.



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**RP-170838** **New WI proposal: Enhancements for high capacity stationary wireless link and introduction of 1024 QAM for LTE**
*Source: Huawei, HiSilicon*

(Replaces RP-170830)

**Abstract:**

new WI for LTE only; leading WG: RAN1;

**Discussion:**

note: After RAN #75, rapporteur clarified that target date should rather be June 18 than Dec.18 for the Core part, this means Core and Perf. part are REL-15 WIs.

**Decision:** The document was **approved**.

**RP-170183** **Motivation for Work Item for DL 1024QAM in LTE**
*Source: Qualcomm Incorporated*

**Decision:** The document was **withdrawn**.

**RP-170182** **New Work Item for DL 1024QAM in LTE**
*Source: Qualcomm Incorporated*

**Abstract:**

new WI for LTE only; leading WI: RAN1; WI code to be used: LTE_DL1024QAM

**Discussion:**

was merged with Huawei proposal

**Decision:** The document was **withdrawn**.

***LTE V2V/V2X***

**RP-170428** **Motivation for New SI: Study on LTE vehicular positioning technologies**
*Source: Intel Corporation*

(Replaces RP-162522)

**Decision:** The document was **noted**.

**RP-170427** **New SID: Study on LTE vehicular positioning technologies**
*Source: Intel Corporation*

(Replaces RP-162521)

**Abstract:**

new SI for LTE only; leading WG: RAN1;

**Decision:** The document was **revised to RP-170683**.

**RP-170683** **New SID: Study on LTE vehicular positioning technologies**
*Source: Intel Corporation*

(Replaces RP-170427)

**Abstract:**



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new SI for LTE only; leading WG: RAN1;

**Decision:** The document was **postponed**.

**RP-170484** **Motivation for new WI proposal on enhancements on LTE-based V2X Services**
*Source: Huawei, HiSilicon*

**Decision:** The document was **noted**.

**RP-170483** **New WI proposal: Enhancements on LTE-based V2X Services**
*Source: Huawei, CATT, LGE, HiSilicon*

**Abstract:**

new WI for LTE only; leading WG: RAN1;

**Decision:** The document was **revised to RP-170724**.

**RP-170724** **New WI proposal: Enhancements on LTE-based V2X Services**
*Source: Huawei, CATT, LGE, HiSilicon*

(Replaces RP-170483)

**Abstract:**

new WI for LTE only; leading WG: RAN1; WI code to be used: LTE_eV2X; follow-up WI of REL-14 WI LTE_V2X;

**Decision:** The document was **revised to RP-170798**.

**RP-170798** **New WI proposal: Enhancements on LTE-based V2X Services**
*Source: Huawei, CATT, LGE, HiSilicon*

(Replaces RP-170724)

**Abstract:**

new WI for LTE only; leading WG: RAN1; WI code to be used: LTE_eV2X; follow-up WI of REL-14 WI LTE_V2X;

**Decision:** The document was **approved**.

**RP-170799** **Draft LS on the support of Unicast and Groupcast transmission over PC5 for eV2X (to: SA2; cc: -; contact: Huawei)**
*Source: Huawei*

**Abstract:**

related to RP-170798

**Decision:** The document was **revised to RP-170841**.

**RP-170841** **LS on the support of Unicast and Groupcast transmission over PC5 for eV2X (to: SA2; cc: SA, SA1, SA3; contact: Huawei)**
*Source: RAN*

(Replaces RP-170799)

**Discussion:**

attached to this LS: approved WID RP-170798



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**Decision:** The document was **approved**.

*LTE unlicensed*

**RP-170247** **Motivation for New WID: Enhancements to LTE operation in unlicensed spectrum**
*Source: Nokia, Ericsson*

**Decision:** The document was **noted**.

**RP-170430** **Motivation for New Work Item on Further Enhanced LAA for LTE**
*Source: Intel Corporation*

(Replaces RP-162250)

**Decision:** The document was **noted**.

**RP-170246** **New WID: Enhancements to LTE operation in unlicensed spectrum**
*Source: Nokia, Ericsson, Qualcomm, Intel*

**Abstract:**

new WI for LTE only; leading WI: RAN1

**Decision:** The document was **revised to RP-170723**.

**RP-170723** **New WID: Enhancements to LTE operation in unlicensed spectrum**
*Source: Nokia, Ericsson, Qualcomm, Intel*

(Replaces RP-170246)

**Abstract:**

new WI for LTE only; leading WI: RAN1

**Decision:** The document was **revised to RP-170814**.

**RP-170814** **New WID: Enhancements to LTE operation in unlicensed spectrum**
*Source: Nokia, Ericsson, Qualcomm, Intel*

(Replaces RP-170723)

**Abstract:**

new WI for LTE only; leading WI: RAN1

**Decision:** The document was **revised to RP-170835**.

**RP-170835** **New WID: Enhancements to LTE operation in unlicensed spectrum**
*Source: Nokia, Ericsson, Qualcomm, Intel*

(Replaces RP-170814)

**Abstract:**

new WI for LTE only; leading WI: RAN1

**Discussion:**

Telecom Italia: error for Perf. part needs to be corrected



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**Decision:** The document was **revised to RP-170848**.

**RP-170848** **New WID: Enhancements to LTE operation in unlicensed spectrum**
*Source: Nokia, Ericsson, Qualcomm, Intel*

(Replaces RP-170835)

**Abstract:**

new WI for LTE only; leading WI: RAN1

**Decision:** The document was **approved**.

**RP-170341** **Motivation for new WI on Further Enhancements to Licensed-Assisted Access with LTE Pcell**
*Source: Huawei, HiSilicon*

**Decision:** The document was **noted**.

**RP-170340** **New WI proposal: Further Enhancements to Licensed-Assisted Access with LTE PCell**
*Source: Huawei, HiSilicon*

**Abstract:**

new WI for LTE only; leading WG: RAN1;

**Decision:** The document was **postponed**.

***URLLC***

**RP-170120** **Motivation for WI on Highly Reliable Low Latency Communication for LTE**
*Source: Ericsson LM*

**Decision:** The document was **noted**.

**RP-170119** **New WI: Highly Reliable Low Latency Communication for LTE**
*Source: Ericsson LM*

**Abstract:**

new WI for LTE; leading WG: RAN1; WI code to be used: LTE_HRLLC; compare RP-170242

**Decision:** The document was **revised to RP-170694**.

**RP-170694** **New WI: Highly Reliable Low Latency Communication for LTE**
*Source: Ericsson LM*

(Replaces RP-170119)

**Abstract:**

new WI for LTE; leading WG: RAN1; WI code to be used: LTE_HRLLC;

**Decision:** The document was **revised to RP-170796**.

**RP-170796** **New WI: Highly Reliable Low Latency Communication for LTE**
*Source: Ericsson LM*

(Replaces RP-170694)



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**Abstract:**

new WI for LTE; leading WG: RAN1; WI code to be used: LTE_HRLLC;

**Decision:** The document was **approved**.

**RP-170243** **Motivation for new WI: URLLC support in LTE**
*Source: LG Electronics*

**Decision:** The document was **noted**.

**RP-170242** **New WI proposal: Ultra reliable low latency communication (URLLC) support in LTE**
*Source: LG Electronics*

**Abstract:**

new WI for LTE only; leading WI: RAN1; WI code to be used: LTE_URLLC; compare RP-170119

**Decision:** The document was **postponed**.

***MIMO enhancements***

**RP-170169** **New WID Proposal: Further Enhancements on Full-Dimension (FD) MIMO for LTE**
*Source: Samsung*

**Abstract:**

new WI for LTE only; leading WI: RAN1; WI code to be used: LTE_eFDMIMO2

**Decision:** The document was **revised to RP-170773**.

**RP-170773** **New WID Proposal: Further Enhancements on Full-Dimension (FD) MIMO for LTE**
*Source: Samsung*

(Replaces RP-170169)

**Decision:** The document was **postponed**.

**RP-170170** **Motivation for new WI: Further Enhancements on Full-Dimension (FD) MIMO for LTE**
*Source: Samsung*

**Decision:** The document was **revised to RP-170674**.

**RP-170674** **Motivation for new WI: Further Enhancements on Full-Dimension (FD) MIMO for LTE**
*Source: Samsung*

(Replaces RP-170170)

**Decision:** The document was **noted**.

**RP-170347** **Discussion on Further MIMO enhancements for LTE in Rel-15**
*Source: Huawei, HiSilicon*

**Decision:** The document was **noted**.

**RP-170348** **New WI proposal: Further MIMO enhancements for LTE**
*Source: Huawei, HiSilicon*



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**Abstract:**

new WI for LTE only; leading WG: RAN1; additional enhancements for FD-MIMO (some leftovers), but also enhancements applicable for low numbers of transmit antennas (such as 4 at the BS not necessarily using AAS)

**Decision:** The document was **revised to RP-170739**.

**RP-170739** **New WI proposal: Further MIMO enhancements for LTE**
*Source: Huawei, HiSilicon*

(Replaces RP-170348)

**Decision:** The document was **postponed**.

***Positioning***

**RP-170245** **Motivation for New WID: UE Positioning Accuracy Enhancements for LTE**
*Source: Nokia, Alcatel-Lucent Shanghai Bell*

**Decision:** The document was **noted**.

**RP-170244** **New WID: UE Positioning Accuracy Enhancements for LTE**
*Source: Nokia, Alcatel-Lucent Shanghai Bell*

**Abstract:**

new WI for LTE only; leading WI: RAN1

**Decision:** The document was **revised to RP-170722**.

**RP-170722** **New WID: UE Positioning Accuracy Enhancements for LTE**
*Source: Nokia, Alcatel-Lucent Shanghai Bell*

(Replaces RP-170244)

**Abstract:**

new WI for LTE only; leading WI: RAN2

**Discussion:**

MCC: leading WG changed from RAN1 to RAN2

**Decision:** The document was **revised to RP-170813**.

**RP-170813** **New WID: UE Positioning Accuracy Enhancements for LTE**
*Source: Nokia, Alcatel-Lucent Shanghai Bell*

(Replaces RP-170722)

**Abstract:**

new WI for LTE only; leading WI: RAN2

**Discussion:**

MCC: leading WG: RAN2

**Decision:** The document was **approved**.



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*Others*

**RP-170344** **Motivation for new WI proposal on Fast Accessible SCells for LTE**
*Source: Huawei, HiSilicon*

**Decision:** The document was **not treated**.

**RP-170343** **New WI proposal: Fast Accessible SCells for LTE**
*Source: Huawei, HiSilicon*

**Abstract:**

new WI for LTE only; leading WG: RAN1;

**Discussion:**

only 3 supporting companies

**Decision:** The document was **not treated**.

**RP-170346** **Motivation for new WI proposal on SRS capacity enhancements for LTE**
*Source: Huawei, HiSilicon*

**Decision:** The document was **not treated**.

**RP-170345** **New WI proposal on SRS capacity enhancements for LTE**
*Source: Huawei, HiSilicon*

**Abstract:**

new WI for LTE only; leading WG: RAN1; not related to CA

**Discussion:**

only 2 supporting companies

**Decision:** The document was **not treated**.

**RP-170720** **New Work Item on Further enhancements for dedicated eMBMS in LTE**
*Source: Qualcomm*

**Abstract:**

new WI for LTE only; leading WG: RAN1

**Discussion:**

only 1 supporting company

**Decision:** The document was **not treated**.

## 10.1.2 led by RAN2

*Mobility*

**RP-170264** **Motivation for new WI on further mobility enhancement for EUTRAN**
*Source: China Telecommunications, Huawei, HiSilicon*

**Decision:** The document was **noted**.



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**RP-170263** **New WI: Further mobility enhancement for E-UTRAN**
*Source: China Telecommunications, Huawei, HiSilicon*

**Abstract:**

new WI for LTE only; leading WG: RAN2;

**Decision:** The document was **postponed**.

**RP-170328** **Motivation of LTE enhancements for UE velocity oriented mobility management**
*Source: China Mobile Com. Corporation*

**Decision:** The document was **noted**.

**RP-170326** **New Work Item proposal: UE velocity oriented mobility management for LTE**
*Source: China Mobile Com. Corporation*

**Abstract:**

new WI for LTE only; leading WG: RAN2;

**Decision:** The document was **postponed**.

*Light connection*

**RP-170397** **Motivation for New WI proposal on enhancements of Light connection for LTE**
*Source: Intel Corporation, Huawei, China Telecom*

**Decision:** The document was **noted**.

**RP-170396** **New WI proposal: Enhancements of Light connection for LTE**
*Source: Intel Corporation, Huawei, China Telecom*

**Abstract:**

new WI for LTE only; leading WG: RAN2;

**Decision:** The document was **postponed**.

*Video/Multimedia*

**RP-170434** **Motivation for WI Proposal on Quality of Experience (QoE) Measurement Collection for streaming services in E-UTRAN**
*Source: China Unicom*

**Abstract:**

motivation paper for new WID

**Decision:** The document was **noted**.

**RP-170432** **New WI Proposal on Quality of Experience (QoE) Measurement Collection for streaming services in E-UTRAN**
*Source: China Unicom,Huawei, China Telecom*

**Abstract:**

new WI for LTE; leading WG: RAN2;



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**Decision:** The document was **revised to RP-170786**.

**RP-170786** **New WI Proposal on Quality of Experience (QoE) Measurement Collection for streaming services in E-UTRAN**
*Source: China Unicom,Huawei, China Telecom*

(Replaces RP-170432)

**Abstract:**

new WI for LTE; leading WG: RAN2;

**Decision:** The document was **approved**.

**RP-170325** **Motivation of LTE enhancements for video**
*Source: China Mobile Com. Corporation*

**Decision:** The document was **noted**.

**RP-170324** **New Work Item proposal: Further enhancements on Video for LTE**
*Source: China Mobile Com. Corporation*

**Abstract:**

new WI for LTE only; leading WG: RAN2;

**Decision:** The document was **revised to RP-170781**.

**RP-170781** **New Work Item proposal: Further enhancements on Video for LTE**
*Source: China Mobile Com. Corporation*

(Replaces RP-170324)

**Abstract:**

new WI for LTE only; leading WG: RAN2;

**Decision:** The document was **approved**.

**RP-170398** **New WI proposal: Multimedia Enhancements for LTE**
*Source: Intel Corporation*

**Abstract:**

new WI for LTE only; leading WG: RAN2;

**Decision:** The document was **withdrawn**.

***Positioning***

**RP-170219** **Motivation paper for Support for high accuracy positioning in LTE**
*Source: Deutsche Telekom, Huawei, HiSilicon, Neul*

**Abstract:**

wrong Tdoc type WIDnew in Tdoc request

**Decision:** The document was **noted**.



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**RP-170220** **New WI: Support for high accuracy positioning in LTE**
*Source: Deutsche Telekom, Huawei, HiSilicon, Neul*

**Abstract:**

new WI for LTE; leading WG: RAN2

**Decision:** The document was **postponed**.

*CA*

**RP-170445** **Motivation for New Work Item for Enhancing Utilization of CA for LTE**
*Source: Nokia, Alcatel-Lucent Shanghai Bell*

(Replaces RP-162259)

**Abstract:**

Motivation for New Work Item for Enhancing Utilization of CA for LTE

**Decision:** The document was **noted**.

**RP-170447** **New WID: Enhancing LTE CA Utilization**
*Source: Nokia, Alcatel-Lucent Shanghai Bell*

(Replaces RP-162258)

**Abstract:**

new WI for LTE; leading WG: RAN2

**Decision:** The document was **revised to RP-170715**.

**RP-170715** **New WID: Enhancing LTE CA Utilization**
*Source: Nokia, Alcatel-Lucent Shanghai Bell*

(Replaces RP-170447)

**Abstract:**

new WI for LTE; leading WG: RAN2

**Decision:** The document was **revised to RP-170805**.

**RP-170805** **New WID: Enhancing LTE CA Utilization**
*Source: Nokia, Alcatel-Lucent Shanghai Bell*

(Replaces RP-170715)

**Abstract:**

new WI for LTE; leading WG: RAN2

**Decision:** The document was **approved**.

**RP-170482** **Motivation for new WI on carrier aggregation in unsynchronized networks for LTE**
*Source: Huawei, HiSilicon*

**Decision:** The document was **noted**.



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**RP-170481** **New WI proposal: carrier aggregation in unsynchronized networks for LTE**
*Source: Huawei, HiSilicon*

**Abstract:**

new WI for LTE only; leading WG: RAN2;

**Discussion:**

only 3 supporting companies

**Decision:** The document was **revised to RP-170731**.

**RP-170731** **New WI proposal: carrier aggregation in unsynchronized networks for LTE**
*Source: Huawei, HiSilicon*

(Replaces RP-170481)

**Decision:** The document was **postponed**.

***LTE drones***

**RP-170157** **Motivation for Study on Enhanced LTE Support for Aerial Vehicles**
*Source: Ericsson, NTT DOCOMO, INC.*

**Abstract:**

related to SID in R2-170156

**Decision:** The document was **noted**.

**RP-170156** **New SID on Study on enhanced LTE Support for Aerial Vehicles**
*Source: NTT DOCOMO, INC., Ericsson*

**Abstract:**

new SI for LTE only; leading WG: RAN2

**Decision:** The document was **revised to RP-170742**.

**RP-170742** **New SID on Study on enhanced LTE Support for Aerial Vehicles**
*Source: NTT DOCOMO, INC., Ericsson*

(Replaces RP-170156)

**Abstract:**

new SI for LTE only; leading WG: RAN2

**Decision:** The document was **revised to RP-170779**.

**RP-170779** **New SID on Study on enhanced LTE Support for Aerial Vehicles**
*Source: NTT DOCOMO, INC., Ericsson*

(Replaces RP-170742)

**Abstract:**

new SI for LTE only; leading WG: RAN2



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**Decision:** The document was **approved**.

*5G core support*

**RP-170286** **Discussion on the support of NGC functions for eLTE**
*Source: China Telecommunications*

**Abstract:**

Discussion on eLTE-NGC

**Decision:** The document was **noted**.

**RP-170375** **Motivation for new Work item on LTE interworking with NR and connectivity to NG**
*Source: ZTE Corporation*

**Decision:** The document was **noted**.

**RP-170374** **New Work item on LTE interworking with NR and connectivity to NG**
*Source: ZTE Corporation*

**Abstract:**

new WI for LTE only?; leading WG: RAN2;

**Decision:** The document was **postponed**.

**RP-170486** **Motivation for new WI proposal on LTE connectivity to 5G-CN**
*Source: Huawei, HiSilicon*

**Decision:** The document was **noted**.

**RP-170485** **New WI proposal: LTE connectivity to 5G-CN**
*Source: Huawei, Ericsson*

**Abstract:**

new WI for LTE only; leading WG: RAN2;

**Decision:** The document was **revised to RP-170730**.

**RP-170730** **New WI proposal: LTE connectivity to 5G-CN**
*Source: Huawei, Ericsson*

(Replaces RP-170485)

**Abstract:**

new WI for LTE only; leading WG: RAN2;

**Decision:** The document was **revised to RP-170782**.

**RP-170782** **New WI proposal: LTE connectivity to 5G-CN**
*Source: Huawei, Ericsson*

(Replaces RP-170730)

**Abstract:**



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new WI for LTE only; leading WG: RAN2;

**Discussion:**

MCC: multiple version of RP-170782 exist

**Decision:** The document was **revised to RP-170840**.

**RP-170840** **New WI proposal: LTE connectivity to 5G-CN**
*Source: Huawei, Ericsson*

(Replaces RP-170782)

**Abstract:**

new WI for LTE only; leading WG: RAN2;

**Decision:** The document was **approved**.

## 10.1.3 led by RAN3

***LTE architecture evolution***

**RP-170262** **New WID: Architecture Evolution for E-UTRAN**
*Source: China Unicom, Orange, Huawei,HiSilicon*

**Abstract:**

new WI for LTE only; leading WG: RAN3;

**Decision:** The document was **revised to RP-170728**.

**RP-170728** **New WID: Architecture Evolution for E-UTRAN**
*Source: China Unicom, Orange, Huawei,HiSilicon*

(Replaces RP-170262)

**Decision:** The document was **revised to RP-170785**.

**RP-170785** **New SID: Study on Architecture Evolution for E-UTRAN**
*Source: China Unicom, Orange, Huawei,HiSilicon*

(Replaces RP-170728)

**Abstract:**

new SI for LTE only; leading WG: RAN3;

**Discussion:**

changed from WI to SI;

Ericsson: has not yet seen the TU allocation

**Decision:** The document was **revised to RP-170843**.

**RP-170843** **New SID: Study on Architecture Evolution for E-UTRAN**
*Source: China Unicom, Orange, Huawei,HiSilicon*

(Replaces RP-170785)



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**Abstract:**

new SI for LTE only; leading WG: RAN3;

**Decision:** The document was **approved**.

**RP-170265** **Motivation for WI on Architecture Evolution for E-UTRAN**
*Source: China Unicom, Orange, Huawei, HiSilicon*

**Decision:** The document was **revised to RP-170729**.

**RP-170729** **Motivation for WI on Architecture Evolution for E-UTRAN**
*Source: China Unicom, Orange, Huawei, HiSilicon*

(Replaces RP-170265)

**Decision:** The document was **noted**.

*Network synchronisation*

**RP-170349** **New WI proposal: Network Assistance for Network Synchronization in LTE**
*Source: Huawei, HiSilicon*

**Abstract:**

new WI for LTE only; leading WG: RAN3;

**Decision:** The document was **postponed**.

**RP-170350** **Motivation for new WI on Network Assistance for Network Synchronization in LTE**
*Source: Huawei, HiSilicon*

**Decision:** The document was **noted**.

**RP-170516** **Discussion on feasibility of Network Based Synchronisation Solution 1**
*Source: Ericsson*

**Decision:** The document was **noted**.

## 10.1.4 led by RAN4 (not spectrum related)

*CRS/interference mitigation*

**RP-170146** **Motivation for new WI on UE requirements for network-based CRS mitigation**
*Source: Ericsson LM*

**Abstract:**

WI is aiming at increasing resource utilization at the network and at the same time reducing the interference from CRS signals and hereby increasing UE performance. The approach has been already tested in life networks and demonstrated up to 80% increased throughput at low and medium traffic load levels. Special attention is paid to supporting legacy UEs.

**Decision:** The document was **noted**.

**RP-170145** **WID on UE requirements for network-based CRS mitigation in LTE**
*Source: Ericsson LM*



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**Abstract:**

new WI for LTE only; leading WG: RAN4; CRS = Cell-specific Reference Signal; a new WI proposal aiming at increasing resource utilization at the network and at the same time reducing the interference from CRS signals and hereby increasing UE performance. The approach has been already tested in life networks and demonstrated up to 80% increased throughput at low and medium traffic load levels. Special attention is paid to supporting legacy UEs.

**Discussion:**

RAN4 chair: no time budget for RRM session left

RAN chair: ok then we look more for RF topics

**Decision:** The document was **postponed**.

**RP-170284** **Motivation for WI: CRS-IM Performance Requirements for Single RX Chain UEs**
*Source: Intel Corporation*

**Decision:** The document was **not treated**.

**RP-170271** **New WI Proposal: Enhanced CRS and SU-MIMO Interference Mitigation Performance Requirements for LTE**
*Source: Intel*

**Abstract:**

new WI for LTE only; leading WG: RAN4

**Discussion:**

only 1 supporting company

RAN chair: it seems this one is also not yet ready for approval

**Decision:** The document was **revised to RP-170747**.

**RP-170747** **New WI Proposal: Enhanced CRS and SU-MIMO Interference Mitigation Performance Requirements for LTE**
*Source: Intel*

(Replaces RP-170271)

**Decision:** The document was **withdrawn**.

***Tx antenna selection***

**RP-170281** **Motivation for the new WID on UE requirements for transmit antenna selection**
*Source: Intel Corporation*

**Decision:** The document was **not treated**.

**RP-170280** **New WID: UE requirements for transmit antenna selection for LTE**
*Source: Intel Corporation*

**Abstract:**

new WI for LTE only; leading WG: RAN4; MCC: no supporting companies?

**Discussion:**

no supporting companies



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**Decision:** The document was **not treated**.

*Advanced Receivers LTE V2X*

**RP-170285** **Motivation for SI: Study on Advanced Receivers LTE V2X**
*Source: Intel Corporation*

**Decision:** The document was **not treated**.

**RP-170272** **New SI proposal: Study on Advanced Receivers for LTE V2X**
*Source: Intel*

**Abstract:**

new SI for LTE only; leading WG: RAN4

**Discussion:**

only 1 supporting company

**Decision:** The document was **not treated**.

*LTE DL 8Rx*

**RP-170354** **Motivation for new work item on LTE DL 8Rx antenna ports**
*Source: Huawei, HiSilicon*

**Decision:** The document was **not treated**.

**RP-170353** **New WI proposal: LTE DL 8Rx antenna ports**
*Source: Huawei, HiSilicon*

**Abstract:**

new WI for LTE only; leading WG: RAN4; WI code to be used: LTE_8Rx_AP_DL

**Decision:** The document was **not treated**.

*MIMO*

**RP-170393** **Motivation for WI on Low Complexity Higher Order MIMO for LTE**
*Source: Qualcomm Japan Inc*

**Abstract:**

This paper presents the motivation to start a new work item on lower complexity higher order MIMO for LTE

**Decision:** The document was **not treated**.

**RP-170395** **New Work Item Proposal: Lower Complexity Higher Order MIMO for LTE**
*Source: Qualcomm Japan Inc*

**Abstract:**

new WI for LTE only; leading WG: RAN4;

**Decision:** The document was **not treated**.



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*CA*

**RP-170267** **Motivation for SI: Enhanced Carrier Aggregation Mobility**
*Source: Intel*

**Decision:** The document was **not treated**.

**RP-170266** **New SI Proposal: Study on enhanced Carrier Aggregation Mobility for LTE**
*Source: Intel*

**Abstract:**

new SI for LTE only; leading WG: RAN4

**Discussion:**

only 1 supporting company

**Decision:** The document was **not treated**.

*High power UE*

**RP-170352** **Motivation for new work item on high power UE for LTE band 42 (power class 2)**
*Source: Huawei, HiSilicon*

**Decision:** The document was **not treated**.

**RP-170351** **New WI proposal: High power UE for LTE band 42 (power class 2)**
*Source: Huawei, HiSilicon*

**Abstract:**

new WI for LTE only; leading WG: RAN4; WI code to be used: LTE_B42_UE_PC2

**Decision:** The document was **not treated**.

## 10.1.5 led by RAN4 (spectrum related)

**RP-170051** **New WI: US 600 MHz Band for LTE**
*Source: T-Mobile USA Inc.*

**Abstract:**

new WI for LTE; leading WG: RAN4

**Decision:** The document was **revised to RP-170740**.

**RP-170740** **New WI: US 600 MHz Band for LTE**
*Source: T-Mobile USA Inc.*

(Replaces RP-170051)

**Abstract:**

new WI for LTE; leading WG: RAN4

**Discussion:**

note: Rapporteur confirmed that the new TR is created by the Core part WI.



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**Decision:** The document was **approved**.

**RP-170151** **New Work Item on V2X new band combinations for LTE**
*Source: LG Electronics Inc.*

**Abstract:**

new WI for LTE; leading WG: RAN4; specifying the V2X band combinations and evaluating the sidelink V2X operation coexistence with legacy LTE system at licensed bands

**Decision:** The document was **revised to RP-170727**.

**RP-170727** **New Work Item on V2X new band combinations for LTE**
*Source: LG Electronics Inc.*

(Replaces RP-170151)

**Abstract:**

new WI for LTE; leading WG: RAN4;

**Decision:** The document was **revised to RP-170752**.

**RP-170752** **New Work Item on V2X new band combinations for LTE**
*Source: LG Electronics Inc.*

(Replaces RP-170727)

**Abstract:**

new WI for LTE; leading WG: RAN4;

**Decision:** The document was **approved**.

**RP-170159** **New WID on 450 MHz Band for LTE in Region 3**
*Source: China Unicom*

**Abstract:**

new WI for LTE; leading WG: RAN4; to standardize a new E-UTRA operating band on 450MHz band

**Decision:** The document was **approved**.

**RP-170514** **New WI: LAA/eLAA for the CBRS 3.5GHz band in the United States**
*Source: AT&T GNS Belgium SPRL*

**Abstract:**

new WI for LTE; leading WG: RAN4; related to CBRS LTE band 48, intending a new band definition

**Decision:** The document was **revised to RP-170804**.

**RP-170804** **New WI: LAA/eLAA for the CBRS 3.5GHz band in the United States**
*Source: AT&T GNS Belgium SPRL*

(Replaces RP-170514)

**Abstract:**

new WI for LTE; leading WG: RAN4; related to CBRS LTE band 48, intending a new band definition



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**Decision:** The document was **approved**.

**RP-170528** **Motivation document for new WI on LAA for the "CBRS" 3.5GHz band in the United States**
*Source: QUALCOMM UK Ltd*

**Decision:** The document was **withdrawn**.

**RP-170529** **New WI: LAA for the "CBRS" 3.5GHz LTE band in the United States**
*Source: QUALCOMM UK Ltd*

**Abstract:**

new WI for LTE; leading WG: RAN4

**Decision:** The document was **withdrawn**.

## 10.2 Open REL-13 LTE SIs

### 10.2.1 Study on multi-node testing for LAA [FS_LTE_LAA_multinode_test]

**RP-170301** **Status report for SI: Study on Multi-node testing for LAA; rapporteur: Huawei**
*Source: RAN4*

**Discussion:**

conclusion: noted; approved: 30%, June 17; note: As this SI is related to testing, it will stay in REL-13.

**Decision:** The document was **noted**.

**RP-170665** **Comments on RAN4 Multi-node test for LAA status**
*Source: CableLabs, Broadcom, Hewlett-Packard Enterprises*

**Abstract:**

late input

**Decision:** The document was **revised to RP-170726**.

**RP-170721** **Way forward on RAN4 multi-node tests SI**
*Source: Qualcomm*

**Discussion:**

RAN chair: we committed ourself to do this work, so an ad hoc may be an option

RAN4 chair: 1TU for online and 1TU for offline session was used but there was a blocking situation

Nokia: confirms that this work is important and should be solved as soon as possible and if we agree on an ad hoc then we should also come out with a solution

RAN chair: heard also that people do not focus on this topic so an ad hoc may help

Broadcom: would like to have a deadline

RAN chair: target dates are our deadlines

Ericsson: there is already an NR ad hoc in next quarter

Orange: prefers to have time allocated in main meeting and not to have ad hocs with a limited number of people



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RAN4 chair: we can try to solve the problem in next RAN4 meetings and if this does not get solved there we will have an extra ad hoc

RAN chair: seems to be useful; target date is June 2017

Nokia: company should come prepared and with a constructive attitude

ZTE: could extend June ad hoc by 1 day

conclusion: evening ad hoc in RAN4 in April (if no online time for this topic), afterwards decision whether RAN4 ad hoc for this topic at the end of Q2/2017 is needed

**Decision:** The document was **noted**.

**RP-170726** **Comments on RAN4 Multi-node test for LAA status**
*Source: CableLabs, Broadcom, Hewlett-Packard Enterprises, Brocade*

(Replaces RP-170665)

**Discussion:**

presented by Broadcom with 3 requests regarding this multi-node testing SI:

1. The tests shall be mandatory.

2. The work shall be allocated more time and prioritized.

3. There shall be a clear timeline and end date.

**Decision:** The document was **noted**.

## 10.3 Open REL-14 LTE WIs (not spectrum related)

### 10.3.1 Enhanced LAA for LTE [LTE_eLAA]

**RP-170268** **Status report for WI Enhanced LAA for LTE; rapporteur: Ericsson**
*Source: RAN1*

**Discussion:**

conclusion: noted; approved: Core: 100%, March 17; Perf.: 33%, June 17; Core part is completed

**Decision:** The document was **noted**.

**RP-170269** **Summary for WI Enhanced LAA for LTE**
*Source: Ericsson Inc., Huawei*

**Decision:** The document was **noted**.

**RP-170618** **Maintenance of Rel-14 Enhanced LAA**
*Source: RAN1*

**Decision:** The document was **approved**.

**RP-170626** **RAN2 CRs to Enhanced LAA for LTE**
*Source: RAN2*

**Decision:** The document was **approved**.



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**RP-170553** **RAN4 CRs to Core part: Enhanced LAA for LTE**
*Source: RAN4*

**Decision:** The document was **approved**.

## 10.3.2 Perf. part: Support for V2V services based on LTE sidelink [LTE_SL_V2V-Perf]

**RP-170130** **Status report of WI Perf. part: Support for V2V services based on LTE sidelink; rapporteur: LG Electronics**
*Source: LG Electronics Inc.*

**Abstract:**

Core part was completed in Sep.16;

requesting TU budget to extend V2V perf. part until June17

**Discussion:**

conclusion: noted; approved: Perf: 80%, June 17

**Decision:** The document was **noted**.

**RP-170554** **RAN4 CRs to Perf. part: Support for V2V services based on LTE sidelink**
*Source: RAN4*

**Decision:** The document was **approved**.

## 10.3.3 Perf. Part: Performance enhancements for high speed scenario in LTE [LTE_high_speed-Perf]

**RP-170253** **Status report for WI: Perf. part: Performance enhancements for high speed scenario in LTE; rapporteur: NTT DOCOMO and Huawei**
*Source: RAN4*

**Abstract:**

Core part was completed in Dec.16

**Discussion:**

conclusion: noted; approved: Perf.: 70%, June 17;

**Decision:** The document was **noted**.

**RP-170555** **RAN4 CRs to Perf. part: Performance enhancements for high speed scenario in LTE**
*Source: RAN4*

**Decision:** The document was **approved**.

## 10.3.4 Core part: Signalling reduction to enable light connection for LTE [LTE_LIGHT_CON-Core]

**RP-170022** **Response to LS C1-165447 on SA2 involvement for the light connection (S2-170695; to: CT1, RAN2, RAN3, SA3-LI, CT4, SA; cc: RAN, CT; contact: Ericsson)**
*Source: SA2*



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**Abstract:**

C1-165447 was not sent to/cc RAN; no RAN action requested

**Discussion:**

conclusion: no LS answer

**Decision:** The document was **noted**.

**RP-170030** **Reply LS to S2-170695 = RP-170022 on SA2 involvement for the light connection (S3i170035; to: SA2; cc: CT1, RAN2, RAN3, CT4, SA, RAN, CT; contact: BT)**

*Source: SA3-LI*

**Abstract:**

no RAN action requested

**Discussion:**

conclusion: no LS answer

**Decision:** The document was **noted**.

**RP-170291** **Status report for WI: Signalling reduction to enable light connection for LTE, rapporteur: Huawei**

*Source: RAN2*

**Discussion:**

Vodafone: While it is not entirely obvious from the CRs for this WI, Vodafone's understanding is that the CRs will result in a UE in "light connected" state not performing the background PLMN search. This is not acceptable to Vodafone as the UE could remain in the LC state for a long period, and therefore the HPLMN could incur substantial inter-operator roaming charges.

MCC: target March 17 so is it intended to stop this work and to not approve CRs for it?

**Decision:** The document was **revised to RP-170787**.

**RP-170787** **Status report for WI: Signalling reduction to enable light connection for LTE, rapporteur: Huawei**

*Source: RAN2*

(Replaces RP-170291)

**Decision:** The document was **revised to RP-170845**.

**RP-170845** **Status report for WI: Signalling reduction to enable light connection for LTE, rapporteur: Huawei**

*Source: RAN2*

(Replaces RP-170787)

**Discussion:**

conclusion: noted; approved: Core: 79%, June 17; the Core part WI is shifted from REL-14 to REL-15. The allocated TUs depend on the approval of an SA WI for light connection. If no SA WI is approved by SA #75, then the WI LTE_LIGHT_CON-Core is considered on hold until June 17 and corresponding TUs can be reused (e.g. for NR).

note: SA #75 approved only a SI in SP-170280 and so the WI LTE_LIGHT_CON-Core is on hold until RAN #76



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**Decision:** The document was **noted**.

**RP-170470** **On the Completion of Light Connection**
*Source: Nokia, Alcatel-Lucent Shanghai Bell*

**Abstract:**

In this contribution we discuss Light Connection status of RAN WGs and its dependencies to SA and CT groups.

**Decision:** The document was **revised to RP-170716**.

**RP-170716** **On the Completion of Light Connection**
*Source: Nokia, Alcatel-Lucent Shanghai Bell*

(Replaces RP-170470)

**Decision:** The document was **noted**.

**RP-170292** **Revision of WI: Signalling reduction to enable light connection for LTE**
*Source: Huawei*

**Abstract:**

last approved WID:

RP-160937; change of rapporteur

**Decision:** The document was **revised to RP-170788**.

**RP-170788** **Revision of WI: Signalling reduction to enable light connection for LTE**
*Source: Huawei*

(Replaces RP-170292)

**Discussion:**

Nokia: WID does not indicate 36.133 as affected spec

Huawei: will add 36.133

RAN3 chair: if SA does not agree, then RAN3 work is on hold, otherwise we can start

Huawei: RAN3 has a part which is independent from SA3 and a part that is dependent

RAN chair: we come back on it

Nokia: aim is to align with SA WI

**Decision:** The document was **approved**.

**RP-170293** **WI exception request for Core part: Signalling reduction to enable light connection for LTE**
*Source: Huawei, Intel, China Telecom*

**Decision:** The document was **withdrawn**.

**RP-170436** **Introduction of Light Connected state**
36.300 CR-0980 Cat: B (Rel-14) v14.1.0
*Source: Huawei, Intel, China Telecom*

**Abstract:**



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company CR; CR is presented for information to show the impact of the proposed Rel-14 exception; there was no previous RAN2 CR for this

**Decision:** The document was **postponed**.

**RP-170437** **Introduction of light connection in S1AP**
36.413 CR-1467 rev 5 Cat: B (Rel-14) v14.1.0
*Source: Huawei, Intel, China Telecom*

**Abstract:**

company CR; resubmission of R3-170812 not agreed by RAN3, presented for information to show the impact of the proposed Rel-14 exception

**Decision:** The document was **postponed**.

**RP-170438** **Introduction of light connection in X2AP**
36.423 CR-1003 rev 6 Cat: B (Rel-14) v14.1.0
*Source: Huawei, Intel, China Telecom*

**Abstract:**

company CR; resubmission of R3-170811 not agreed by RAN3; is presented for information to show the impact of the proposed Rel-14 exception

**Decision:** The document was **postponed**.

**RP-170627** **RAN2 CRs to Core part: Signalling reduction to enable light connection for LTE**
*Source: RAN2*

**Decision:** The document was **postponed**.

## 10.3.5 Core part: Enhanced LTE-WLAN Aggregation (LWA) [LTE_WLAN_aggr-Core]

**RP-170329** **Status report of WI Core part: Enhanced LTE-WLAN Aggregation (LWA); rapporteur: Intel Corporation**
*Source: RAN2*

**Discussion:**

conclusion: noted; approved: Core: 100%, March17; Core part completed

**Decision:** The document was **noted**.

**RP-170628** **RAN2 CRs to Core part: Enhanced LTE-WLAN Aggregation (LWA)**
*Source: RAN2*

**Decision:** The document was **approved**.

**RP-170535** **RAN3 CRs for Enhanced LTE-WLAN Aggregation (LWA)-Core Part**
*Source: RAN3*

**Decision:** The document was **approved**.



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**RP-170331** **Xw support for WT MAC address signalling**
36.463 CR-0037 Cat: B (Rel-14) v14.0.0
*Source: Intel Corporation*

**Abstract:**

company CR to address one RAN3 issue related to late RAN2 agreements (taken on Fri of Athens meeting), which could not be addressed in the last RAN3 meeting;

**Decision:** The document was **approved**.

**RP-170330** **Summary for WI Core part: Enhanced LTE-WLAN Aggregation (LWA)**
*Source: Intel Corporation*

**Decision:** The document was **noted**.

## 10.3.6 Core part: Radiated perf. req. for the verification of multi-antenna reception of UEs in LTE [LTE_MIMO_OTA-Core]

**RP-170276** **Status report of WI Core part: Radiated performance requirements for the verification of multi-antenna reception of UEs in LTE**
*Source: RAN4*

**Discussion:**

MCC: do not use % steps less than 1% please

conclusion: noted; approved: Core part: 33%, June 17

**Decision:** The document was **noted**.

**RP-170556** **RAN4 CRs to Core part: Radiated performance requirements for the verification of multi-antenna reception of UEs in LTE**
*Source: RAN4*

**Decision:** The document was **approved**.

**RP-170278** **Revision of WI Core part: Radiated performance requirements for the verification of multi-antenna reception of UEs in LTE**
*Source: Intel Corporation*

**Abstract:**

last approved WID: RP-162306

**Discussion:**

Intel: is updating completion dates only

**Decision:** The document was **approved**.

**RP-170277** **WI exception request for Core part: Radiated performance requirements for the verification of multi-antenna reception of UEs in LTE**
*Source: Intel Corporation*

**Decision:** The document was **approved**.



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**RP-170279** **Draft LS on MIMO OTA (to: GCF; cc: -; contact: Intel)**
*Source: Intel Corporation*

**Decision:** The document was **revised to RP-170766**.

**RP-170766** **LS on MIMO OTA (to: GCF CAG, GCF PAG; cc: -; contact: Intel)**
*Source: RAN*

(Replaces RP-170279)

**Decision:** The document was **approved**.

## 10.3.7 Enhancements on Full-Dimension (FD) MIMO for LTE [LTE_eFDMIMO]

**RP-170174** **Status report for WI: Enhancement on Full-Dimension (FD) MIMO for LTE**
*Source: Samsung*

**Discussion:**

conclusion: noted; approved: Core: 100%, March17; Perf.: 0%, Sep.17

**Decision:** The document was **noted**.

**RP-170607** **Introduction of eFD-MIMO**
*Source: RAN1*

**Decision:** The document was **approved**.

**RP-170629** **RAN2 CRs to Enhancements on Full-Dimension (FD) MIMO for LTE**
*Source: RAN2*

**Decision:** The document was **approved**.

**RP-170173** **Summary for WI on Enhancement on Full-Dimension (FD) MIMO for LTE**
*Source: Samsung*

**Decision:** The document was **noted**.

## 10.3.8 Further mobility enhancements in LTE [LTE_eMob]

**RP-170368** **Status Report of WI further mobility enhancements in LTE; rapporteur:ZTE**
*Source: ZTE Corporation*

**Abstract:**

the core part of this WI is completed!

**Discussion:**

MCC: please avoid < >

conclusion: noted; approved: Core: 100%, March 17; Perf.: 30%, June 17

**Decision:** The document was **noted**.

**RP-170630** **RAN2 CRs to Further mobility enhancements in LTE**
*Source: RAN2*



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**Decision:** The document was **approved**.

**RP-170536** **RAN3 CRs for Further mobility enhancements in LTE-Core Part**
*Source: RAN3*

**Decision:** The document was **approved**.

**RP-170557** **RAN4 CRs to Core part: Further mobility enhancements in LTE**
*Source: RAN4*

**Decision:** The document was **approved**.

**RP-170369** **Summary for WI Further mobility enhancements in LTE**
*Source: ZTE Corporation*

**Decision:** The document was **noted**.

## 10.3.9 Uplink Capacity Enhancements for LTE [LTE_UL_CAP_enh]

**RP-170114** **Status report for Uplink Capacity Enhancements for LTE; rapporteur: Ericsson**
*Source: RAN1*

**Discussion:**

conclusion: noted; approved: Core: 100%, March 17; Perf.: 20%, Sep.17; Core part completed

**Decision:** The document was **noted**.

**RP-170605** **Introduction of Uplink Capacity Enhancements for LTE**
*Source: RAN1*

**Decision:** The document was **approved**.

**RP-170668** **RAN2 CRs to Uplink Capacity Enhancements for LTE**
*Source: RAN2*

**Decision:** The document was **approved**.

**RP-170631** **RAN2 CRs to Uplink Capacity Enhancements for LTE with 4 categories (technically endorsed CRs)**
*Source: RAN2*

**Abstract:**

MCC: RAN has to decide among 2 alternative CR sets defining new categories to support 256QAM in uplink: RP-170631 (4 categories, in line with a RAN1 LS R1-166044) or RP-170632 (5 categories, one more category recently defined by RAN1)

**Decision:** The document was **rejected**.

**RP-170632** **RAN2 CRs to Uplink Capacity Enhancements for LTE with 5 categories (technically endorsed CRs)**
*Source: RAN2*

**Abstract:**



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MCC: RAN has to decide among 2 alternative CR sets defining new categories to support 256QAM in uplink: RP-170631 (4 categories, in line with a RAN1 LS R1-166044) or RP-170632 (5 categories, one more category recently defined by RAN1)

**Decision:** The document was **approved**.

**RP-170419** **Introduction of UL 300Mbps class UE category**
*Source: Qualcomm Incorporated*

**Discussion:**

proposal to approve RP-170632 with 5 categories

Nokia: would also support the CRset with 5 categories

**Decision:** The document was **noted**.

**RP-170537** **RAN3 CRs for Uplink Capacity Enhancements for LTE-Core Part**
*Source: RAN3*

**Decision:** The document was **approved**.

**RP-170558** **RAN4 CRs to Core part: Uplink Capacity Enhancements for LTE**
*Source: RAN4*

**Decision:** The document was **approved**.

**RP-170115** **Summary for WI Uplink Capacity Enhancements for LTE**
*Source: Ericsson, CMCC*

**Decision:** The document was **noted**.

## 10.3.10 eMBMS enhancements for LTE [MBMS_LTE_enh2]

**RP-170200** **Status report for eMBMS enhancements for LTE; rapporteur: Ericsson**
*Source: RAN1*

**Discussion:**

conclusion: noted; approved: Core: 90%, June 17; Perf.: 0%, Sep.17

**Decision:** The document was **noted**.

**RP-170608** **Introduction of eMBMS enhancements for LTE**
*Source: RAN1*

**Decision:** The document was **approved**.

**RP-170633** **RAN2 CRs to eMBMS enhancements for LTE**
*Source: RAN2*

**Decision:** The document was **approved**.

**RP-170199** **Updated WID "eMBMS enhancements for LTE"**
*Source: Ericsson*



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**Abstract:**

last approved WID: RP-162231; proposing extension of the WI by one quarter

**Discussion:**

RRM to RAN4 part added

**Decision:** The document was **approved**.

**RP-170201** **WI exception request for Core part: eMBMS enhancement for LTE**
*Source: Ericsson*

**Decision:** The document was **approved**.

## 10.3.11 Perf. part: SRS switching between LTE component carriers [LTE_SRS_switch-Perf]

**RP-170296** **Status report for WI Perf Part: SRS (sounding reference signal) switching between LTE component carriers, rapporteur: Huawei**
*Source: RAN4*

**Abstract:**

Core part was completed in Dec.16

**Discussion:**

conclusion: noted; approved: Perf.: 25%, June 17

**Decision:** The document was **noted**.

## 10.3.12 Perf. part: DL Multiuser Superposition Transmission for LTE [LTE_MUST-Perf]

**RP-170471** **Status Report for WI: Perf. part: Downlink Multiuser Superposition Transmission for LTE; rapporteur: Mediatek**
*Source: RAN4*

**Abstract:**

Core part was completed in Dec.16

**Discussion:**

conclusion: noted; approved: Perf.: 25%, June 17

**Decision:** The document was **noted**.

## 10.3.13 LTE Measurement Gap Enhancement [LTE_meas_gap_enh]

**RP-170273** **Status report of WI: Measurement gap enhancement; rapporteur: Intel Corporation**
*Source: RAN4*

**Discussion:**

conclusion: noted; approved: Core: 95, June 17; Perf: 20%, June 17

**Decision:** The document was **noted**.



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**RP-170634** **RAN2 CRs to LTE Measurement Gap Enhancement**
*Source: RAN2*

**Decision:** The document was **approved**.

**RP-170275** **WI exception request for Core part: Measurement gap enhancement**
*Source: Intel*

**Decision:** The document was **approved**.

## 10.3.14 LTE-based V2X Services [LTE_V2X]

**RP-170027** **Reply to RP-161919 on LTE-based vehicle-to-vehicle communications (ITS(17)000026r6; to: RAN; cc: -; contact: ETSI TC ITS chairman)**
*Source: ETSI TC ITS*

**Abstract:**

note: LS RP-161919 was sent out to ETSI TC ITS on 27.09.2016 not on 29.11.2016 as indicated in RP-170027; RAN action requested

**Decision:** The document was **replied to**.

**RP-170031** **LS Response to ETSI ITS LS ITS(17)000026r6 = RP-170027 on LTE-based vehicle-to-vehicle communications (R1-1704116; to: RAN; cc: RAN2, RAN4; contact: Huawei)**
*Source: RAN1*

**Abstract:**

RAN action requested

**Discussion:**

moved from AI 10.8.1 to AI 10.3.14;

conclusion: no answer to RAN1 but used as basis for RP-170767

**Decision:** The document was **noted**.

**RP-170767** **Reply LS to ITS(17)000026r6 = RP-170027 on LTE-based vehicle-to-vehicle communications (to: ETSI TC ITS; cc: -; contact: RAN chairman (Qualcomm))**
*Source: RAN*

**Discussion:**

based on RP-170031

**Decision:** The document was **approved**.

**RP-170042** **LS on eV2X Normative Requirements Completion (S1-171461; to: RAN; cc: SA, CT; contact: LG)**
*Source: SA1*

**Abstract:**

no explicit RAN action requested; note: SA1 is working already on REL-15

**Discussion:**

conclusion: no LS answer



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**Decision:** The document was **noted**.

**RP-170049** **LS from NGMN V2X Task-Force to 3GPP (NGMN_LS_170122; to: RAN, SA; contact: CMCC)**
*Source: NGMN*

**Discussion:**

conclusion: no LS answer

**Decision:** The document was **noted**.

**RP-170236** **Status report of WI: LTE-based V2X Services; rapporteur: LG Electronics**
*Source: RAN1*

**Discussion:**

conclusion: noted; approved: Core: 100%, March 17; Perf.: 0%, Sep.17; Core part completed

**Decision:** The document was **noted**.

**RP-170622** **Introduction of V2X**
*Source: RAN1*

**Decision:** The document was **approved**.

**RP-170635** **RAN2 CRs to LTE-based V2X Services**
*Source: RAN2*

**Decision:** The document was **approved**.

**RP-170538** **RAN3 CRs for LTE-based V2X Services-Core Part**
*Source: RAN3*

**Decision:** The document was **approved**.

**RP-170559** **RAN4 CRs to LTE-based V2X Services**
*Source: RAN4*

**Decision:** The document was **approved**.

**RP-170127** **TR 36.786 v1.0.0 on V2X Services based on LTE; User Equipment (UE) radio transmission and reception**

36.786 v1.0.0
*Source: LG Electronics Inc.*

**Abstract:**

RAN4 TR 36.786 is provided for 1-step approval

**Discussion:**

conclusion: approved as REL-14 TR

**Decision:** The document was **approved**.

**RP-170237** **Summary for WI LTE-based V2X Services**
*Source: LG Electronics*



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**Decision:** The document was **noted**.

## 10.3.15 Further enhanced MTC for LTE [LTE_feMTC]

**RP-170462** **Status report of WI Further enhanced MTC for LTE; rapporteur: Ericsson**
*Source: RAN1*

**Discussion:**

conclusion: noted; approved: Core: 95%, June 17; Perf.: 0%, Dec.17;

**Decision:** The document was **noted**.

**RP-170623** **Introduction of FeMTC**
*Source: RAN1*

**Abstract:**

MCC: late submission

**Decision:** The document was **approved**.

**RP-170636** **RAN2 CRs to Further enhanced MTC for LTE**
*Source: RAN2*

**Discussion:**

LG: one MAC CR was not agreed and should also belong to NB-IOT

RAN2 chair: we concluded it can be approved as it is (LG concern can be addressed in a future CR); CR R2-1702438 includes more NB_IOTenh-Core changes than LTE_feMTC-Core changes, so it would have been more appropriate to package this CR in RP-170637;

**Decision:** The document was **approved**.

**RP-170560** **RAN4 CRs to Core part: Further enhanced MTC for LTE**
*Source: RAN4*

**Decision:** The document was **approved**.

**RP-170517** **OTDOA Enhancements for FeMTC**
36.455 CR-0073 Cat: B (Rel-14) v14.0.0
*Source: Ericsson*

**Abstract:**

company CR; late RAN3 impact discovered; discussion on the RAN3 reflector; CR is povided to finalize RAN3 part of the WI (so CR was not seen by RAN3 in Athens and a revised WID is provided in RP-170532)

**Decision:** The document was **revised to RP-170691**.

**RP-170691** **OTDOA Enhancements for FeMTC**
36.455 CR-0073 rev 1 Cat: B (Rel-14) v14.0.0
*Source: Ericsson*

(Replaces RP-170517)

**Abstract:**



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company CR; late RAN3 impact discovered; discussion on the RAN3 reflector; CR is povided to finalize RAN3 part of the WI (so CR was not seen by RAN3 in Athens and a revised WID is provided in RP-170532)

**Decision:** The document was **approved**.

**RP-170532** **Revised WID for WI Further enhanced MTC for LTE**
*Source: Ericsson*

**Abstract:**

last approved WID: RP-162520; related company CR in RP-170517

**Discussion:**

affected specs updated

Note: The rapporteur confirmed after RAN #75 that the target date for WI LTE_feMTC-Perf is Dec.17 (so the WID has a mistake but the status report is correct).

**Decision:** The document was **approved**.

**RP-170463** **WI exception request for Core part: Further enhanced MTC for LTE**
*Source: Ericsson*

**Discussion:**

RAN4 RF and demodulation part concerned

**Decision:** The document was **approved**.

**RP-170464** **Summary for WI Further enhanced MTC for LTE**
*Source: Ericsson*

**Discussion:**

MCC: WI is not yet completed

**Decision:** The document was **postponed**.

## 10.3.16 Enhancements of NB-IoT [NB_IOTenh-Core]

**RP-170039** **Reply LS to S3-170485 on mobility enhancements for NB-IoT (R2-1702290; to: SA3, RAN; cc: RAN3, CT1, SA2; contact: Vodafone)**
*Source: RAN2*

**Abstract:**

no RAN action requested; LS S3-170485 was not sent to/cc RAN

**Discussion:**

Nokia: SA3 has not taken a position so far?

RAN chair: we can see at RAN #76 from SA3 results whether RAN needs to change something

conclusion: no LS answer

**Decision:** The document was **noted**.

**RP-170288** **Status report for WI: Enhancements of NB-IoT; rapporteur: Huawei**
*Source: RAN1*



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**Discussion:**

conclusion: noted; approved: Core: 95%, June 17; Perf.: 0%, Dec.17;

**Decision:** The document was **noted**.

**RP-170624** **Introduction of NB-IoT enhancements for LTE**
*Source: RAN1*

**Decision:** The document was **approved**.

**RP-170637** **RAN2 CRs to Enhancements of NB-IoT**
*Source: RAN2*

**Discussion:**

Ericsson: CRs depend on SA3

Mediatek: CRs are complete in what they are adding and we should approve them

SA3: will have an ad hoc which will have a mandate to agree CRs

RAN chair: RAN2 chairman is asked to discuss offline to come with a way forward

**Decision:** The document was **approved**.

**RP-170658** **RAN2 CRs to Enhancements of NB-IoT, part 2**
*Source: RAN2*

**Abstract:**

Rel-14 WI, Rel-13 CR

**Decision:** The document was **withdrawn**.

**RP-170539** **RAN3 CRs for Enhancements of NB-IoT-Core Part**
*Source: RAN3*

**Abstract:**

MCC: company CR RP-170319 is trying to replace RAN3 agreed CR R3-170912 of RP-170539

**Discussion:**

conclusion: all CRs approved except R3-170912 which is replaced by RP-170319

**Decision:** The document was **partially approved**.

**RP-170319** **Introduction of S1 UE information retrieve procedure**
36.413 CR-1507 rev 1 Cat: B (Rel-14) v14.1.0
*Source: Huawei*

**Abstract:**

company CR; RAN3 agreed CR R3-170912 of RP-170539 needs to be revised to fix some mistakes (procedure code/IE-ID missing, typos);

**Decision:** The document was **approved**.



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**RP-170540** **RAN3 CRs related to SA CIoT_Ext WI**
*Source: RAN3*

**Decision:** The document was **approved**.

**RP-170561** **RAN4 CRs to Core part: Enhancements of NB-IoT**
*Source: RAN4*

**Decision:** The document was **approved**.

**RP-170290** **WI exception request for Core part: Enhancements of NB-IoT**
*Source: RAN1*

**Decision:** The document was **revised to RP-170712**.

**RP-170712** **WI exception request for Core part: Enhancements of NB-IoT**
*Source: RAN1*

(Replaces RP-170290)

**Decision:** The document was **revised to RP-170842**.

**RP-170842** **WI exception request for Core part: Enhancements of NB-IoT**
*Source: RAN1*

(Replaces RP-170712)

**Decision:** The document was **approved**.

**RP-170289** **Summary for WI for enhancements of NB-IoT**
*Source: Huawei*

**Discussion:**

MCC: WI is not yet completed

**Decision:** The document was **postponed**.

## 10.3.17 Core part: Voice and Video Enhancement for LTE [LTE_VoLTE_ViLTE_enh-Core]

**RP-170023** **Reply LS to R2-169120 = RP-162344 on RAN-Assisted Codec Adaptation (S4-170219; to: RAN2, CT3; cc: RAN3, SA2, RAN; contact: Intel)**
*Source: SA4*

**Abstract:**

no RAN action requested

**Discussion:**

no LS answer

**Decision:** The document was **noted**.



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**RP-170038** **Reply LS to S4-170219 = RP-170023 on RAN-Assisted Codec Adaptation (C3-171255; to: SA4, RAN2; cc: RAN3, RAN, SA2; contact: Nokia)**
*Source: CT3*

**Abstract:**

no RAN action requested

**Discussion:**

no LS answer

**Decision:** The document was **noted**.

**RP-170322** **Status Report for WI Core part: Voice and Video Enhancement for LTE; rapporteur: CMCC**
*Source: RAN2*

**Discussion:**

conclusion: noted; approved: Core: 100%, March 17; Core part is completed

**Decision:** The document was **revised to RP-170803**.

**RP-170803** **Status Report for WI Core part: Voice and Video Enhancement for LTE; rapporteur: CMCC**
*Source: RAN2*

(Replaces RP-170322)

**Decision:** The document was **noted**.

**RP-170625** **Introduction of Voice and Video enhancement for LTE**
*Source: RAN1*

**Decision:** The document was **approved**.

**RP-170638** **RAN2 CRs to Core part: Voice and Video Enhancement for LTE**
*Source: RAN2*

**Decision:** The document was **approved**.

**RP-170541** **RAN3 CRs for Voice and Video Enhancement for LTE-Core Part**
*Source: RAN3*

**Decision:** The document was **approved**.

**RP-170323** **Summary for WI Core part: Voice and Video Enhancement for LTE**
*Source: China Mobile Com. Corporation*

**Decision:** The document was **noted**.

## 10.3.18 Core part: Flexible eNB-ID and Cell-ID in E-UTRAN [LTE_FNBID-Core]

**RP-170475** **Status report of WI Core part: Flexible eNB-ID and Cell-ID in E-UTRAN; rapporteur: China Telecom**
*Source: RAN3*

**Discussion:**



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conclusion: noted; approved: Core: 100%, March 17; WI is completed

**Decision:** The document was **noted**.

**RP-170542** **RAN3 CRs for Flexible eNB-ID and Cell-ID in E-UTRAN-Core Part**
*Source: RAN3*

**Abstract:**

MCC: R3-170844 of RP-170542 is linked to CT4 CR C4-171466 to TS 29.274 (submitted to CT #75 for approval in CP-170040) but linking is not indicated on RAN3 CR

**Decision:** The document was **approved**.

**RP-170478** **Summary for WI Flexible eNB-ID and Cell-ID in E-UTRAN**
*Source: China Telecommunications*

**Discussion:**

Ericsson: cooperation with GERAN and CT groups, but there was no GERAN work done, should this be reflected in the summary?

RAN3 chair: we sent an LS and there was no answer so we assume no impact

Huawei: we checked that there is no impact

**Decision:** The document was **noted**.

## 10.3.19 Perf. part: 4 RX antenna ports with CA for LTE DL [LTE_4Rx_AP_DL_CA-Perf]

**RP-170136** **Status Report of WI: Perf. part 4 receiver (RX) antenna ports with Carrier Aggregation (CA) for LTE downlink (DL); rapporteur: Ericsson**
*Source: RAN4*

**Abstract:**

Core part was completed in Dec.16

**Discussion:**

moved from AI 10.1.4 to AI 10.3.19

conclusion: noted; approved: Perf.: 50%, Sep.17

**Decision:** The document was **noted**.

**RP-170562** **RAN4 CRs to 4 receiver (4Rx) antenna ports with Carrier Aggregation (CA) for LTE downlink (DL)**
*Source: RAN4*

**Decision:** The document was **approved**.

## 10.3.20 Requirements for a new UE cat. with single receiver based on Cat.1 for LTE [LTE_UE_cat_1RX]

**RP-170040** **LS on Capabilities for Category 1bis UE (R2-1702390; to: RAN; cc: RAN4; contact: Qualcomm)**
*Source: RAN2*



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**Abstract:**

RAN action requested

**Discussion:**

Intel: IncMon should be optional as well, increases power consumption in idle mode

RAN2 chair: RAN has an action but does not need to reply

conclusion: no LS answer

**Decision:** The document was **noted**.

**RP-170389** **Status report of WI: Requirements for a new UE category with single receiver based on Category 1 for LTE; rapporteur Qualcomm Incorporated**

*Source: RAN4*

**Discussion:**

Ericsson: Positioning test cases are missing in the list of open issues of the performance part

**Decision:** The document was **revised to RP-170713**.

**RP-170713** **Status report of WI: Requirements for a new UE category with single receiver based on Category 1 for LTE; rapporteur Qualcomm Incorporated**

*Source: RAN4*

(Replaces RP-170389)

**Discussion:**

MCC: previous version was flagged by Ericsson

conclusion: noted; approved: Core: 95%, June 17; Perf.: 70%, Sep.17

**Decision:** The document was **noted**.

**RP-170639** **RAN2 CRs to Requirements for a new UE category with single receiver based on Category 1 for LTE**

*Source: RAN2*

**Decision:** The document was **approved**.

**RP-170640** **RAN2 CRs to Requirements for a new UE category with single receiver based on Category 1 for LTE, part 2**

*Source: RAN2*

**Discussion:**

MCC: General comment: Acc. to the specification drafting rules it is not possible that cat.B CRs of a Rel-14 WI (LTE_UE_cat_1Rx-Core) are modifying REL-13 specifications, otherwise REL-13 is not frozen

RAN2 chair: This was a special decision at RAN #74 to have REL-13 signalling for this

(RAN #74 endorsed the way forward of RP-172569: "Introduce related signaling in Rel. 13")

**Decision:** The document was **approved**.



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**RP-170418** **Feature optionality for Cat.1bis UE**
36.306 CR-1434 Cat: B (Rel-14) v14.1.0
*Source: Qualcomm Incorporated*

**Abstract:**

company CR; related LSin RP-170040 from RAN2; this CR had no previous CR in RAN2; features made optional for Category 1bis UE in this CR: crs-InterfHandl-r11, ss-CCH-InterfHandl-r11, FGI101

**Discussion:**

conclusion: IncMon will be added in a revision of the CR

Qualcomm: needs also REL-13 CR

**Decision:** The document was **revised to RP-170806**.

**RP-170806** **Feature optionality for Cat.1bis UE**
36.306 CR-1434 rev 1 Cat: B (Rel-14) v14.1.0
*Source: Qualcomm Incorporated*

(Replaces RP-170418)

**Abstract:**

company CR; related LSin RP-170040 from RAN2; this CR had no previous CR in RAN2; features made optional for Category 1bis UE in this CR: crs-InterfHandl-r11, ss-CCH-InterfHandl-r11, FGI101

**Decision:** The document was **approved**.

**RP-170417** **Feature optionality for Cat.1bis UE**
36.331 CR-2701 Cat: B (Rel-14) v14.1.0
*Source: Qualcomm Incorporated*

**Abstract:**

company CR; related LSin RP-170040 from RAN2; this CR had no previous CR in RAN2; features made optional for Category 1bis UE in this CR: crs-InterfHandl-r11, ss-CCH-InterfHandl-r11, FGI101

**Discussion:**

conclusion: IncMon will be added in a revision of the CR

Qualcomm: needs also REL-13 CR

**Decision:** The document was **revised to RP-170807**.

**RP-170807** **Feature optionality for Cat.1bis UE**
36.331 CR-2701 rev 1 Cat: B (Rel-14) v14.1.0
*Source: Qualcomm Incorporated*

(Replaces RP-170417)

**Abstract:**

company CR; related LSin RP-170040 from RAN2; this CR had no previous CR in RAN2; features made optional for Category 1bis UE in this CR: crs-InterfHandl-r11, ss-CCH-InterfHandl-r11, FGI101

**Decision:** The document was **approved**.



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**RP-170808** **Feature optionality for Cat.1bis UE**
36.306 CR-1435 Cat: B (Rel-13) v13.4.0
*Source: Qualcomm Incorporated*

**Abstract:**

company CR; related LSin RP-170040 from RAN2; this CR had no previous CR in RAN2; features made optional for Category 1bis UE in this CR: crs-InterfHandl-r11, ss-CCH-InterfHandl-r11, FGI101

**Decision:** The document was **approved**.

**RP-170809** **Feature optionality for Cat.1bis UE**
36.331 CR-2704 Cat: B (Rel-13) v13.4.0
*Source: Qualcomm Incorporated*

**Abstract:**

company CR; related LSin RP-170040 from RAN2; this CR had no previous CR in RAN2; features made optional for Category 1bis UE in this CR: crs-InterfHandl-r11, ss-CCH-InterfHandl-r11, FGI101

**Decision:** The document was **approved**.

**RP-170563** **RAN4 CRs to Requirements for a new UE category with single receiver based on Category 1 for LTE**
*Source: RAN4*

**Decision:** The document was **approved**.

**RP-170390** **WI exception request for Core part: Requirements for a new UE category with single receiver based on Category 1 for LTE**
*Source: Qualcomm Japan Inc*

**Abstract:**

some positioning core requirements are not yet finalized

**Decision:** The document was **revised to RP-170768**.

**RP-170768** **WI exception request for Core part: Requirements for a new UE category with single receiver based on Category 1 for LTE**
*Source: Qualcomm Japan Inc*

(Replaces RP-170390)

**Decision:** The document was **approved**.

**RP-170791** **Revised WID: Requirements for a new UE category with single receiver based on Category 1 for LTE**
*Source: Qualcomm*

**Abstract:**

last approved WID: RP-1702570

**Decision:** The document was **approved**.



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## 10.3.21 Core part: Enh. LTE WLAN Radio Level Integration with IPsec Tunnel (eLWIP) [LTE_WLAN_eLWIP-Core]

**RP-170195** **Status report of WI Enhanced LTE WLAN Radio Level Integration with IPsec Tunnel (eLWIP); rapporteur: Nokia**
*Source: RAN3*

**Abstract:**

Completion: 100%

**Discussion:**

conclusion: noted; approved: Core: 100%, March 17; Core part is completed

**Decision:** The document was **noted**.

**RP-170550** **Introducing eLWIP enhancements**
36.300 CR-0990 Cat: B (Rel-14) v14.1.0
*Source: Intel*

**Abstract:**

company CR; this 36.300 CR R3-170903 was endorsed by RAN3 by email but was arriving too late in RAN2 to be handled by official email agreement, therefore it is submitted to RAN; late input

**Discussion:**

note: It turned out that the correct WI code of CR RP-170550 is LTE_WLAN_eLWIP-Core and not LTE_WLAN_aggr-Core; therefore moved from AI 10.3.5 to AI 10.3.21

**Decision:** The document was **approved**.

**RP-170543** **RAN3 CRs for Enhanced LTE WLAN Radio Level Integration with IPsec Tunnel (eLWIP)-Core Part**
*Source: RAN3*

**Decision:** The document was **approved**.

**RP-170706** **WI summary for "Enhanced LTE WLAN Radio Level Integration with IPsec Tunnel (eLWIP)"**
*Source: Nokia*

**Decision:** The document was **noted**.

## 10.3.22 Perf. part: Enh. CRS and SU-MIMO Interference Mitigation Perf. Requirements for LTE [LTE_eCRSIM_eSUMIMO-Perf]

**RP-170270** **Status report of WI: Enhanced CRS and SU-MIMO Interference Mitigation Performance Requirements for LTE; rapporteurs: Intel Corporation, Huawei, LGE**
*Source: RAN4*

**Discussion:**

conclusion: noted, approved:50%, Sep.17

**Decision:** The document was **noted**.



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## 10.4 Open REL-14 LTE & UMTS WIs (not spectrum related)

### 10.4.1 Perf. part: Further Indoor Positioning Enh. for UTRA and LTE [UTRA_LTE_iPos_enh2-Perf]

**RP-170231** **Status report of WI Further Indoor Positioning enhancements for UTRA and LTE; rapporteur: Huawei, NextNav**
*Source: RAN4*

**Abstract:**

Core part was completed in Dec.16

**Discussion:**

conclusion: noted; approved: Perf.: 50%, June 17

**Decision:** The document was **noted**.

**RP-170564** **RAN4 CRs to Perf. part: Further Indoor Positioning Enhancements for UTRA and LTE**
*Source: RAN4*

**Decision:** The document was **approved**.

### 10.4.2 Enhancements of BS RF and EMC requirements for Active Antenna System (AAS) [AASenh_BS_LTE_UTRA]

**RP-170297** **Status report for WI: Enhancements of Base Station (BS) RF and EMC requirements for Active Antenna System (AAS), rapporteur: Huawei**
*Source: RAN4*

**Discussion:**

conclusion: noted, approved: Core: 40%, Dec.17; Perf.: 10%, June 18; both are shifted from REL-14 to REL-15

**Decision:** The document was **noted**.

**RP-170299** **Motivations for revision of WI on enhancements of Base Station (BS) RF and EMC requirements for Active Antenna System (AAS)**
*Source: RAN4*

**Decision:** The document was **noted**.

**RP-170298** **Revision of WI: Enhancements of Base Station (BS) RF and EMC requirements for Active Antenna System (AAS)**
*Source: Huawei*

**Abstract:**

last approved WID: RP-161668; to update affected specifications and to align target date with proposed shift to Rel-15

**Decision:** The document was **revised to RP-170769**.

**RP-170769** **Revision of WI: Enhancements of Base Station (BS) RF and EMC requirements for Active Antenna System (AAS)**
*Source: Huawei*

(Replaces RP-170298)



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**Decision:** The document was **revised to RP-170844**.

**RP-170844** **Revision of WI: Enhancements of Base Station (BS) RF and EMC requirements for Active Antenna System (AAS)**
*Source: Huawei*

(Replaces RP-170769)

**Decision:** The document was **approved**.

## 10.4.3 Core part: LTE UE TRP & TRS and UTRA Hand Phantom related UE TRP and TRS Requirements [LTE_UTRA_TRP_TRS-Core]

**RP-170698** **LS on Definition of Wide hand Phantom within 3GPP for use in Antenna Performance measurements (GSMA_LS_170222; to: RAN, RAN4; cc: CTIA OTA WG, GCF SG; contact: China Unicom)**
*Source: GSMA*

**Abstract:**

LS arrived on 08.03.2017 during RAN #75

**Discussion:**

conclusion: no LS answer

**Decision:** The document was **noted**.

**RP-170221** **Status Report of WI: Core part: LTE UE TRP and TRS and UTRA Hand Phantom related UE TRP and TRS Requirements; rapporteur: Telecom Italia**
*Source: RAN4*

**Discussion:**

conclusion: noted; approved: Core: 75%, June 17

**Decision:** The document was **noted**.

**RP-170223** **Revised WID: LTE UE TRP and TRS and UTRA Hand Phantom related UE TRP and TRS Requirements**
*Source: TELECOM ITALIA S.p.A.*

**Abstract:**

last approved WID: RP-162061

**Decision:** The document was **approved**.

**RP-170222** **WI exception request for Core part: LTE UE TRP and TRS and UTRA Hand Phantom related UE TRP and TRS Requirements**
*Source: TELECOM ITALIA S.p.A.*

**Decision:** The document was **approved**.



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### 10.4.4 Core part: Enhancements of Dedicated Core (DECOR) Networks for UMTS and LTE [New WI: eDECOR-UTRA_LTE-Core]

**RP-170518** **Status report of WI Enhancements of Dedicated Core Networks for UMTS and LTE; rapporteur: Ericsson**
*Source: RAN3*

**Discussion:**

conclusion: noted; approved: Core: 100%, March 17; Core part WI is completed

**Decision:** The document was **noted**.

**RP-170641** **RAN2 CRs to Core part: Enhancements of Dedicated Core (DECOR) Networks for UMTS and LTE**
*Source: RAN2*

**Decision:** The document was **approved**.

**RP-170544** **RAN3 CRs for Enhancements of Dedicated Core (DECOR) Networks for UMTS and LTE-Core Part**
*Source: RAN3*

**Decision:** The document was **approved**.

**RP-170547** **WI summary for WI Enhancements of Dedicated Core Networks for UMTS and LTE**
*Source: Ericsson*

**Abstract:**

late input

**Decision:** The document was **noted**.

## 10.5 Open REL-14 LTE WIs (spectrum related)

**RP-170506** **Basket CA Rapporteurship and Workload**
*Source: Qualcomm Japan Inc*

**Abstract:**

In this paper we discuss some problems related to the workload that basket CA rapporteurs have and make some proposals on how the work process can be improved

**Discussion:**

proposals:

1. Approve the “big CRs” over e-mail within 1 week after the meeting ends. The CRs are usually just a collection of already agreed TPs

2. Drafting of the “big CRs” could also be handled by MCC if resources are available.

MCC: 2. is not realistic as it will fall in the busy period where a large number of RAN4 CRs need to be packed

RAN4 chair: proposes to go for option 1.

RAN chair: you can establish a deadline

**Decision:** The document was **noted**.



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## 10.5.1 LTE Advanced intra-band CA for xDL/yUL including contiguous and non-contiguous spectrum [LTE_CA_R14_intra]

**RP-170186** **Status report of WI LTE_CA_R14_intra; rapporteur: Ericsson**
*Source: RAN4*

**Abstract:**

Status Report: LTE Advanced Intra-band CA including contiguous and non-contiguous spectrum Rel-14; Previous SR: RP-162021.

**Discussion:**

conclusion: noted; approved: Core: 82%, June 17; Perf.: 82%, June 17

**Decision:** The document was **noted**.

**RP-170565** **RAN4 CRs to Core part: LTE Advanced intra-band Carrier Aggregation for xDL/yUL including contiguous and non-contiguous spectrum**
*Source: RAN4*

**Decision:** The document was **approved**.

**RP-170188** **Revised WID: Basket WI for LTE Advanced Intra-band CA including contiguous and non-contiguous spectrum**
*Source: Ericsson*

**Abstract:**

last approved WID: RP-162023

**Decision:** The document was **approved**.

**RP-170190** **WI exception request for Core part: LTE Advanced intra-band Carrier Aggregation for xDL/yUL including contiguous and non-contiguous spectrum**
*Source: Ericsson*

**Decision:** The document was **approved**.

## 10.5.2 LTE Advanced inter-band CA Rel-14 for 2DL/1UL [LTE_CA_R14_2DL1UL]

**RP-170124** **Status Report to TSG: LTE Advanced inter-band CA Rel-14 for 2DL/1UL; rapporteur: Qualcomm**
*Source: RAN4*

**Discussion:**

conclusion: noted; approved: Core: 80%, June 17; Perf.: 80%, June 17

**Decision:** The document was **noted**.

**RP-170126** **TR 36.714-02-01 v0.5.1 LTE Advanced inter-band CA for 2DL/1UL Rel-14**
36.714-02-01 v0.5.1
*Source: Qualcomm Incorporated*

**Abstract:**

RAN4 basket CA TR 36.714-02-01 is provided for information



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**Decision:** The document was **withdrawn**.

**RP-170566** **RAN4 CRs to Core part: LTE Advanced inter-band Carrier Aggregation Rel-14 for 2DL/1UL**
*Source: RAN4*

**Decision:** The document was **approved**.

**RP-170123** **Revision of WID: LTE Advanced inter-band CA Rel-14 for 2DL/1UL**
*Source: Qualcomm Incorporated*

**Abstract:**

last approved WID: RP-161996; adds more CA configurations.

**Decision:** The document was **approved**.

**RP-170125** **WI exception request for WI Core part: LTE Advanced inter-band CA Rel-14 for 2DL/1UL**
*Source: Qualcomm Incorporated*

**Decision:** The document was **approved**.

## 10.5.3 LTE Advanced inter-band CA Rel-14 for 3DL/1UL [LTE_CA_R14_3DL1UL]

**RP-170308** **Status report for WI: LTE Advanced inter-band CA Rel-14 for 3DL/1UL; rapporteur: Huawei**
*Source: RAN4*

**Discussion:**

conclusion: noted; approved: Core: 90%, June 17; Perf.: 90%, June 17

**Decision:** The document was **noted**.

**RP-170567** **RAN4 CRs to Core part: LTE Advanced inter-band Carrier Aggregation Rel-14 for 3DL/1UL**
*Source: RAN4*

**Decision:** The document was **approved**.

**RP-170309** **Revised WID: LTE Advanced inter-band CA Rel-14 for 3DL/1UL**
*Source: Huawei, HiSilicon*

**Abstract:**

last approved WID: RP-162146

**Decision:** The document was **approved**.

**RP-170457** **LTE 3DL/1UL CA late band combination**
*Source: VODAFONE Group Plc*

**Discussion:**

RAN4 chair: these combinations were proposed but they missed the deadline; would recommend to respect the deadline

**Decision:** The document was **noted**.

**RP-170310** **WI exception request for LTE Advanced inter-band CA Rel-14 for 3DL/1UL**
*Source: Huawei, HiSilicon*



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**Decision:** The document was **approved**.

## 10.5.4 LTE Advanced inter-band CA Rel-14 for 4DL/1UL [LTE_CA_R14_4DL1UL]

**RP-170187** **Status report of WI LTE_CA_R14_4DL1UL; rapporteur: Ericsson**
*Source: RAN4*

**Abstract:**

Previous SR: RP-162020.

**Discussion:**

conclusion: noted; approved: Core: 95%, June 17; Perf.: 95%, June 17

**Decision:** The document was **noted**.

**RP-170568** **RAN4 CRs to Core part: LTE Advanced inter-band Carrier Aggregation Rel-14 for 4DL/1UL**
*Source: RAN4*

**Decision:** The document was **approved**.

**RP-170189** **Revised WID: Basket WI for LTE Advanced Inter-band CA Rel-14 for 4DL/1UL**
*Source: Ericsson*

**Abstract:**

last approved WID: RP-162022

**Decision:** The document was **approved**.

**RP-170456** **LTE CA 4DL/1UL late band combination**
*Source: VODAFONE Group Plc*

**Discussion:**

RAN chair: same approach as for previous AI

**Decision:** The document was **noted**.

**RP-170191** **WI exception request for Core part: LTE Advanced inter-band CA Rel-14 for 4DL/1UL**
*Source: Ericsson*

**Decision:** The document was **approved**.

## 10.5.5 LTE Advanced inter-band CA Rel-14 for 5DL/1UL [LTE_CA_R14_5DL1UL]

**RP-170144** **Status Report: LTE Advanced inter-band CA Rel-14 for 5DL/1UL; rapporteur: Nokia**
*Source: RAN4*

**Discussion:**

conclusion: noted; approved: Core: 95%, June 17; Perf.: 95%, June 17

**Decision:** The document was **noted**.



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**RP-170569** **RAN4 CRs to LTE Advanced inter-band Carrier Aggregation Rel-14 for 5DL/1UL**
*Source: RAN4*

**Decision:** The document was **approved**.

**RP-170143** **Revised WI: LTE Advanced inter-band CA Rel-14 for 5DL/1UL**
*Source: Nokia*

**Abstract:**

last approved WID: RP-162005

**Decision:** The document was **approved**.

**RP-170142** **WI exception request for Core part: LTE Advanced inter-band CA Rel-14 for 5DL/1UL**
*Source: Nokia*

**Decision:** The document was **approved**.

## 10.5.6 LTE Advanced inter-band CA Rel-14 for 2DL/2UL [LTE_CA_R14_2DL2UL]

**RP-170311** **Status report for WI: LTE Advanced inter-band CA Rel-14 for 2DL/2UL; rapporteur: Huawei**
*Source: RAN4*

**Discussion:**

conclusion: noted; approved: Core: 90%, June 17; Perf.: 90%, June 17

**Decision:** The document was **noted**.

**RP-170570** **RAN4 CRs to Core part: LTE Advanced inter-band Carrier Aggregation Rel-14 for 2DL/2UL**
*Source: RAN4*

**Decision:** The document was **approved**.

**RP-170312** **Revised WID: LTE Advanced inter-band CA Rel-14 for 2DL/2UL**
*Source: Huawei, HiSilicon*

**Abstract:**

last approved WID: RP-162148

**Decision:** The document was **approved**.

**RP-170313** **WI exception request for Core part: LTE Advanced inter-band CA Rel-14 for 2DL/2UL**
*Source: Huawei, HiSilicon*

**Decision:** The document was **approved**.

## 10.5.7 LTE Advanced inter-band CA Rel-14 for xDL/2UL with x=3,4,5 [LTE_CA_R14_xDL2UL]

**RP-170129** **Status report for WI LTE Advanced inter-band Carrier Aggregation Rel-14 for xDL/2UL with x=3,4,5; rapporteur: LG Electronics**
*Source: RAN4*



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**Abstract:**

requesting TU budget to complete xDL/2UL CA at RAN4 #82bis and #83.

**Discussion:**

MCC: 0% for Perf. part i.e. no CRs to 36.133 and 36.141 sounds strange;

conclusion: noted; approved: Core: 95%, June 17; Perf.: 0%, June 17

**Decision:** The document was **noted**.

**RP-170571** **RAN4 CRs to Core part: LTE Advanced inter-band Carrier Aggregation Rel-14 for xDL/2UL with x=3,4,5**
*Source: RAN4*

**Decision:** The document was **approved**.

**RP-170128** **Revised WID: LTE Advanced inter-band CA Rel-14 for xDL/2UL with x=3,4,5**
*Source: LG Electronics Inc.*

**Abstract:**

last approved WID: RP-162036; to add new xDL/2UL CA band combination and changed status; RAN4 agreed to extend CA basket WI until June so changed TU budget is requested in SR

**Decision:** The document was **approved**.

**RP-170152** **WI exception request for Core part: LTE Advanced inter-band Carrier Aggregation Rel-14 for xDL/2UL with x=3,4,5**
*Source: LG Electronics Inc.*

**Abstract:**

based on operator request, xDL/2UL inter-band CA in rel-14 will be extened until June 2017

**Decision:** The document was **approved**.

## 10.5.8 LTE Advanced inter-band CA Rel-14 for 3DL/3UL [LTE_CA_R14_3DL3UL]

**RP-170202** **Status report of WI LTE Advanced Inter-band CA Rel-14 for 3DL/3UL; rapporteur: Nokia; source: RAN4**
*Source: Nokia*

**Discussion:**

conclusion: noted; approved: Core: 100%, March 17; Perf.: 100%, March 17; Core and Perf. part WI completed

**Decision:** The document was **noted**.

**RP-170494** **TR 36.714-03-03 v1.0.0 on LTE Advanced Inter-band CA Rel-14 for 3DL/3UL; for approval**
36.714-03-03 v1.0.0
*Source: Nokia Corporation*

**Abstract:**

RAN4 basket CA TR 36.714-03-03 is provided for 1-step approval

**Discussion:**



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conclusion: approved as REL-14 TR

**Decision:** The document was **approved**.

## 10.5.9 New band support for Rel-14 Narrowband Internet of Things (NB-IOT) [NB_IOT_R14_bands]

**RP-170140** **Status report for WI New band support for Rel-14 NB-IoT; rapporteur: Ericsson**
*Source: RAN4*

**Discussion:**

MCC: Perf. part was already at 99% at RAN #74

conclusion: noted; approved: Core: 99%, June 17; Perf.: 70%, June 17

**Decision:** The document was **noted**.

**RP-170572** **RAN4 CRs to Core part: New band support for Rel-14 Narrowband Internet of Things (NB-IOT)**
*Source: RAN4*

**Decision:** The document was **approved**.

**RP-170139** **Updated WID "New band support for Rel-14 NB-IoT"**
*Source: Ericsson*

**Abstract:**

last approved WID: RP-161890; based on a request from NTT DoCoMo band 21 is added to the WI

**Decision:** The document was **approved**.

**RP-170141** **WI exception request for Core part: New band support for Rel-14 Narrowband Internet of Things (NB-IOT)**
*Source: Ericsson*

**Abstract:**

exception due to addition of band 21

**Decision:** The document was **approved**.

## 10.5.10 Core part: Addition of 1.4 & 3MHz Channel BW to E-UTRA operating band 65 for CGC operations in Region 1 [New WI: LTE_1980_2170_REG1_addBWs-Core]

**RP-170111** **Status Report for WICore part: Addition of 1.4 and 3 MHz Channel Bandwidth to E-UTRA operating band 65 for CGC (Complementary Ground Component) operations in Region 1**
*Source: HUGHES Network Systems Ltd*

**Abstract:**

Status report to TSG for 100% completion of Work Item related to addition of 1.4 and 3 MHz channel bandwidth to Band 65

**Discussion:**

conclusion: noted, approved: Core: 100%, March 17; Core part WI completed



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**Decision:** The document was **noted**.

**RP-170573** **RAN4 CRs to Core part: Addition of 1.4 and 3 MHz Channel Bandwidth to E-UTRA operating band 65 for CGC (Complementary Ground Component) operations in Region 1**
*Source: RAN4*

**Decision:** The document was **approved**.

**RP-170052** **Revised WID: Core part: Addition of 1.4 and 3 MHz Channel Bandwidth to E-UTRA operating band 65 for CGC (Complementary Ground Component) operations in Region 1**
*Source: HUGHES Network Systems Ltd*

(Replaces RP-162515)

**Abstract:**

last approved WID: RP-162515

**Decision:** The document was **revised to RP-170235**.

**RP-170235** **Revised WID: Core part: Addition of 1.4 and 3 MHz Channel Bandwidth to E-UTRA operating band 65 for CGC (Complementary Ground Component) operations in Region 1**
*Source: HUGHES Network Systems Ltd*

(Replaces RP-162515)

**Abstract:**

last approved WID: RP-162515; revision of RP-170052; reference to one specification was removed and reference to two others was added; wrong WI code in Tdoc request

**Decision:** The document was **approved**.

## 10.5.11 Core part: Introduction of new band support for 4Rx antenna ports for LTE [New WI: LTE_4Rx_AP_DL_bands-Core]

**RP-170305** **Status report for WI: Introduction of new band support for 4Rx antenna ports; rapporteur: Huawei**
*Source: RAN4*

**Discussion:**

conclusion: noted; approved: Core: 80%, June 17

**Decision:** The document was **noted**.

**RP-170574** **RAN4 CRs to Core part: Introduction of new band support for 4Rx antenna ports for LTE**
*Source: RAN4*

**Decision:** The document was **approved**.

**RP-170307** **Revision of WI: Core part: Introduction of new band support for 4Rx antenna ports for LTE**
*Source: Huawei, HiSilicon*

**Abstract:**

last approved WID: RP-162496; title change, addition of WI code, other editorial revisions



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**Decision:** The document was **approved**.

**RP-170306** **WI exception request for Core part: Introduction of new band support for 4Rx antenna ports for LTE**

*Source: Huawei, HiSilicon*

**Decision:** The document was **approved**.

### 10.5.12 Core part: Addition of band 25 and 26 to LTE MTC cat.0 [New WI: LC_MTC_LTE_cat0_B25_B26-Core]

**RP-170215** **Status Report for Addition of band 25 and 26 to LTE MTC cat.0; rapporteur: Sprint**
*Source: RAN4*

**Discussion:**

conclusion: noted; approved: Core: 100%, March 17; Core part WI completed

**Decision:** The document was **noted**.

**RP-170575** **RAN4 CRs to Core part: Addition of band 25 and 26 to LTE MTC cat.0**
*Source: RAN4*

**Decision:** The document was **approved**.

### 10.5.13 Core part: Addition of bands 25 and 40 to LTE MTC cat.1 [New WI: LTE_MTCe2_L1_cat1_B25_B40-Core]

**RP-170216** **Status Report for Addition of bands 25 and 40 to LTE MTC cat.1; rapporteur: Sprint**
*Source: RAN4*

**Discussion:**

conclusion: noted; approved: Core: 100%, March 17; Core part WI completed

**Decision:** The document was **noted**.

**RP-170576** **RAN4 CRs to Addition of bands 25 and 40 to LTE MTC cat.1**
*Source: RAN4*

**Decision:** The document was **approved**.

## 10.6 Small Technical Enhancements and Improvements for REL-14 [TEI14]

**RP-170642** **RAN2 CRs to Small Technical Enhancements and Improvements for REL-14**
*Source: RAN2*

**Decision:** The document was **approved**.

**RP-170577** **RAN4 CRs to TEI14**
*Source: RAN4*

**Decision:** The document was **approved**.



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# 10.7 Open REL-14 LTE SIs

## 10.7.1 Feasibility Study on LTE Advanced CA of Band 3 and Band 39 [FS_LTE_CA_B3_B39]

**RP-170370** **Status Report of SI Feasibility Study on LTE Advanced Carrier Aggregation of Band 3 and Band 39; rapporteur: ZTE**
*Source: ZTE Corporation*

**Discussion:**

MCC: no TR provided so SI completed via pCRs to 36.714-02-01 ?

SI for 2DL/1UL or 3DL/1UL?

ZTE: The SI was revised in RP-161704 at RAN #73 to extend the studies on 3DL/1UL CA for Band 3 + Band 39 + Band 8/Band 41 according to the outcome of 2DL/1UL studies that it's difficult to aggregate 2DL CC only; results of this SI are captured into TR 36.714-02-01 and TR 36.714-03-01;

MCC: as WI code and title have to remain, it is not a good idea to extend the scope of the SI like this; next time better consider to open a new SI;

conclusion: noted; approved: 100%, March 17; SI completed

**Decision:** The document was **noted**.

## 10.7.2 Study on Context Aware Service Delivery in RAN for LTE [FS_LTE_context]

**RP-170363** **Status Report for SI Study on Context Aware Service Delivery in RAN for LTE; rapporteur: CMCC**
*Source: RAN3*

**Discussion:**

conclusion: noted; approved: 100%, March 17; SI completed

**Decision:** The document was **noted**.

**RP-170362** **TR 36.933 v2.0.0 on Study on Context Aware Service Delivery in RAN for LTE**
36.933 v2.0.0
*Source: China Mobile Com. Corporation*

**Abstract:**

wrong Tdoc type "report" in Tdoc request; moved from AI 5.3 to AI 10.7.2; RAN3 TR 36.933 is provided for approval

**Discussion:**

conclusion: approved as REL-14 TR

**Decision:** The document was **approved**.

## 10.7.3 Study on further enhancements to Coordinated Multi-Point (CoMP) Operation for LTE [FS_feCOMP_LTE]

**RP-170431** **Status report of SI: Further enhancements to Coordinated Multi-Point (CoMP) Operation for LTE; rapporteur: Intel Corporation**
*Source: RAN1*

**Discussion:**



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conclusion: noted; approved: 100%, March 17; SI completed

**Decision:** The document was **noted**.

**RP-170446** **TR 36.741 v2.0.1 on Study on Further enhancements to Coordinated Multi-Point (CoMP) Operation for LTE**
36.741 v2.0.1
*Source: Intel Corporation, ZTE*

**Abstract:**

RAN1 TR 36.741 is provided for approval

**Discussion:**

conclusion: approved as REL-14 TR

**Decision:** The document was **approved**.

### 10.7.4 Study on SON for eCoMP for LTE [FS_LTE_SON_eCOMP]

**RP-170203** **Status report of SI Study on SON for eCoMP for LTE; rapporteur: Nokia**
*Source: RAN3*

**Discussion:**

conclusion: noted; approved: 60%, June 17; SI is moved to REL-15

**Decision:** The document was **noted**.

**RP-170204** **TR 36.742 v1.0.0 on Study on SON for eCoMP for LTE; for information**
36.742 v1.0.0
*Source: Nokia, Alcatel-Lucent Shanghai Bell*

**Abstract:**

RAN3 TR 36.742 is provided for information

**Decision:** The document was **noted**.

## 10.8 Closed REL-14 LTE WIs (not spectrum related)

### 10.8.1 Core part: Support for V2V services based on LTE sidelink [LTE_SL_V2V-Core]

**RP-170613** **Maintenance of Rel-14 Support for V2V services based on LTE sidelink**
*Source: RAN1*

**Decision:** The document was **approved**.

**RP-170643** **RAN2 CRs to Core part: Support for V2V services based on LTE sidelink**
*Source: RAN2*

**Discussion:**

MCC: warning: CR R2-1702068 (of RP-170643) and R2-1702069 (of RP-170643) are introducing the same changes as also covered in CR R2-1702414 of RP-170635



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**Decision:** The document was **approved**.

**RP-170644** **RAN2 CRs to Core part: Support for V2V services based on LTE sidelink, part 2**
36.331 v..
*Source: RAN2*

**Abstract:**

MCC: cat. B 36.331 CR for a REL-14 WI (LTE_SL_V2V-Core) that was declared to be 100% complete in Sep.2016

**Decision:** The document was **approved**.

**RP-170578** **RAN4 CRs to Core part: Support for V2V services based on LTE sidelink**
*Source: RAN4*

**Decision:** The document was **approved**.

## 10.8.2 Core part: L2 latency reduction techniques for LTE [LTE_LATRED_L2-Core]

## 10.8.3 Core part: Performance enhancements for high speed scenario in LTE [LTE_high_speed-Core]

**RP-170534** **LS on additional RRC parameters for PRACH resource configuration for high speed scenario (R1-1704133; to: RAN2; cc: RAN; contact: Huawei)**
*Source: RAN1*

**Abstract:**

Note: WI LTE_high_speed-Core was completed at RAN #74 in Dec.16; no RAN action requested

**Decision:** The document was **noted**.

**RP-170617** **Maintenance of Rel-14 Performance enhancements for high speed scenario in LTE**
*Source: RAN1*

**Decision:** The document was **approved**.

**RP-170321** **Correction to PRACH resource configuration for high speed scenario**
36.331 CR-2698 Cat: F (Rel-14) v14.1.0
*Source: Huawei, HiSilicon*

**Abstract:**

company CR; RAN1 agreed 36.211 CR R1-1704132 (by email) where two additional RRC parameters are introduced for PRACH resource configuration for the Rel-14 high speed scenario; RAN1 has also sent LSout R1-1704133 = RP-170534 (agreed by email after Athens) to ask RAN2 to capture the 2 parameters in 36.331 but RAN2 did not have time for this and had no RAN2 Tdoc on this; Note: The REL-14 WI LTE_high_speed-Core was declared 100% complete at RAN #74 in Dec.16.

**Discussion:**

Nokia: a lot of REL-14 work that gets exceptions, so concerned that this was not reviewed by RAN2

**Decision:** The document was **approved**.

**RP-170579** **RAN4 CRs to Core part: Performance enhancements for high speed scenario in LTE**
*Source: RAN4*



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**Decision:** The document was **approved**.

### 10.8.4 Core part: SRS (sounding reference signal) switching between LTE component carriers [LTE_SRS_switch-Core]

**RP-170615** **Maintenance of Rel-14 SRS (sounding reference signal) switching between LTE component carriers**

*Source: RAN1*

**Decision:** The document was **approved**.

**RP-170645** **RAN2 CRs to Core part: SRS (sounding reference signal) switching between LTE component carriers**

36.331 v..
*Source: RAN2*

**Decision:** The document was **approved**.

**RP-170646** **RAN2 CRs to Core part: SRS (sounding reference signal) switching between LTE component carriers, part 2**

*Source: RAN2*

**Discussion:**

MCC: cat B CRs for a REL-14 WI (LTE_SRS_switch-Core) that was declared to be 100% complete in Dec.2016

**Decision:** The document was **approved**.

### 10.8.5 Core part: Downlink Multiuser Superposition Transmission for LTE [LTE_MUST-Core]

**RP-170616** **Maintenance of Rel-14 Downlink Multiuser Superposition Transmission for LTE**
*Source: RAN1*

**Decision:** The document was **approved**.

### 10.8.6 Core part: 4RX antenna ports with CA for LTE DL [LTE_4Rx_AP_DL_CA-Core]

## 10.9 Closed REL-14 LTE & UMTS WIs (not spectrum related)

### 10.9.1 Multi-Band BS testing with three or more bands [MB_BS_test_3B]

### 10.9.2 Core part: Further Indoor Positioning Enh. for UTRA and LTE [UTRA_LTE_iPos_enh2-Core]

**RP-170647** **RAN2 CRs to Core part: Further Indoor Positioning Enhancements for UTRA and LTE**
36.305 v..
*Source: RAN2*

**Decision:** The document was **approved**.



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## 10.10 Closed REL-14 LTE WIs (spectrum related)

### 10.10.1 LTE 2.6 GHz FDD Suppl. DL band (2570-2620 MHz) and LTE CA (2DL/1UL) with Band 3 for region 1 [LTE_FDD_2600_CA_B3]

### 10.10.2 AWS-3/4 Band for LTE [LTE_AWS_3_4]

### 10.10.3 CBRS 3.5GHz band for LTE in the United States [LTE_TDD_3550_CBRS_US]

### 10.10.4 LTE Band 41 UE power class 2 operation [LTE_B41_UE_PC2-Core]

## 10.11 Closed REL-14 LTE SIs

## 10.12 Open REL-15 LTE WIs (not spectrum related)

### 10.12.1 Shortened TTI and processing time for LTE [LTE_sTTIandPT]

**RP-170112** **Status report for Shortened TTI and processing time for LTE; rapporteur: Ericsson**
*Source: RAN1*

**Discussion:**

note: Rapporteur confirmed that Perf. part stays at 0%;

conclusion: noted; approved: Core: 30%, Sep.17; Perf.: 0%, March 18

**Decision:** The document was **revised to RP-170800**.

**RP-170800** **Status report for Shortened TTI and processing time for LTE; rapporteur: Ericsson**
*Source: RAN1*

(Replaces RP-170112)

**Discussion:**

Huawei: why is there a TU increase?

Ericsson: was probably a misunderstanding

RAN chair: we can come back to it

**Decision:** The document was **revised to RP-170851**.

**RP-170851** **Status report for Shortened TTI and processing time for LTE; rapporteur: Ericsson**
*Source: RAN1*

(Replaces RP-170800)

**Decision:** The document was **noted**.

**RP-170487** **Discussion on the specification of shortened TTI in Rel-14**
*Source: Huawei, HiSilicon*

**Discussion:**

Proposals



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–RAN tasks WG1 to provide RRC parameters to RAN2 after RAN1#88bis

–RAN tasks RAN WGs to start preparing CRs for sTTI after April WGs

–RAN tasks RAN WGs to agree CRs (including ASN.1) for sTTI by RAN#76, for approval at RAN#76

Samsung: not sure that RAN1 could provide such a level of detail at 40% completion level

Nokia: considers this as micro management of what WGs should take care of

Intel: same view, usually RAN1 is providing data when almost all work is done

**Decision:** The document was **noted**.

**RP-170113** **Revised WID: Shortened TTI and processing time for LTE**
*Source: Ericsson*

(Replaces RP-162014)

**Abstract:**

last approved WID: RP-162014

**Decision:** The document was **approved**.

### 10.12.2 Void

### 10.12.3 Core part: Addition of Power Class 1 UE to bands B3/B20/B28 for LTE [LTE_HPUE_B3_B20_B28-Core]

**RP-170302** **Status report for WI: Core part: Addition of power class 1 UE to B3/B20/B28 for LTE; rapporteur: Huawei**
*Source: RAN4*

**Discussion:**

conclusion: noted; approved: Core: 70%, June 17

**Decision:** The document was **noted**.

## 10.13 Open REL-15 LTE WIs (spectrum related)

### 10.13.1 450MHz E-UTRA FDD Band for LTE PPDR and PMR/PAMR in Europe [New WI: LTE450_Europe_PPDR]

**RP-170059** **Status report of WI 450MHz E-UTRA FDD Band for LTE PPDR and PMR/PAMR in Europe; rapporteur: Airbus DS SLC**
*Source: RAN4*

**Discussion:**

conclusion: noted; approved: Core: 10%, Sep.17; Perf.: 0%, March 17; Perf. part is stopped

**Decision:** The document was **noted**.



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## 10.13.2 E-UTRA 700MHz in Europe for Broadband-PPDR [New WI: LTE700_Europe_PPDR]

**RP-170065** **Status report of WI E-UTRA 700MHz in Europe for Broadband-PPDR; rapporteur: Airbus DS SLC**

*Source: RAN4*

**Discussion:**

conclusion: noted; approved: Core: 25%, Sep.17; Perf.: 0%, Sep.17

**Decision:** The document was **noted**.

**RP-170212** **Revision of WI E-UTRA 700MHz in Europe for Broadband-PPDR: Adapting LTE band 68 for usage in Europe**

*Source: Minstere de l'Interieur (French MoI), Airbus DS SLC*

**Abstract:**

last approved WID: RP-162534

**Discussion:**

MCC: general reminder for all REL-15 WIs: REL-15 specs will not introduced before Sep.17

ATT: question: if there is no Perf. part, would this not create a problem in RAN5

RAN5 chair: Core part can be used

RAN4 chair: not all RAN4 WIs have a Perf. part

**Decision:** The document was **approved**.

## 10.13.3 FDD operating band in the L-band for LTE [New WI: LTE_FDD_L_Band]

**RP-170248** **Status Report of WI: FDD operating band in the L-band for LTE; rapporteur: NTT DOCOMO, INC.**

*Source: RAN4*

**Discussion:**

conclusion: noted; approved: Core: 50%, June 17; Perf.: 0%, June 17

**Decision:** The document was **noted**.

## 10.13.4 TDD operating band in the L-band for LTE [New WI: LTE_TDD_L_Band]

**RP-170303** **Status report for WI: TDD operating band in the L-band for LTE; rapporteur: Huawei**

*Source: RAN4*

**Discussion:**

conclusion: noted; approved: Core: 15%, June 17; Perf.: 0%, June 17

**Decision:** The document was **noted**.

**RP-170304** **Revision of WI: TDD operating band in the L-band for LTE**

*Source: Huawei, HiSilicon*

**Abstract:**



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last approved WID: RP-162557; title update.

**Decision:** The document was **approved**.

### 10.13.5 LTE Extended 1.5 GHz SDL band (1427 – 1518 MHz) and LTE CA (2DL/1UL) with Band 20 [New WI: LTE_SDL_1500ext]

**RP-170036** **LS on Channeling arrangement and Least Restrictive Technical Conditions applicable to 1427-1518 MHz in CEPT (ECC_PT1_LS_170120a; to: RAN, RAN4; cc: -; contact: Ofcom)**
*Source: ECC PT1*

**Abstract:**

no explicit RAN action requested;

**Discussion:**

conclusion: no LS answer

**Decision:** The document was **noted**.

**RP-170401** **Status Report of WI: LTE Extended 1.5 GHz SDL band (1427 – 1518 MHz) and LTE Carrier Aggregation (2DL/1UL) with Band 20; rapporteur: Qualcomm Incorporated**
*Source: RAN4*

**Discussion:**

conclusion: noted; approved: Core: 20%, June 17; Perf.: 0%, June 17

**Decision:** The document was **noted**.

### 10.13.6 Core part: Add UE Power Class 2 to band 41 intra-band contiguous LTE CA [New WI: LTE_CA_C_B41_PC2-Core]

**RP-170122** **Status report for WI Core part: Add UE Power Class 2 to band 41 intra-band contiguous LTE Carrier Aggregation; rapporteur: Sprint**
*Source: RAN4*

**Discussion:**

conclusion: noted; approved: Core: 5%, June 17

**Decision:** The document was **noted**.

## 10.14 Open REL-15 LTE SIs (not spectrum related)

### 10.14.1 Study on further enhancements to LTE D2D, UE to network relays for IoT and wearables [FS_feD2D_IoT_relay_wearable]

**RP-170294** **Status report for SI: Further Enhancements LTE Device to Device, UE to Network Relays for IoT and Wearables; rapporteur: Huawei**
*Source: RAN2*

**Abstract:**

Add RAN3 TU



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**Decision:** The document was **revised to RP-170708**.

**RP-170708** **Status report for SI: Further Enhancements LTE Device to Device, UE to Network Relays for IoT and Wearables; rapporteur: Huawei**
*Source: RAN2*

(Replaces RP-170294)

**Discussion:**

conclusion: noted; approved: 35%, Sep.17

**Decision:** The document was **noted**.

**RP-170327** **Plan for FeD2D work**
*Source: LG Electronics France*

**Discussion:**

LG: also Sequans is supporting this Tdoc

proposals:

RAN2 should make SI conclusion on layer 2 relay until June 2017.

RAN1 will start WI phase for sidelink enhancement from September 2017.

**Decision:** The document was **noted**.

**RP-170295** **Revision of SI: Further Enhancements LTE Device to Device, UE to Network Relays for IoT and Wearables**
*Source: Huawei, Huawei Device*

**Abstract:**

last approved SID: RP-161839; adding RAN3 as secondary responsible WG

**Decision:** The document was **approved**.

## 10.14.2 Study on LTE bandwidth flexibility enhancements [FS_LTE_BW_flex]

**RP-170300** **Status report for SI: LTE bandwidth flexibility enhancements; rapporteur: Huawei**
*Source: RAN4*

**Discussion:**

Ericsson: Time budget should be discussed together with all other proposed WI/SIs.

Huawei: Ericsson is proposing to stop the SI, we would be ok if it would be addressed in the NR WI

RAN chair: seems to be a possible way forward so try to capture this in the NR WID and we can then stop this SI

Huawei: we can stop the SI as objective is transferred into NR WI as shown in the document on handling RAN4 NR workload from NTT Docomo (RP-170443)

Nokia: so planned TUs can be reused

Huawei: yes

MCC: was there a TR already, if yes please let me know

Huawei: TR 36.740



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conclusion: noted; approved: 50%, March 17; SI is stopped, TR 36.740 will be withdrawn

**Decision:** The document was **noted**.

**RP-170504** **On the study on LTE bandwidth flexibility enhancements**
*Source: Ericsson LM*

**Decision:** The document was **withdrawn**.

### 10.14.3 Study on interference cancellation receiver for LTE BS [FS_LTE_IC_BS]

**RP-170158** **Status report for SI: Study on interference cancellation receiver for LTE BS, rapporteur: China Telecom**
*Source: RAN4*

**Discussion:**

conclusion: noted; approved: 65%, June 17

**Decision:** The document was **noted**.

**RP-170160** **TR 36.766 V1.0.0 for Study on interference cancellation receiver for LTE BS**
36.766 v1.0.0
*Source: China Telecom*

**Abstract:**

RAN4 TR 36.766 is provided for information

**Decision:** The document was **noted**.

### 10.14.4 Study on uplink data compression in LTE [New SI: FS_LTE_UDC]

**RP-170404** **Status Report for SI: Study on UL data compression in LTE**
*Source: CATT*

**Discussion:**

conclusion: noted; approved: 0%, June 17

**Decision:** The document was **noted**.

**RP-170403** **Revised SID on Study on UL data compression in LTE**
*Source: CATT*

**Abstract:**

last approved SID: RP-162541

**Decision:** The document was **approved**.

## 10.15 LTE UE capabilities/FGIs/IoT bits/UE categories

**RP-170184** **Introduction of new TBS for DL 256QAM**
*Source: Qualcomm Incorporated*



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**Decision:** The document was **noted**.

**RP-170185** **Way Forward on new TBS for DL 256QAM**
*Source: Qualcomm Incorporated*

**Decision:** The document was **revised to RP-170759**.

**RP-170759** **Way Forward on new TBS for DL 256QAM**
*Source: Qualcomm Incorporated*

(Replaces RP-170185)

**Discussion:**

Mediatek: thought the CR would not be needed with Qualcomm CRs we want to approve acc. to the decision of Wed morning?

RAN chair: double-check offline and if there is a problem we can come back if needed

conclusion: Finally proposal was accepted, RAN2/RAN3 are requested to prepare the CRs

**Decision:** The document was **noted**.

**RP-170399** **Introduction of a new UL UE category for 300Mbps with 64QAM**
36.331 CR-2699 Cat: B (Rel-14) v14.1.0
*Source: Intel Corporation*

**Abstract:**

company CR; compare RP-161776 postponed by RAN #73

**Decision:** The document was **postponed**.

**RP-170400** **Introduction of a new UL UE category for 300Mbps with 64QAM**
36.306 CR-1432 Cat: B (Rel-14) v14.1.0
*Source: Intel Corporation*

**Abstract:**

company CR; compare RP-161776 postponed by RAN #73 and RP-161513 withdrawn at RAN #73

**Decision:** The document was **postponed**.

# 11 UMTS

## 11.1 New WI/SI proposals for UMTS

**RP-170257** **On NW assisted DL interference mitigation - Motivation**
*Source: Qualcomm Incorporated*

**Decision:** The document was **noted**.

**RP-170256** **New WID on Network assisted DL interference mitigation for UMTS**
*Source: Qualcomm Incorporated*

**Abstract:**



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new WI for UMTS only; leading WG: RAN2

**Decision:** The document was **revised to RP-170703**.

**RP-170703** **New WID on DL interference mitigation for UMTS**
*Source: Qualcomm Incorporated*

(Replaces RP-170256)

**Abstract:**

new WI for UMTS only; leading WG: RAN2

**Decision:** The document was **approved**.

**RP-170519** **Motivation for SI: Study on a simplified HS-SCCH for UMTS**
*Source: Ericsson*

**Abstract:**

SID in RP-170520

**Decision:** The document was **noted**.

**RP-170520** **New SI proposal: Study on a simplified HS-SCCH for UMTS**
*Source: Ericsson*

**Abstract:**

new SI for UTRAN only; leading WG: RAN1; postponed at RAN#74 in RP-162290

**Decision:** The document was **revised to RP-170725**.

**RP-170725** **New SI proposal: Study on a simplified HS-SCCH for UMTS**
*Source: Ericsson*

(Replaces RP-170520)

**Discussion:**

note: After RAN #75, MCC indicated that this SI has no TR impact and no target date to add the SI into the workplan (rapporteurs were reminded multiple times in the meeting and via the RAN reflector that basic requirements for new WIs/SIs to respect 3GPP working procedures must to be fulfilled).

RAN chair insisted to keep the SI approved with target date RAN #76. The missing TR has to be clarified in a SID revision at RAN #76.

**Decision:** The document was **rejected**.

**RP-170661** **Motivation for new SI Study on scheduling enhancements with carrier aggregation for UMTS**
*Source: Huawei*

**Abstract:**

new SI for UMTS only; leading WG: RAN2; late input

**Decision:** The document was **noted**.

**RP-170660** **New SI proposal: Study on scheduling enhancements with carrier aggregation for UMTS**
*Source: Huawei*



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**Abstract:**

late input; new SI for UMTS only; leading WG: RAN1

**Decision:** The document was **revised to RP-170719**.

**RP-170719** **New SI proposal: Study on scheduling enhancements with carrier aggregation for UMTS**
*Source: Huawei*

(Replaces RP-170660)

**Abstract:**

new SI for UMTS only; leading WG: RAN1

**Discussion:**

Nokia: wants to come back later on this

**Decision:** The document was **approved**.

## 11.2 Open REL-14 UMTS WIs (not spectrum related)

### 11.2.1 Core part: QoE Measurement Collection for streaming services in UTRAN [UMTS_QMC_Streaming-Core]

**RP-170258** **Status Report for WI Core part: Quality of Experience (QoE) Measurement Collection for streaming services in UTRAN; rapporteur: China Unicom**
*Source: RAN2*

**Discussion:**

conclusion: noted; approved: Core: 100%, March 17; Core part WI completed

**Decision:** The document was **noted**.

**RP-170648** **RAN2 CRs to Core part: Quality of Experience (QoE) Measurement Collection for streaming services in UTRAN**
*Source: RAN2*

**Decision:** The document was **approved**.

**RP-170545** **RAN3 CRs for Quality of Experience (QoE) Measurement Collection for streaming services in UTRAN-Core Part**
*Source: RAN3*

**Decision:** The document was **approved**.

**RP-170259** **Summary for WI Quality of Experience (QoE) Measurement Collection for streaming services in UTRAN**
*Source: China Unicom*

**Decision:** The document was **noted**.



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## 11.3 Small Technical Enhancements and Improvements for REL-14 [TEI14]

**RP-170649** **RAN2 CRs to Small Technical Enhancements and Improvements for REL-14**
25.331 v..
*Source: RAN2*

**Decision:** The document was **approved**.

## 11.4 Closed REL-14 UMTS WIs

### 11.4.1 Core part: RRC optimization for UMTS [UTRA_RRCopt-Core]

### 11.4.2 Core part: DTX/DRX enhancements in CELL_FACH [FACH_DTXDRX-Core]

### 11.4.3 Core part: Multi-Carrier Enhancements for UMTS [UTRA_MCe-Core]

**RP-170614** **Clarification on the TTI switching for single cell E-DCH and dual cell E-DCH**
*Source: RAN1*

**Decision:** The document was **approved**.

## 11.5 Closed REL-14 UMTS SIs

## 11.6 UMTS UE capabilities/IoT bits/UE categories

# 12 GERAN

## 12.1 New WI/SI proposals for GERAN (led by RAN6)

## 12.2 Open REL-14 GERAN WIs

### 12.2.1 Positioning Enhancements for GERAN [ePOS_GERAN]

**RP-170192** **Status report WI Positioning Enhancements for GERAN; rapporteur: Ericsson**
*Source: RAN6*

**Discussion:**

conclusion: noted; approved: Core: 80%, June 17; Perf.: 80%, June 17

**Decision:** The document was **noted**.

**RP-170060** **RAN6 agreed CRs for REL-14 WI: Positioning Enhancements for GERAN (ePOS_GERAN-Core)**
*Source: RAN6*

**Decision:** The document was **approved**.

**RP-170551** **RAN6 agreed CR for REL-14 WI: Positioning Enhancements for GERAN (ePOS_GERAN-Perf)**
*Source: RAN6*



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**Decision:** The document was **approved**.

**RP-170057** **WI exception request for Core part: Positioning Enhancements for GERAN**
*Source: Ericsson*

**Decision:** The document was **approved**.

### 12.2.2 Radio Interface Enh. for Ext. Coverage GSM for support of Cellular IoT [CIoT_EC_GSM_radio_enh]

**RP-170474** **Status Report of WI Radio Interface Enhancements for EC-GSM-IoT; rapporteur: Nokia**
*Source: RAN6*

**Discussion:**

conclusion: noted; approved: Core: 80%, June 17; Perf.: 80%, June 17

**Decision:** The document was **noted**.

**RP-170061** **RAN6 agreed CRs for REL-14 WI: Radio Interface Enhancements for Extended Coverage GSM for support of Cellular Internet of Things (CIoT_EC_GSM_radio_enh)**
*Source: RAN6*

**Abstract:**

MCC: CR R6-170138 has WI code ePOS_GERAN-Perf and does not belong into this CRpack; it is therefore reissued in RP-170551

**Discussion:**

conclusion: all CRs approved except R6-170138 which is reissued in RP-170551

**Decision:** The document was **partially approved**.

**RP-170058** **WI exception request for Core part: Radio Interface Enhancements for Extended Coverage GSM for support of Cellular Internet of Things**
*Source: Nokia*

**Decision:** The document was **approved**.

## 12.3 Small Technical Enhancements and Improvements for REL-14 [TEI14]

**RP-170062** **RAN6 agreed CRs for REL-14 WI Small Technical Enhancements and Improvements for REL-14 (TEI14)**
*Source: RAN6*

**Decision:** The document was **approved**.

## 12.4 Closed REL-14 GERAN WIs

### 12.4.1 Core part: Dedicated Core Networks for GERAN [DECOR_GERAN-Core]

**RP-170194** **Summary for WI Dedicated Core Networks for GERAN**
*Source: Ericsson LM*



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**Abstract:**

Note: The WI DECOR_GERAN-Core was already completed at RAN #73 in Sep.2016.

**Decision:** The document was **noted**.

## 12.5 Closed REL-14 GERAN SIs

# 13 New and open RAN5 UE Conformance testing WIs and SIs

## 13.1 New WI/SI proposals for UE conformance testing (led by RAN5)

**RP-170121 New WID on UE Conformance Test Aspects – Interference Mitigation for Downlink Control Channels of LTE**

*Source: Intel Corporation (UK) Ltd*

**Abstract:**

new WI for LTE only; leading WG: RAN5; tested: REL-13 LTE_IM_DLCCH-Perf (note: WI had no Core part); WI code to be used: LTE_IM_DLCCH-UEConTest

**Decision:** The document was **approved**.

**RP-170193 New WI: UE Conformance Test Aspects - LTE 2.6 GHz FDD SDL band (2570-2620 MHz) and LTE Carrier Aggregation (2DL/1UL) with Band 3 for Region 1 (Band 69)**

*Source: ORANGE*

**Abstract:**

new WI for LTE only; leading WG: RAN5; tested: REL-14 LTE_FDD_2600_CA_B3-Core; WI code to be used: LTE_FDD_2600_CA_B3-UEConTest

**Decision:** The document was **approved**.

**RP-170234 New WID on UE Conformance Test Aspects – RAT Independent Further Indoor Positioning Enhancements for LTE**

*Source: NextNav, AT&T, Broadcom*

**Abstract:**

new WI for LTE only; leading WG: RAN5; tested: REL-14 UTRA_LTE_iPos_enh2-Core (but only RAT independent aspects for LTE); WI code to be used: LTE_iPos_enh2_RI-UEConTest; endorsed by RAN5 in R5-161389

**Decision:** The document was **approved**.

**RP-170355 New WI proposal: UE Conformance Test Aspects - SRS (sounding reference signal) switching between LTE component carriers**

*Source: Huawei, CMCC*

**Abstract:**

new WI for LTE only; leading WG: RAN5; tested: REL-14 LTE_SRS_switch-Core; WI code to be used: LTE_SRS_switch-UEConTest; endorsed by RAN5 in R5-171397

**Decision:** The document was **approved**.



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**RP-170356** **New WI proposal: UE Conformance Test Aspects - Quality of Experience (QoE) Measurement Collection for streaming services in UTRAN**

*Source: Huawei, China Unicom*

**Abstract:**

new WI for UMTS only; leading WG: RAN5; tested: REL-14 UMTS_QMC_Streaming-Core; WI code to be used: UMTS_QMC_Streaming-UEConTest; endorsed by RAN5 in R5-171593

**Decision:** The document was **approved**.

**RP-170367** **New WI: UE Conformance Test Aspects - Performance enhancements for high speed scenario in LTE**

*Source: China Mobile Com. Corporation*

**Abstract:**

new WI for LTE only; leading WG: RAN5; tested: REL-14 LTE_high_speed-Core; WI code to be used: LTE_high_speed-UEConTest

**Decision:** The document was **approved**.

**RP-170495** **New WID on UE Conformance Test Aspects – New band support for Rel-14 NB-IoT**

*Source: Ericsson*

**Abstract:**

new WI for LTE; leading WG: RAN5; tested: REL-14 NB_IOT_R14_bands-Core; is the Core part completed at RAN #75?

**Decision:** The document was **approved**.

**RP-170496** **New WID on UE Conformance Test Aspects - 4 Rx antenna ports with CA for LTE DL**

*Source: Ericsson*

**Abstract:**

new WI for LTE only; leading WG: RAN5; tested: REL-14 LTE_4Rx_AP_DL_CA-Core; WI code to be used: LTE_4Rx_AP_DL_CA-UEConTest

**Decision:** The document was **revised to RP-170704**.

**RP-170704** **New WID on UE Conformance Test Aspects - 4 Rx antenna ports with CA for LTE DL**

*Source: Ericsson*

(Replaces RP-170496)

**Abstract:**

new WI for LTE; leading WG: RAN5; tested: REL-14 LTE_4Rx_AP_DL_CA-Core; WI code to be used: LTE_4Rx_AP_DL_CA-UEConTest;

**Discussion:**

RAN5 chair: this was not endorsed in RAN5;

Ericsson: RAN4 performance part is done and it was also circulated on the RAN5 reflector

**Decision:** The document was **approved**.



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## 13.2 Open Rel-5 WIs

### 13.2.1 UE Conf. Test Aspects – IMS for Converged IP Communications [New WI: IMS_CONV_IP_COM-UEConTest]

**RP-170134** **STatus report for UE Conformance Test Aspects - IMS for Converged IP Communications; rapporteur: ROHDE & SCHWARZ**
*Source: RAN5*

**Abstract:**

12 test cases planned, current status is: 0 out of 12 test cases completed.

**Discussion:**

conclusion: noted; approved: 5%, Dec.17

**Decision:** The document was **noted**.

## 13.3 Open Rel-7 WIs

### 13.3.1 UE Conf. Test Aspects - Multimedia Telephony Services for IMS (MTSI) over fixed access [MTSI_FIXED_ACCESS-UEConTest]

**RP-170135** **Status report for UE Conformance Test Aspects – Multimedia Telephony Services for IMS (MTSI) over fixed access; rapporteur: Telecom Italia**
*Source: RAN5*

**Discussion:**

conclusion: noted; approved: 100%, March 17, WI completed

**Decision:** The document was **noted**.

**RP-170066** **RAN5 agreed non TTCN CR(s) WI UE Conformance Test Aspects – Multimedia Telephony Services for IMS (MTSI) over fixed access(MTSI_FIXED_ACCESS-UEConTest)**
*Source: RAN5*

**Decision:** The document was **approved**.

## 13.4 Open Rel-12 WIs

### 13.4.1 UE Conf. Test Aspects – LTE Device-to-Device Proximity Services [LTE_D2D_Prox-UEConTest]

**RP-170254** **Status Report of WI: UE Conformance Test aspects - LTE Device–to-Device Proximity Services**
*Source: RAN5*

**Discussion:**

conclusion: noted; approved: 92%, June 17

**Decision:** The document was **noted**.



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**RP-170067** **RAN5 agreed non TTCN CR(s) WI UE Conformance Test Aspects – UE Conformance Test Aspects – LTE Device-to-Device Proximity Services (LTE_D2D_PROX-UEConTest)**
*Source: RAN5*

**Decision:** The document was **approved**.

## 13.4.2 UE Conf. Test Aspects - E-UTRA Small cell enhancements - Physical layer aspects [LTE_SC_enh_L1-UEConTest]

**RP-170314** **Status report for WI: UE Conformance Test Aspects - E-UTRA small cell enhancements - Physical layer aspects; rapporteur: Huawei**
*Source: RAN5*

**Discussion:**

conclusion: noted; approved: 96%, June 17

**Decision:** The document was **noted**.

**RP-170068** **RAN5 agreed non TTCN CR(s) WI UE Conformance Test Aspects - E-UTRA Small cell enhancements - Physical layer aspects (LTE_SC_enh_L1-UEConTest)**
*Source: RAN5*

**Decision:** The document was **approved**.

## 13.4.3 UE Conf. Test Aspects - Dual connectivity for LTE [LTE_SC_enh_dualC-UEConTest]

**RP-170497** **Status report for WI UE Conformance Test Aspects - Dual connectivity for LTE; rapporteur: Ericsson**
*Source: RAN5*

**Abstract:**

target date shifted: +3 months

**Discussion:**

conclusion: noted; approved: 90%, June 17

**Decision:** The document was **noted**.

**RP-170069** **RAN5 agreed non TTCN CR(s) WI UE Conformance Test Aspects - Dual connectivity for LTE (LTE_SC_enh_dualC-UEConTest)**
*Source: RAN5*

**Decision:** The document was **approved**.

## 13.4.4 UE Conf. Test Aspects: Network-Assisted Interference Cancellation and Suppression for LTE [LTE_NAICS-UEConTest]

**RP-170467** **Status report for UE Conformance Test Aspects - Network-Assisted Interference Cancellation and Suppression for LTE; rapporteur: MediaTek Inc.**
*Source: RAN5*

**Discussion:**



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conclusion: noted; approved: 100%, March 17; WI completed

**Decision:** The document was **noted**.

**RP-170070** **RAN5 agreed non TTCN CR(s) WI UE Conformance Test Aspects: Network-Assisted Interference Cancellation and Suppression for LTE (LTE_NAICS-UEConTest)**
*Source: RAN5*

**Decision:** The document was **approved**.

### 13.4.5 UE Conf. Test Aspects - Further Enh. to LTE TDD for DL-UL Interf. Management and Traffic Adaptation [LTE_TDD_eIMTA-UEConTest]

**RP-170402** **Status Report for WI: UE Conformance Test Aspects - Further Enhancements to LTE TDD for DL-UL Interference Management and Traffic Adaptation**
*Source: RAN5*

**Discussion:**

conclusion: noted; approved: 60%, Dec.17

**Decision:** The document was **noted**.

### 13.4.6 UE Conf. Test Aspects - Increasing the min. number of carriers for UE monitoring in UTRA and E-UTRA [LTE_UTRA_IncMon-UEConTest]

**RP-170498** **Status report for WI UE Conformance Test Aspects - Increasing the minimum number of carriers for UE monitoring in UTRA and E-UTRA; rapporteur: Ericsson**
*Source: RAN5*

**Discussion:**

conclusion: noted; approved: 10%, June 17

**Decision:** The document was **noted**.

**RP-170071** **RAN5 agreed non TTCN CR(s) WI UE Conformance Test Aspects: Increasing the minimum number of carriers for UE monitoring in UTRA and E-UTRA (LTE_UTRA_IncMon-UEConTest)**
*Source: RAN5*

**Decision:** The document was **approved**.

## 13.5 Open Rel-13 WIs

### 13.5.1 UE Conf. Test Aspects - Rel-13 LTE CA configurations [LTE_CA_Rel13-UEConTest]

**RP-170072** **RAN5 agreed non TTCN CR(s) WI UE Conformance Test Aspects - Rel-13 LTE CA configurations (LTE_CA_Rel13-UEConTest) (Batch 1)**
*Source: RAN5*

**Decision:** The document was **approved**.



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**RP-170499** **Status report for WI UE Conformance Test Aspects - Rel-13 CA configurations; rapporteur: Ericsson**

*Source: RAN5*

**Abstract:**

target date shifted: +9 months,

Includes all Rel-13 CA configurations associated with the 138 RAN4 Rel-13 CA WIs. The completion per CA configuration is provided by the attached RAN5 work plan attached to the SR (34 CA configurations completed).

**Discussion:**

conclusion: noted; approved: 56%, Dec.17

**Decision:** The document was **noted**.

**RP-170073** **RAN5 agreed non TTCN CR(s) WI UE Conformance Test Aspects - Rel-13 LTE CA configurations (LTE_CA_Rel13-UEConTest) (Batch 2)**

*Source: RAN5*

**Decision:** The document was **approved**.

**RP-170074** **RAN5 agreed non TTCN CR(s) WI UE Conformance Test Aspects - Rel-13 LTE CA configurations (LTE_CA_Rel13-UEConTest) (Batch 3)**

*Source: RAN5*

**Decision:** The document was **approved**.

## 13.5.2 UE Conf. Test Aspects - LTE DL 4 Rx antenna ports [LTE_4Rx_AP_DL-UEConTest]

**RP-170500** **Status report for WI UE Conformance Test Aspects - LTE DL 4 Rx antenna ports; rapporteur: Ericsson**

*Source: RAN5*

**Abstract:**

target dated shifte:: +3 months

**Discussion:**

conclusion: noted; approved: 70%, June 17

**Decision:** The document was **noted**.

**RP-170075** **RAN5 agreed non TTCN CR(s) WI UE Conformance Test Aspects - LTE DL 4 Rx antenna ports (LTE_4Rx_AP_DL-UEConTest)**

*Source: RAN5*

**Decision:** The document was **approved**.

## 13.5.3 UE Conf. Test Aspects - Licensed-Assisted Access using LTE [LTE_LAA-UEConTest]

**RP-170255** **Status report for WI: UE Conformance Test Aspects - Licensed-Assisted Access using LTE**

*Source: RAN5*



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**Discussion:**

conclusion: noted; approved: 45%, June 17

**Decision:** The document was **noted**.

**RP-170076** **RAN5 agreed non TTCN CR(s) WI UE Conformance Test Aspects - Licensed-Assisted Access using LTE (LTE_LAA-UEConTest)**
*Source: RAN5*

**Decision:** The document was **approved**.

## 13.5.4 UE Conf. Test Aspects - Further LTE Physical Layer Enhancements for MTC [LTE_MTCe2_L1-UEConTest]

**RP-170501** **Status report for WI UE Conformance Test Aspects – Further LTE Physical Layer Enhancements for MTC; rapporteur: Ericsson**
*Source: RAN5*

**Abstract:**

Test: 85%, June 17. The work is split into 3 phases. Phase 1 (CE Mode A, FDD) is 97% completed. Phase 2 (CE Mode B, TDD) is 80% completed. Phase 3: Control Plane IoT optimization etc is 20% completed.

**Discussion:**

conclusion: noted; approved: 85%, June 17

**Decision:** The document was **noted**.

**RP-170077** **RAN5 agreed non TTCN CR(s) WI UE Conformance Test Aspects - Further LTE Physical Layer Enhancements for MTC (LTE_MTCe2_L1-UEConTest) (Batch 1)**
*Source: RAN5*

**Decision:** The document was **approved**.

**RP-170078** **RAN5 agreed non TTCN CR(s) WI UE Conformance Test Aspects - Further LTE Physical Layer Enhancements for MTC (LTE_MTCe2_L1-UEConTest) (Batch 2)**
*Source: RAN5*

**Decision:** The document was **approved**.

**RP-170079** **RAN5 agreed non TTCN CR(s) WI UE Conformance Test Aspects - Further LTE Physical Layer Enhancements for MTC (LTE_MTCe2_L1-UEConTest) (Batch 3)**
*Source: RAN5*

**Decision:** The document was **approved**.

**RP-170080** **RAN5 agreed non TTCN CR(s) WI UE Conformance Test Aspects - Further LTE Physical Layer Enhancements for MTC (LTE_MTCe2_L1-UEConTest) (Batch 4)**
*Source: RAN5*

**Decision:** The document was **approved**.



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## 13.5.5 UE Conf. Test Aspects - WLAN/3GPP Radio Level Integration and Interworking Enh. Interworking [LTE_WLAN_radio-UEConTest]

**RP-170055** **Status report for UE Conformance Test Aspects – Wireless Local Area Network (WLAN) – 3GPP Radio Level Integration and Interworking Enhancements (Rel-13)**
*Source: Intel Corporation (UK) Ltd*

**Discussion:**

conclusion: noted; approved: 27%, Sep.17

**Decision:** The document was **noted**.

**RP-170081** **RAN5 agreed non TTCN CR(s) WI UE Conformance Test Aspects - WLAN/3GPP Radio Level Integration and Interworking Enhancement Interworking (LTE_WLAN_radio-UEConTest)**
*Source: RAN5*

**Decision:** The document was **approved**.

## 13.5.6 UE Conf. Test Aspects - Narrowband Internet of Things (NB-IOT) [NB_IOT-UEConTest]

**RP-170032** **Reply LS to RP-162346 on RMC configurations for NB-IoT RF tests (R4-1702006; to: RAN5; cc: RAN; contact: China Mobile)**
*Source: RAN4*

**Abstract:**

no RAN action requested

**Discussion:**

RAN5 chair: is already addressed

conclusion: no LS answer from RAN

**Decision:** The document was **noted**.

**RP-170366** **Status report for WI UE Conformance Test Aspects - Narrowband Internet of Things (NB-IOT); rapporteur: CMCC**
*Source: RAN5*

**Discussion:**

conclusion: noted; approved: 85%, June 17

**Decision:** The document was **noted**.

**RP-170711** **Void**
*Source: Huawei*

(Replaces RP-170366)

**Discussion:**

wrong Tdoc request

**Decision:** The document was **withdrawn**.



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**RP-170082** **RAN5 agreed non TTCN CR(s) WI UE Conformance Test Aspects - Narrowband Internet of Things (NB-IOT) (NB_IOT-UEConTest) (Batch 1)**
*Source: RAN5*

**Decision:** The document was **approved**.

**RP-170083** **RAN5 agreed non TTCN CR(s) WI UE Conformance Test Aspects - Narrowband Internet of Things (NB-IOT) (NB_IOT-UEConTest) (Batch 2)**
*Source: RAN5*

**Discussion:**

MCC: it turned out that R5-170946 was at the end not agreed by RAN5

conclusion: All CRs of RP-170083 are approved except R5-170946 which is withdrawn

**Decision:** The document was **partially approved**.

**RP-170084** **RAN5 agreed non TTCN CR(s) WI UE Conformance Test Aspects - Narrowband Internet of Things (NB-IOT) (NB_IOT-UEConTest) (Batch 3)**
*Source: RAN5*

**Decision:** The document was **approved**.

**RP-170085** **RAN5 agreed non TTCN CR(s) WI UE Conformance Test Aspects - Narrowband Internet of Things (NB-IOT) (NB_IOT-UEConTest) (Batch 4)**
*Source: RAN5*

**Decision:** The document was **approved**.

### 13.5.7 UE Conf. Test Aspects – Indoor Positioning Enhancement Support for LTE and UMTS [UTRA_LTE_iPos_enh-UEConTest]

**RP-170086** **RAN5 agreed non TTCN CR(s) WI UE Conformance Test Aspects – Indoor Positioning Enhancement Support for LTE and UMTS**

**(UTRA_LTE_iPos_enh-UEConTest)**
*Source: RAN5*

**Decision:** The document was **approved**.

**RP-170232** **Status report of WI UE Conformance Test Aspects – Indoor Positioning Enhancements Support for LTE and UMTS; rapporteur: NextNav**
*Source: RAN5*

**Discussion:**

conclusion: noted; approved: 100%, March 17; WI completed

**Decision:** The document was **noted**.

**RP-170233** **Revision of WI UE Conformance Test Aspects – Indoor Positioning Enhancement Support for LTE and UMTS**
*Source: NextNav, AT&T, Broadcom*

**Abstract:**

last approved WID: RP-161478



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**Discussion:**

ATT: is an example where someone did the good example to take something out where there is no operator interest

**Decision:** The document was **approved**.

## 13.5.8 UE Conf. Test Aspects – Further Enhancements of Minimization of Drive Tests for E-UTRAN [LTE_eMDT2-UEConTest]

**RP-170054** **Status report for UE Conformance Test Aspects - Further Enhancements of Minimization of Drive Tests for E-UTRAN (Rel-13)**
*Source: Intel Corporation (UK) Ltd*

**Discussion:**

conclusion: noted; approved: 100%, March 17; WI completed

**Decision:** The document was **noted**.

**RP-170087** **RAN5 agreed non TTCN CR(s) WI MS Conformance Test Aspects - Further Enhancements of Minimization of Drive Tests for E-UTRAN (LTE_eMDT2-UEConTest)**
*Source: RAN5*

**Decision:** The document was **approved**.

## 13.5.9 UE Conf. Test Aspects - LTE Carrier Aggregation Enhancement Beyond 5 Carriers: PUCCH on Scell [LTE_CA_enh_b5C_PUCCH-UEConTest]

**RP-170316** **Status report for WI: LTE CA Enhancement Beyond 5 Carriers - PUCCH on Scell; rapporteur: Huawei**
*Source: RAN5*

**Discussion:**

conclusion: noted; approved: 5%, Sep.17

**Decision:** The document was **noted**.

## 13.5.10 UE Conf. Test Aspects - Support for Mission Critical Push To Talk over LTE (MCPTT) [New WI: MCPTT-ConTest]

**RP-170552** **Status report for WI UE Conformance Test Aspects - Support for Mission Critical Push To Talk over LTE (MCPTT); rapporteur: US Department of Commerce**
*Source: RAN5*

**Abstract:**

late input

**Discussion:**

conclusion: noted; approved: 5%, Dec.17

**Decision:** The document was **noted**.



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## 13.6 Open Rel-14 WIs

### 13.6.1 UE Conf. Test Aspects - LTE UE TRP and TRS and UTRA Hand Phantom [LTE_UTRA_TRP_TRS-UEConTest]

**RP-170225** **Status Report of WI UE Conformance Test Aspects - LTE UE TRP and TRS and UTRA Hand Phantom; rapporteur: ZTE**
*Source: RAN5*

**Discussion:**

conclusion: noted; approved: 77%, Sep.17

**Decision:** The document was **noted**.

**RP-170088** **RAN5 agreed non TTCN CR(s) WI MS Conformance Test Aspects - LTE UE TRP and TRS and UTRA Hand Phantom (LTE_UTRA_TRP_TRS-UEConTest)**
*Source: RAN5*

**Decision:** The document was **approved**.

### 13.6.2 UE Conf. Test Aspects – Rel-14 CA configurations [LTE_CA_R14-UEConTest]

**RP-170502** **Status report for WI UE Conformance Test Aspects - Rel-14 CA configurations; rapporteur: Ericsson**
*Source: RAN5*

**Abstract:**

Includes all Rel-14 CA associated with the RAN4 Rel-14 bucket CA WIs (currently 506 Rel-14 CA configurations included in the RAN5 work plan). The completion per CA configuration is provided by the attached RAN5 work plan attached to the SR (8 Rel-14 CA configurations completed).

**Discussion:**

conclusion: noted; approved: 9%, March 18

**Decision:** The document was **noted**.

**RP-170089** **RAN5 agreed non TTCN CR(s) WI UE Conformance Test Aspects - Rel-14 CA configurations (LTE_CA_R14-UEConTest)**
*Source: RAN5*

**Decision:** The document was **approved**.

### 13.6.3 UE Conf. Test Aspects - Radiated Perf. of Multiple-antenna Receivers in the LTE UE [LTE_MIMO_OTA-UEConTest]

**RP-170118** **Status Report of WI: UE Conformance Test Aspects – Radiated Performance of Multiple-antenna Receivers in the UE; rapporteur: Intel Corporation**
*Source: Intel Corporation (UK) Ltd*

**Discussion:**

conclusion: noted; approved: 20%, June 17



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**Decision:** The document was **noted**.

**RP-170090** **RAN5 agreed non TTCN CR(s) WI MS Conformance Test Aspects - x (LTE_MIMO_OTA-UEConTest)**
*Source: RAN5*

**Decision:** The document was **approved**.

## 13.6.4 UE Conf. Test Aspects - Support for V2V services based on LTE sidelink [LTE_SL_V2V-UEConTest]

**RP-170315** **Status report for WI: Support for V2V services based on LTE sidelink; rapporteur: Huawei**
*Source: RAN5*

**Discussion:**

conclusion: noted; approved: 15%, Sep.17

**Decision:** The document was **noted**.

**RP-170091** **RAN5 agreed non TTCN CR(s) WI MS Conformance Test Aspects - Support for V2V services based on LTE sidelink (LTE_SL_V2V-UEConTest)**
*Source: RAN5*

**Decision:** The document was **approved**.

## 13.6.5 UE Conf. Test Aspects - Enhanced LAA for LTE [LTE_eLAA-UEConTest]

**RP-170056** **Status report for UE Conformance Test Aspects – Enhanced LAA for LTE**
*Source: Intel Corporation (UK) Ltd*

**Discussion:**

conclusion: noted; approved: 5%, Sep.17

**Decision:** The document was **noted**.

## 13.6.6 UE Conf. Test Aspects – LTE Band 41 UE power class 2 operation [LTE_B41_UE_PC2-UEConTest]

**RP-170224** **Status Report: UE Conformance Test Aspects – Band 41 power class 2 operation; rapporteur: Sprint**
*Source: RAN5*

**Discussion:**

conclusion: noted; approved: 100%, March 17; WI is completed

**Decision:** The document was **noted**.

**RP-170092** **RAN5 agreed non TTCN CR(s) WI MS Conformance Test Aspects - LTE Band 41 UE power class 2 operation (LTE_B41_UE_PC2-UEConTest)**
*Source: RAN5*

**Decision:** The document was **approved**.



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### 13.6.7 UE Conf. Test Aspects – CBRS 3.5GHz Band for LTE in the United States (Band 48) [New WI: LTE_TDD_3550_CBRS_US-UEConTest]

**RP-170505** **WI Status report: UE Conformance Test Aspects – CBRS 3.5GHz Band for LTE in the United States (Band 48); rapporteur: Nokia**
*Source: RAN5*

**Discussion:**

conclusion: noted; approved: 60%, June 17

**Decision:** The document was **noted**.

**RP-170093** **RAN5 agreed non TTCN CR(s) under WI UE Conformance Test Aspects – Citizens Broadband Radio Service (CBRS) 3.5GHz Band for LTE in the United States (Band 48) (LTE_TDD_3550_CBRS_US-UEConTest)**
*Source: RAN5*

**Decision:** The document was **approved**.

### 13.6.8 Test - (Small) Technical Enhancements and Improvements for Rel-14 [TEI14_Test]

**RP-170110** **RAN5 agreed non TTCN CR(s) under WI Small Technical Enhancements and Improvements for Rel-14 Conformance Testing (TEI14_Test)**
*Source: RAN5*

**Decision:** The document was **approved**.

# 14 Maintenance for closed WIs/SIs for REL-13 and earlier

## 14.1 TSG RAN WG1

### 14.1.1 Approval of CRs to closed Rel-8 WIs and WIs of previous releases

**RP-170621** **Maintenance to TR25.996 - Spatial channel model for Multiple Input Multiple Output (MIMO) simulations**
*Source: RAN1*

**Decision:** The document was **approved**.

### 14.1.2 Approval of CRs to closed Rel-9 WIs (incl. TEI9)

**RP-170620** **Maintenance to TR36.814 - Further advancements for E-UTRA physical layer aspects**
*Source: RAN1*

**Decision:** The document was **approved**.



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## 14.1.3 Approval of CRs to closed Rel-10 WIs (incl. TEI10)

## 14.1.4 Approval of CRs to closed Rel-11 WIs (incl. TEI11)

**RP-170611** **Correction on single layer precoding for EPCCH**
*Source: RAN1*

**Decision:** The document was **approved**.

## 14.1.5 Approval of CRs to closed Rel-12 WIs (incl. TEI12)

**RP-170619** **Maintenance to TR36.873 - Study on 3D channel model for LTE**
*Source: RAN1*

**Decision:** The document was **approved**.

## 14.1.6 Approval of CRs to closed Rel-13 WIs (incl. TEI13)

**RP-170606** **Maintenance of Rel-13 LTE carrier aggregation enhancement beyond 5 carriers**
*Source: RAN1*

**Decision:** The document was **approved**.

**RP-170609** **Maintenance of Rel-13 Further LTE Physical Layer Enhancements for MTC**
*Source: RAN1*

**Decision:** The document was **approved**.

**RP-170610** **Maintenance of Rel-13 NB-IoT feature**
*Source: RAN1*

**Decision:** The document was **approved**.

**RP-170612** **Corrections for Rel-13 (36.211/36212)**
*Source: RAN1*

**Decision:** The document was **approved**.



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### 14.1.7 Approval of linked CR packages led by RAN WG1

## 14.2 TSG RAN WG2

### 14.2.1 Approval of CRs to closed Rel-8 WIs and WIs of previous releases

### 14.2.2 Approval of CRs to closed Rel-9 WIs (incl. TEI9)

### 14.2.3 Approval of CRs to closed Rel-10 WIs (incl. TEI10)

### 14.2.4 Approval of CRs to closed Rel-11 WIs (incl. TEI11)

### 14.2.5 Approval of CRs to closed Rel-12 WIs (incl. TEI12)

**RP-170650** **RAN2 CRs to Approval of CRs to closed Rel-12 WIs (incl. TEI12)**
*Source: RAN2*

**Decision:** The document was **approved**.

### 14.2.6 Approval of CRs to closed Rel-13 WIs (incl. TEI13)

**RP-170413** **Alignment of RAN2 specification with CT1/SA2 on control plane, user plane and user plane optimization**
*Source: Qualcomm Incorporated*

**Decision:** The document was **noted**.

**RP-170414** **Draft reply LS to S2-170518 on Multiple bearer capability handling independent of CIoT user plane optimization (to: SA2, CT1; cc: -; contact: Qualcomm)**
*Source: Qualcomm Incorporated*

**Abstract:**

note: S2-170518 was sent to: RAN2 (see R2-1700719), cc: CT1 but not to/cc RAN;

**Discussion:**

Qualcomm: typo: we should say RAN and not RAN2

**Decision:** The document was **revised to RP-170775**.

**RP-170775** **Reply LS to S2-170518 on Multiple bearer capability handling independent of CIoT user plane optimization (to: SA2, CT1, RAN2; cc: -; contact: Qualcomm)**
*Source: RAN*

(Replaces RP-170414)

**Discussion:**

note: LSin S2-170518 was sent to: RAN2; cc: CT1 and not to/cc RAN;

**Decision:** The document was **approved**.

**RP-170415** **IOT status indication for NB-IoT 3.75 kHz single tone**
36.331 CR-2700 Cat: F (Rel-13) v13.4.0
*Source: Qualcomm Incorporated*



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**Abstract:**

company CR; CR had no RAN2 Tdoc allocated so far; IOT issue identified.

**Decision:** The document was **withdrawn**.

**RP-170416** **IOT status indication for NB-IoT 3.75 kHz single tone**
36.306 CR-1433 Cat: F (Rel-13) v13.4.0
*Source: Qualcomm Incorporated*

**Abstract:**

company CR; CR had no RAN2 Tdoc allocated so far; IOT issue identified.

**Decision:** The document was **withdrawn**.

**RP-170651** **RAN2 CRs to Approval of CRs to closed Rel-13 WIs (incl. TEI13), part 1**
*Source: RAN2*

**Decision:** The document was **approved**.

**RP-170652** **RAN2 CRs to Approval of CRs to closed Rel-13 WIs (incl. TEI13), part 2**
*Source: RAN2*

**Decision:** The document was **approved**.

**RP-170653** **RAN2 CRs to Approval of CRs to closed Rel-13 WIs (incl. TEI13), part 3**
*Source: RAN2*

**Decision:** The document was **approved**.

**RP-170654** **RAN2 CRs to Approval of CRs to closed Rel-13 WIs (incl. TEI13), part 4**
*Source: RAN2*

**Decision:** The document was **approved**.

**RP-170655** **RAN2 CRs to Approval of CRs to closed Rel-13 WIs (incl. TEI13), part 5**
*Source: RAN2*

**Decision:** The document was **approved**.

**RP-170656** **RAN2 CRs to Approval of CRs to closed Rel-13 WIs (incl. TEI13), part 6**
*Source: RAN2*

**Decision:** The document was **approved**.

**RP-170657** **RAN2 CRs for UP data transfer without CIOT UP optimization (technically endorsed CRs)**
*Source: RAN2*

**Abstract:**

MCC: RAN has to decide whether to approve this CR set of not; the CRs are intended to align RAN2 specs with CT1/SA2 specs acc. to an SA2 LS S2-170518 = R2-1700719; however no consensus was achieved in RAN2 whether this RAN2 CRs are needed

**Decision:** The document was **approved**.



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14.2.7 Approval of linked CR packages led by RAN WG2

## 14.3 TSG RAN WG3

14.3.1 Approval of CRs to closed Rel-8 WIs and WIs of previous releases

14.3.2 Approval of CRs to closed Rel-9 WIs (incl. TEI9)

14.3.3 Approval of CRs to closed Rel-10 WIs (incl. TEI10)

14.3.4 Approval of CRs to closed Rel-11 WIs (incl. TEI11)

14.3.5 Approval of CRs to closed Rel-12 WIs (incl. TEI12)

14.3.6 Approval of CRs to closed Rel-13 WIs (incl. TEI13)

14.3.7 Approval of linked CR packages led by RAN WG3

## 14.4 TSG RAN WG4

14.4.1 Approval of CRs to closed Rel-8 WIs and WIs of previous releases

14.4.2 Approval of CRs to closed Rel-9 WIs (incl. TEI9)

14.4.3 Approval of CRs to closed Rel-10 WIs (incl. TEI10)

14.4.4 Approval of CRs to closed Rel-11 WIs (incl. TEI11)

**RP-170580** **RAN4 CRs to TEI11**
*Source: RAN4*

**Decision:** The document was **approved**.

14.4.5 Approval of CRs to closed Rel-12 WIs (incl. TEI12)

**RP-170581** **RAN4 CRs to Perf. part: Low cost & enhanced coverage MTC UE for LTE**
*Source: RAN4*

**Decision:** The document was **approved**.

**RP-170582** **RAN4 CRs to Perf. part: LTE Advanced inter-band Carrier Aggregation of Band 39 and Band 41**
*Source: RAN4*

**Decision:** The document was **approved**.

**RP-170583** **RAN4 CRs to Core part: Carrier Aggregation for LTE**
*Source: RAN4*

**Decision:** The document was **approved**.



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**RP-170584** **RAN4 CRs to Perf. part: E-UTRA Small cell enhancements - Physical layer aspects**
*Source: RAN4*

**Decision:** The document was **approved**.

**RP-170585** **RAN4 CRs to TEI12**
*Source: RAN4*

**Decision:** The document was **approved**.

## 14.4.6 Approval of CRs to closed Rel-13 WIs (incl. TEI13)

**RP-170586** **RAN4 CRs to Base Station (BS) RF requirements for Active Antenna System (AAS)**
*Source: RAN4*

**Decision:** The document was **approved**.

**RP-170587** **RAN4 CRs to Perf. part: LTE DL 4 Rx antenna ports**
*Source: RAN4*

**Decision:** The document was **approved**.

**RP-170588** **RAN4 CRs to Perf. Part: LTE Advanced inter-band Carrier Aggregation of Band 1 and Band 40**
*Source: RAN4*

**Decision:** The document was **approved**.

**RP-170589** **RAN4 CRs to Core part: Carrier Aggregation for LTE**
*Source: RAN4*

**Decision:** The document was **approved**.

**RP-170590** **RAN4 CRs to Perf. part: Interference mitigation for downlink control channels of LTE**
*Source: RAN4*

**Decision:** The document was **approved**.

**RP-170591** **RAN4 CRs to Core part: Licensed-Assisted Access using LTE**
*Source: RAN4*

**Decision:** The document was **approved**.

**RP-170592** **RAN4 CRs to Perf. part: Licensed-Assisted Access using LTE**
*Source: RAN4*

**Decision:** The document was **approved**.

**RP-170593** **RAN4 CRs to Perf. part: Performance requirements of MMSE-IRC receiver for LTE BS**
*Source: RAN4*

**Decision:** The document was **approved**.



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**RP-170594** **RAN4 CRs to Core part: Further LTE Physical Layer Enhancements for MTC**
*Source: RAN4*

**Decision:** The document was **approved**.

**RP-170595** **RAN4 CRs to Perf. Part: Further LTE Physical Layer Enhancements for MTC, part 1**
*Source: RAN4*

**Decision:** The document was **approved**.

**RP-170596** **RAN4 CRs to Perf. Part: Further LTE Physical Layer Enhancements for MTC, part 2**
*Source: RAN4*

**Decision:** The document was **approved**.

**RP-170597** **RAN4 CRs to Perf. Part: Further LTE Physical Layer Enhancements for MTC, part 3**
*Source: RAN4*

**Decision:** The document was **approved**.

**RP-170598** **RAN4 CRs to Core part: Narrowband Internet of Things (IOT), part1**
*Source: RAN4*

**Decision:** The document was **approved**.

**RP-170599** **RAN4 CRs to Core part: Narrowband Internet of Things (IOT), part2**
*Source: RAN4*

**Decision:** The document was **approved**.

**RP-170600** **RAN4 CRs to Perf. part: Narrowband Internet of Things (IOT), part1**
*Source: RAN4*

**Decision:** The document was **approved**.

**RP-170601** **RAN4 CRs to Perf. part: Narrowband Internet of Things (IOT), part2**
*Source: RAN4*

**Decision:** The document was **approved**.

**RP-170602** **RAN4 CRs to Core part: Radiated requirements for the verification of multi-antenna reception performance of UEs**
*Source: RAN4*

**Decision:** The document was **approved**.

**RP-170603** **RAN4 CRs to TEI13**
*Source: RAN4*

**Decision:** The document was **approved**.



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### 14.4.7 Approval of linked CR packages led by RAN WG4

## 14.5 TSG RAN WG5

### 14.5.1 Approval of CRs to closed REL-10 WIs (incl. TEI10_Test) and WIs of previous releases

**RP-170094** **RAN5 agreed non TTCN CR(s) under WI Small Technical Enhancements and Improvements for Rel 99 Conformance Testing(TEI_Test)**
*Source: RAN5*

**Decision:** The document was **approved**.

**RP-170095** **RAN5 agreed non TTCN CR(s) under WI Small Technical Enhancements and Improvements for Rel-8 Conformance Testing(TEI8_Test) (Batch 1)**
*Source: RAN5*

**Decision:** The document was **approved**.

**RP-170096** **RAN5 agreed non TTCN CR(s) under WI Small Technical Enhancements and Improvements for Rel-8 Conformance Testing(TEI8_Test) (Batch 2)**
*Source: RAN5*

**Decision:** The document was **approved**.

**RP-170097** **RAN5 agreed non TTCN CR(s) under WI Small Technical Enhancements and Improvements for Rel-9 Conformance Testing(TEI9_Test)**
*Source: RAN5*

**Decision:** The document was **approved**.

**RP-170106** **RAN5 agreed non TTCN CR(s) under WI Small Technical Enhancements and Improvements for Rel-10 Conformance Testing (TEI10_Test)**
*Source: RAN5*

**Decision:** The document was **approved**.

### 14.5.2 Approval of CRs to closed REL-11 WIs (incl. TEI11_Test)

**RP-170107** **RAN5 agreed non TTCN CR(s) under WI Small Technical Enhancements and Improvements for Rel-11 Conformance Testing (TEI11_Test)**
*Source: RAN5*

**Decision:** The document was **approved**.

### 14.5.3 Approval of CRs to closed REL-12 WIs (incl. TEI12_Test)

**RP-170108** **RAN5 agreed non TTCN CR(s) under WI Small Technical Enhancements and Improvements for Rel-12 Conformance Testing (TEI12_Test)**
*Source: RAN5*

**Decision:** The document was **approved**.



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## 14.5.4 Approval of CRs to closed REL-13 WIs (incl. TEI13_Test)

**RP-170098** **CR to 34.229-3: Add new verified and e-mail agreed TTCN test cases in the TC lists in 34.229-3 (prose), Annex A**

34.229-3 v..
*Source: RAN5*

**Decision:** The document was **approved**.

**RP-170099** **CR to 34.229-3: Add new verified and e-mail agreed TTCN test cases in the TC lists in 34.229-3 (TTCN), Annex A**

34.229-3 v..
*Source: RAN5*

**Decision:** The document was **approved**.

**RP-170100** **CR to 34.123-3: Add new verified and e-mail agreed TTCN test cases in the TC lists in 34.123-3 (prose), Annex A**

34.123-3 v..
*Source: RAN5*

**Decision:** The document was **approved**.

**RP-170101** **CR to 34.123-3: Add new verified and e-mail agreed TTCN test cases in the TC lists in 34.123-3 (TTCN), Annex A**

34.123-3 v..
*Source: RAN5*

**Decision:** The document was **approved**.

**RP-170102** **CR to 36.523-3: Add new verified and e-mail agreed TTCN test cases in the TC lists in 36.523-3 (prose), Annex A**

36.523-3 v..
*Source: RAN5*

**Decision:** The document was **approved**.

**RP-170103** **CR to 36.523-3: Add new verified and e-mail agreed TTCN test cases in the TC lists in 36.523-3 (TTCN), Annex A**

36.523-3 v..
*Source: RAN5*

**Decision:** The document was **approved**.

**RP-170104** **CR to 37.751-4: Add new verified and e-mail agreed TTCN test cases in the TC lists in 37.571-4 (prose), Annex A**

37.571-4 v..
*Source: RAN5*

**Decision:** The document was **approved**.

**RP-170105** **CR to 37.571-4: Add new verified and e-mail agreed TTCN test cases in the TC lists in 37.571-4 (TTCN), Annex A**

37.571-4 v..
*Source: RAN5*



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**Decision:** The document was **approved**.

**RP-170109** **RAN5 agreed non TTCN CR(s) under WI Small Technical Enhancements and Improvements for Rel-13 Conformance Testing (TEI13_Test)**
*Source: RAN5*

**Decision:** The document was **approved**.

### 14.5.5 Approval of linked CR packages led by RAN WG5

## 14.6 TSG RAN WG6

### 14.6.1 Approval of CRs to closed Rel-8 WIs and WIs of previous releases

### 14.6.2 Approval of CRs to closed Rel-9 WIs (incl. TEI9)

### 14.6.3 Approval of CRs to closed Rel-10 WIs (incl. TEI10)

### 14.6.4 Approval of CRs to closed Rel-11 WIs (incl. TEI11)

### 14.6.5 Approval of CRs to closed Rel-12 WIs (incl. TEI12)

### 14.6.6 Approval of CRs to closed Rel-13 WIs (incl. TEI13)

**RP-170063** **RAN6 agreed CRs for REL-13 WI Core Part: Extended DRX (eDRX) for GSM (eDRX_GSM)**
*Source: RAN6*

**Decision:** The document was **approved**.

**RP-170064** **RAN6 agreed CRs for REL-13 WI: Extended Coverage GSM (EC-GSM) for support of Cellular Internet of Things (CIoT_EC_GSM)**
*Source: RAN6*

**Decision:** The document was **approved**.

### 14.6.7 Approval of linked CR packages led by RAN WG6

## 14.7 Closed SIs for REL-13 and earlier

# 15 Inter WG/TSG-related discussions & decisions

**RP-170778** **Agenda for joint SA-RAN session of TSG #75**
*Source: RAN chairman (Qualcomm), SA chairman (Samsung)*

**Discussion:**

treated in joint RAN-SA session on Wed evening

**Decision:** The document was **noted**.



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**RP-170780** **Discussion on inter-RAT interworking between NR and other 3GPP RATs**
*Source: Deutsche Telekom, BT, MediaTek*

**Discussion:**

treated in joint RAN-SA session on Wed evening

**Decision:** The document was **noted**.

**RP-170783** **SA input to joint RAN-SA session on LTE light connection**
*Source: SA*

**Discussion:**

treated in joint RAN-SA session on Wed evening

**Decision:** The document was **noted**.

**RP-170784** **Minutes of joint session RAN - SA during TSG #75**
*Source: ETSI MCC*

**Decision:** The document was **noted**.

# 16 Terms of Reference (ToR)

**RP-170521** **Proposed update to RAN1 Terms of Reference**
*Source: Ericsson*

**Abstract:**

last approved ToR of RAN1: RP-110963 (RAN #53)

**Discussion:**

becoming effective after RAN #76 in June 2017

**Decision:** The document was **approved**.

**RP-170522** **Proposed update to RAN2 Terms of Reference**
*Source: Ericsson*

**Abstract:**

last approved ToR of RAN1: RP-110964 (RAN #53)

**Discussion:**

becoming effective after RAN #76 in June 2017

**Decision:** The document was **approved**.

**RP-170523** **Proposed update to RAN6 Terms of Reference**
*Source: Ericsson*

**Abstract:**

last approved ToR of RAN6: RP-160058 (RAN #71)

**Discussion:**



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becoming effective after RAN #76 in June 2017

**Decision:** The document was **approved**.

# 17 TSG RAN elections

The RAN chairman checked on Monday morning asking the delegates whether there are any other chairman candidates than those published on the 3GPP webpage.

There was no other candidate coming up, so RAN chairman candidates are:

Mr. Balázs Bertényi Nokia Corporation / ETSI
Mr. Satoshi Nagata NTT DOCOMO INC. / ARIB
Mr. Giovanni Romano TELECOM ITALIA S.p.A. / ETSI

and the first ballot with start on Monday at 18:00 in room Tramontana.

MCC reminded delegates to check-in for RAN #75 before 16:00 on Monday as we will then print a participants list used for the election.

Results of the first ballot were announced by the RAN chairman after the election:

| vote topic | **TSG RAN Chairman** |
|---|---|
| ballot number: | **1** |
| number on voting list: | **274** |
| number of ballot papers issued for this ballot | **248** |
| statutory quorum percentage: | **30%** |
| quorum for this vote: | **83** |
| quorum reached? | **yes** |

| **candidate** | **votes for** | **percent** | **71% ?** |
|---|---|---|---|
| Mr. Balázs Bertényi, Nokia Corporation / ETSI | **109** | 44,309% | NO |
| Mr. Satoshi Nagata, NTT DOCOMO INC. / ARIB | **112** | 45,528% | NO |
| Mr. Giovanni Romano, TELECOM ITALIA S.p.A. / ETSI | **25** | 10,163% | NO |
| ABSTAIN or spoiled | **2** | 0,813% | |
| total votes cast: | 246 | 100,000% | |
| total returned papers | 248 | | |
| number of proxy votes cast: | 56 | | |
| number of non-returned papers | 0 | | |

None of the candidates achieved 71% so a 2nd ballot is needed. Mr. Giovanni Romano withdrew from the 2nd ballot.

The second ballot was announced to start on Tue 12:45.

Results of the 2nd ballot were announced by the RAN chairman after the election:

| vote topic | **TSG RAN Chairman** |
|---|---|
| ballot number: | **2** |
| number on voting list: | **274** |
| number of ballot papers issued for this ballot | **248** |
| statutory quorum percentage: | **30%** |
| quorum for this vote: | **83** |



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| | |
|---|---|
| quorum reached? | **yes** |

| candidate | votes for | percent | 71% ? |
|---|---|---|---|
| Mr. Balázs Bertényi, Nokia Corporation / ETSI | **141** | 56,855% | NO |
| Mr. Satoshi Nagata, NTT DOCOMO INC. / ARIB | **107** | 43,145% | NO |
| ABSTAIN or spoiled | **0** | 0,000% | |
| total votes cast: | 248 | 100,000% | |
| total returned papers | 248 | | |
| number of proxy votes cast: | 56 | | |
| number of non-returned papers | 0 | | |

According to Article 28 of the 3GPP working procedures **Mr. Balázs Bertényi, Nokia Corporation / ETSI was elected as new RAN chairman**.

The RAN chairman Dino Flore asked on Tue afternoon after the chairman election whether there are any other vice-chairman candidates than those published on the 3GPP webpage:

Dr. Abdulhadi AbouAlmal, ETISALAT / ETSI
Mr. Chungwoo Hwang, KT Corp. / TTA
Mr. Vince Spatafora, AT&T / ATIS
Dr. Xiaodong Xu, China Mobile Com. Corporation / CCSA

and

Mr. Satoshi Nagata, NTT DOCOMO INC, ARIB who indicated to run for RAN vice-chairman as well.

There was no other candidate coming up. So RAN vice-chairman candidates were:

Dr. Abdulhadi AbouAlmal, ETISALAT / ETSI
Mr. Chungwoo Hwang, KT Corp. / TTA
Mr. Vince Spatafora, AT&T / ATIS
Dr. Xiaodong Xu, China Mobile Com. Corporation / CCSA
Satoshi Nagata, NTT DOCOMO INC, ARIB

Respecting the regional balance of the RAN leadership, the RAN chairman Dino Flore started with the vice chairman election for America. As there was only one candidate for this region:

**Mr. Vince Spatafora, AT&T / ATIS was elected as new RAN vice-chair** by acclamation.

A voting for the 2nd RAN vice-chairman from Asia will take place on Tue 18:00 with the following candidates:

Mr. Chungwoo Hwang, KT Corp. / TTA
Dr. Xiaodong Xu China, Mobile Com. Corporation / CCSA
Mr. Satoshi Nagata, NTT DOCOMO INC, ARIB

Mr. Satoshi Nagata, NTT DOCOMO INC, ARIB withdrew from the election of the 2nd RAN vice-chairman.

Results of the 1st ballot for 2nd RAN vice-chairman were announced by the RAN chairman after the election:

| vote topic | **RAN vice-chairman 2** |
|---|---|
| ballot number: | **1** |
| number on voting list: | **274** |
| number of ballot papers issued for this ballot | **225** |
| statutory quorum percentage: | **30%** |
| quorum for this vote: | **83** |



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| | |
|---|---|
| quorum reached? | **yes** |

| **candidate** | **votes for** | **percent** | **71 % ?** |
|---|---|---|---|
| Mr. Chungwoo Hwang, KT Corp. / TTA | **72** | 32,432% | NO |
| Dr. Xiaodong Xu, China Mobile Com. Corporation / CCSA | **150** | 67,568% | NO |
| ABSTAIN or spoiled | **4** | 1,802% | |
| total votes cast: | 222 | 100,000% | |
| total returned papers | 226 | | |
| number of proxy votes cast: | 54 | | |
| number of non-returned papers | 0 | | |

Mr. Chungwoo Hwang KT Corp. / TTA withdrew from a 2 ballot of the election of the 2nd RAN vice-chairman.

**Dr. Xiaodong Xu, China Mobile Com. Corporation / CCSA was elected as 2nd RAN vice-chairman**.

Remaining vice-chairman candidates for the 3rd RAN vice-chairman position (not region limited):

Dr. Abdulhadi AbouAlmal ETISALAT / ETSI
Mr. Chungwoo Hwang KT Corp. / TTA
Mr. Satoshi Nagata, NTT DOCOMO INC, ARIB

Mr. Chungwoo Hwang KT Corp. / TTA withdrew from the election of the 3rd RAN vice-chairman.

A voting for the 3rd RAN vice-chairman position will take place on Wed 12:45 with the following candidates:

Dr. Abdulhadi AbouAlmal ETISALAT / ETSI
Mr. Satoshi Nagata, NTT DOCOMO INC, ARIB

Results of 1st ballot for the 3rd RAN vice-chairman after the election:

| vote topic | **RAN vice-chairman 3** |
|---|---|
| ballot number: | **1** |
| number on voting list: | **274** |
| number of ballot papers issued for this ballot | **226** |
| statutory quorum percentage: | **30%** |
| quorum for this vote: | **83** |
| quorum reached? | **yes** |

| **candidate** | **votes for** | **percent** | **71% ?** |
|---|---|---|---|
| Dr. Abdulhadi AbouAlmal | **40** | 17,778% | NO |
| Mr. Satoshi Nagata | **185** | 82,222% | **YES** |
| ABSTAIN or spoiled | **1** | 0,444% | |
| total votes cast: | 225 | 100,000% | |
| total returned papers | 226 | | |
| number of proxy votes cast: | 54 | | |
| number of non-returned papers | 0 | | |

According to Article 28 of the 3GPP working procedures **Mr. Satoshi Nagata, NTT DOCOMO INC. / ARIB was elected as 3rd RAN vice-chairman**.



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# 18 Project management

**RP-170468** **Handling of WIDs across TSG RAN**
*Source: MediaTek Inc.*

**Discussion:**

• Proposal 1a: 4WTUs daily shall remain the reference budget for a Work Session. Exceptionally, and subject to TSG approval only, a maximum of 5WTUs daily may be scheduled for a Work Session. 5WTUs shall never be allocated on Fridays.

• Proposal 1b: For technical discussions, the WG leadership may exceed the TSG-approved WTUs by a maximum of [.5WTU i.e. 1 hour] per Work Session throughout the meeting week. When exceeding this [.5WTU] margin, a penalty shall be imposed on WIDs that made use of this extra time in this Work Session. In this case, any decision taken during that extra time shall be considered non-binding and shall be subject to being reopened and discussed. This shall be notified to plenary as part of the WG Chairman's report.

• Proposal 1c: For work planning discussions, [0.5~1WTU] is always reserved by the WG Chairman on Thursday during WTU5 (or the earliest free WTU on that day).

• Proposal 1d: The WG/TSG leadership shall ensure 'offline' discussions are well coordinated and not conflicting with each other. In particular, 'offline' discussions in a WG shall not be more constraining on delegations than parallel Work Sessions in that WG.

• Proposal 2: WID Rapporteur and WG Chairman shall flag at the following TSG any WID that exceeded its planned WTU budget beyond [.25WTU], for action i.e. potential WTU adjustment and/or WID re-scoping. The reason for excess shall be reported so appropriate action can be taken at TSG.

• Proposal 3: any new WID (with the exception of RAN4 WIDs) shall always start with at least [1] WTU in the lead WG, within the first possible meeting of this WG prior the next TSG meeting immediately following WID approval. If this cannot be guaranteed, the approval of the WID shall be postponed at least to the next TSG.

• Proposal 4: Given the above we would like to propose that across RAN WGs:

o Draft WIDs be always submitted for information to relevant WGs, including WTU consideration, before being submitted to TSG for approval

o Draft WIDs be discussed 'online' in WGs during a work planning session, aiming at preliminary agreement on scope, objectives and required WTU

o WG Chairman to allocate [0.5~1WTU] for a work planning session on Thursday during WTU5 (or the earliest free WTU on that day).

o In addition some email discussion could be organized on the WG reflector

o WG Chairman to provide a work planning summary ('online' + email discussion) to the TSG as part of her WG report

• Proposal 5: The WID status report shall be prepared in and endorsed by the WGs in charge of the WID before presentation to TSG. The WID Status Report shall indicate the coherence of the work done so far i.e. whether what has been achieved so far is usable or unusable. Not all objectives of a WID need to be fulfilled for the work to be usable.

• Proposal 6: At least one meeting cycle should be allowed to review CRs incorporating a feature in a Release – last minute review should be discouraged.

• Proposal 7: A WID Status Report shall accurately reflect the status and maturity of the work. The Rapporteurs and WGs shall ensure this is always followed.

RAN chair: good point for discussing this now with new RAN leadership

NEC: proposal 4 may be critical as in RAN we preferred to approve them in RAN

Mediatek: WIDs are more for information in WGs

RAN3 chair: we had this process a few times in RAN3 but there were no comments as people were busy



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**Decision:** The document was **noted**.

**RP-170019** **3GPP Work Plan review at Plenary #75**
*Source: ETSI MCC*

**Decision:** The document was **noted**.

**RP-170776** **TR 21.914 v.0.2.0 on Release 14 Description**
*Source: ETSI MCC*

**Decision:** The document was **revised to RP-170833**.

**RP-170833** **TR 21.914 v.0.2.1 on Release 14 Description**
*Source: ETSI MCC*

(Replaces RP-170776)

**Decision:** The document was **noted**.

**RP-170822** **Status of time budgets for RAN1/2/3/4/6 REL-14 & beyond WIs/SIs after RAN #75**
*Source: RAN1/RAN2/RAN3/RAN4/RAN6 chairmen*

**Abstract:**

endorsed by RAN #74: RP-162530

**Discussion:**

endorsed by email

**Decision:** The document was **endorsed**.

# 19 Future meeting schedule

**Meeting schedule 2010/2011/2012/2013/2014/2015/2016/2017:**

| MEETING | DATES | LOCATION | HOST |
|---|---|---|---|
| RAN #47 | 16 March – 19 March 2010 | Vienna, Austria | EF3 |
| RAN #48 | 1 June – 4 June 2010 | Seoul, Korea | TTA |
| RAN #49 | 14 Sep. – 17 Sep. 2010 | San Antonio, USA | NAF3 |
| RAN #50 | 7 Dec. – 10 Dec. 2010 | Istanbul, Turkey | EF3 |
| RAN #51 @ | 15 March – 18 March 2011 | Kansas City, USA | Sprint Nextel |
| RAN #52 | 31 May – 3 June 2011 | Bratislava, Slovakia | EF3 |
| RAN #53 | 13 Sep. – 16 Sep. 2011 | Fukuoka, Japan | ARIB & TTC |
| RAN #54 | 6 Dec. – 9 Dec. 2011 | Berlin, Germany | EF3 |
| RAN #55 | 28 Feb. – 2 March 2012 | Xiamen, China | ZTE, CMCC |
| REL-12 workshop *** | 11 June - 12 June 2012 | Ljubljana, Slovenia | EF3 |
| RAN #56 | 13 June – 15 June 2012 | Ljubljana, Slovenia | EF3 |
| RAN #57 | 4 Sep. – 7 Sep. 2012 | Chicago, USA | NAF3 |
| RAN #58 | 4 Dec. – 7 Dec. 2012 | Barcelona, Spain | EF3 |
| RAN #59 @ | 26 Feb. – 1 March 2013 | Vienna, Austria | EF3 |
| RAN #60 | 11 June – 14 June 2013 | Oranjestad, Aruba | NAF3 |
| RAN #61 | 3 Sep. – 6 Sep. 2013 | Porto, Portugal | EF3 |
| RAN #62 | 3 Dec. – 6 Dec. 2013 | Busan, Korea | TTA |
| RAN #63 ** | 3 March – 6 March 2014 | Fukuoka, Japan | ARIB & TTC |
| RAN #64 | 10 June – 13 June 2014 | Sophia Antipolis, France | ETSI |



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| MEETING | DATES | LOCATION | HOST |
|---|---|---|---|
| RAN workshop LTE-U | 13 June 2014 | Sophia Antipolis, France | ETSI |
| RAN #65 | 9 Sep. – 12 Sep. 2014 | Edinburgh, Scotland | EF3 |
| RAN #66 ** | 8 Dec. – 11 Dec. 2014 | Maui, USA | NAF3 |
| RAN #67 ** @ | 9 March – 12 March 2015 | Shanghai, China | Huawei |
| RAN #68 ** | 15 June – 18 June 2015 | Malmö, Sweden | EF3 |
| workshop LAA | 29 Aug. 2015 | Beijing, China | Huawei |
| RAN #69 ** | 14 Sep. – 16 Sep. 2015 | Phoenix, USA | NAF3 |
| workshop 5G | 17 Sep. – 18 Sep. 2015 | Phoenix, USA | NAF3 |
| RAN #70 ** | 7 Dec. – 10 Dec. 2015 | Sitges, Spain | EF3 |
| 5G Req. ad hoc | 28 Jan. - 29 Jan. 2016 | Barcelona, Spain | EF3 |
| RAN #71 ** | 7 March – 10 March 2016 | Göteborg, Sweden | EF3 |
| RAN #72 ** | 13 June – 16 June 2016 | Busan, Korea | TTA |
| RAN #73 ** | 19 Sep. – 22 Sep. 2016 | New Orleans, USA | NAF3 |
| RAN #74 ** | 5 Dec. – 8 Dec. 2016 | Vienna, Austria | EF3 |
| **RAN #75 ** @** | **6 March - 9 March 2017** | **Dubrovnik, Croatia** | **EF3** |
| RAN #76 ** | 5 June - 8 June 2017 | West Palm Beach, USA | NAF3 |
| RAN #77 ** | 11 Sep. - 14 Sep. 2017 | Sapporo, Japan | ARIB & TTC |
| RAN #78 ** | 18 Dec. - 21 Dec. 2017 | Lisbon, Portugal | EF3 |
| RAN #79 ** | 19 March – 22 March 2018 | tbd, India | IF3 |
| RAN #80 ** | 11 June – 14 June 2018 | tbd, North America | NAF3 |
| RAN #81 ** | 10 Sep. – 13 Sep. 2018 | tbd, Australia | Telstra |
| RAN #82 ** | 10 Dec. – 13 Dec. 2018 | Sorrento, Italy | EF3 |

***: RAN Workshop on REL-12 and onwards

**: 1 week TSG i.e. in same week with CT and SA, therefore RAN starting on Monday (compare RP-131328)

@: elections

# 20 Any other business

ZTE announced that the RAN WG1/2/3/4 ad hocs in June 2017 will take place in Qingdao, China.

**RP-170846** **Way forward**
*Source: Dubrovnik Crowd*

*Farewell presentation from new chairman for leaving chairman Dino Flore.*

**Decision:** The document was **noted**.

*TSG RAN thanked the leaving RAN leadership*
*TSG RAN Chairman: Dino Flore (Qualcomm, ATIS)*
*TSG RAN Vice chairman: Takaharu Nakamura (Fujitsu, ARIB)*
*TSG RAN Vice chairman: Giovanni Romano (Telecom Italia, ETSI)*
*TSG RAN Vice chairman: Sharat Chander (AT&T, ATIS)*
*for their hard work for 3GPP TSG RAN in the last 4 years.*

# 21 Closing of the meeting (No later than Thursday 8 pm)

The TSG RAN chairman Dino Flore (Qualcomm) thanked the delegates for participating and contributing to RAN meeting #75, he thanked the host for organizing the meeting and he closed the meeting on Thursday March 9th, 2017 at 18:20.


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# Annex A:
# List of participants

The list of participants of this RAN meeting #75 is attached to this report.

Total number of participants: 355 (registered before the meeting: 406)

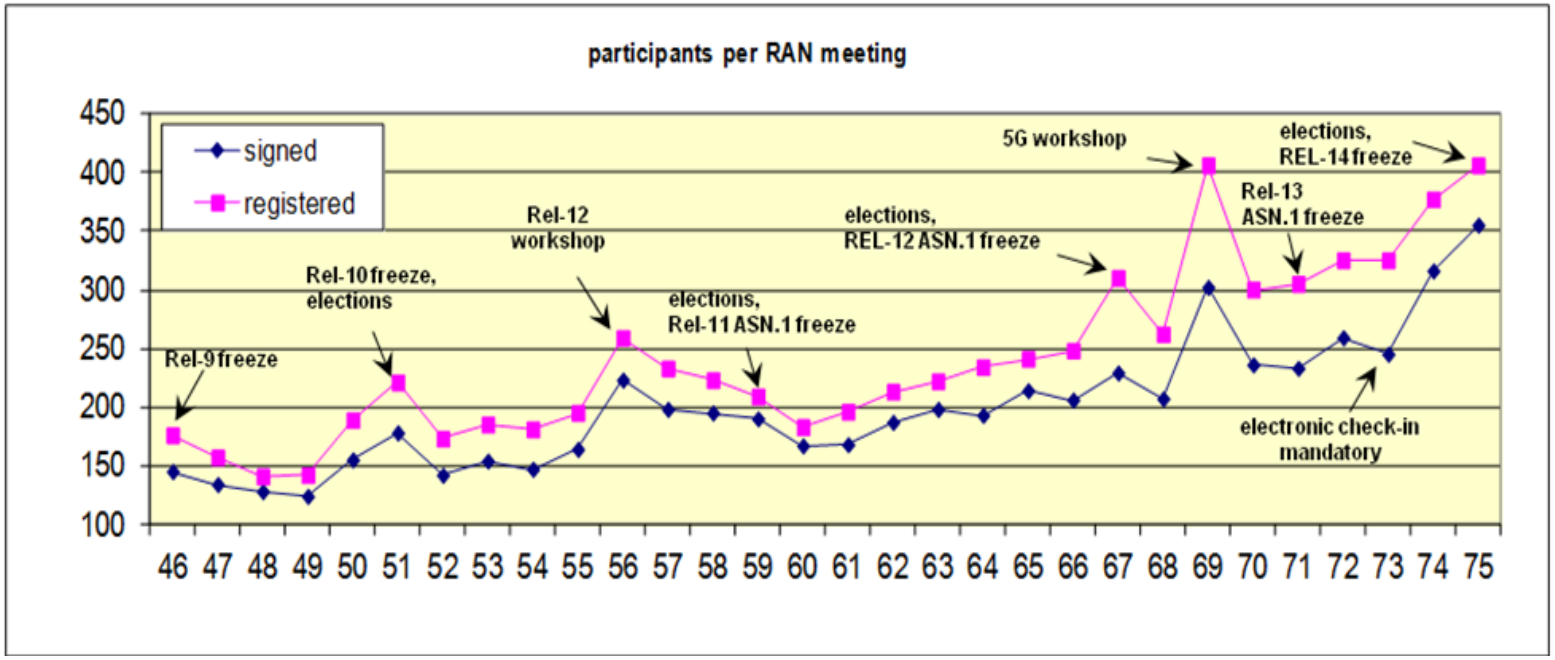



**Fig. A-1: Participants per RAN meeting (registered beforehand and actual participants who signed)**
**(1 week TSG: #63, #66 and further meetings)**



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# Annex B:
# List of Tdocs

The list of Tdocs of this RAN meeting #75 is attached to this report.

Total number of Tdocs: 855 (RP-170001 - RP-170855) of which 821 Tdocs are available, i.e. 34 are not available and they are withdrawn.

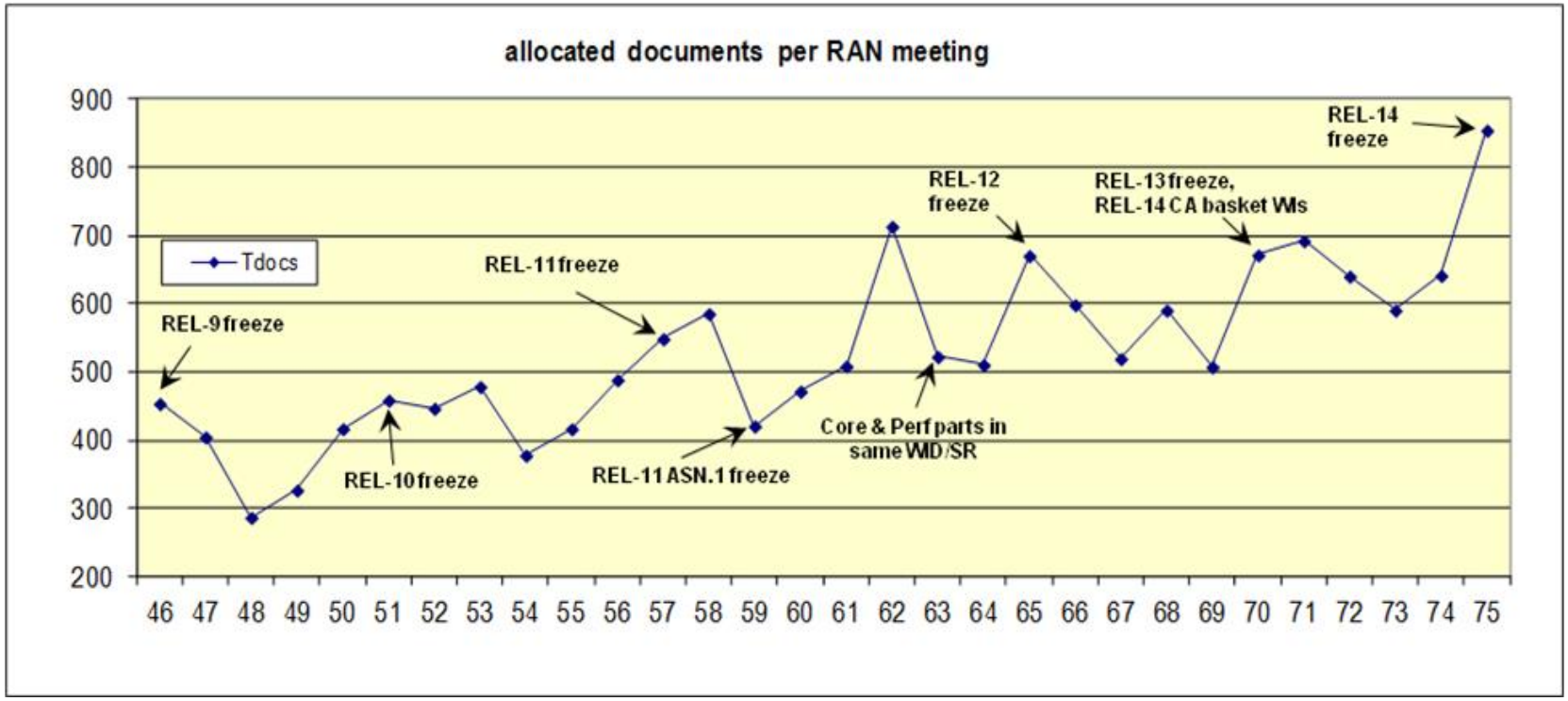



**Fig. B-1: Number of allocated Tdocs per RAN meeting**



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# Annex C:
# Incoming liaison statements (LSin)

In total 33 LSs/LTIs were received for RAN #75 (2 of them, RP-170698 and RP-170792, were received during the meeting). 32 LSs/LTIs were treated and 1 was postponed (RP-170792).

| Document | Original | Title | From | Decision | Reply in |
|---|---|---|---|---|---|
| RP-170020 | R4-1700305 | LS for a proposed reply to ITU-R WP5D/TEMP/182(Rev.1) = RP-161966 = R4-1609014 on Characteristics of terrestrial IMT systems for frequency sharing/interference analysis in the frequency range between 24.25 GHz and 86 GHz (R4-1700305; to: RAN; cc: RAN1; contact: Ericsson) | RAN4 | noted | |
| RP-170022 | S2-170695 | Response to LS C1-165447 on SA2 involvement for the light connection (S2-170695; to: CT1, RAN2, RAN3, SA3-LI, CT4, SA; cc: RAN, CT; contact: Ericsson) | SA2 | noted | |
| RP-170023 | S4-170219 | Reply LS to R2-169120 = RP-162344 on RAN-Assisted Codec Adaptation (S4-170219; to: RAN2, CT3; cc: RAN3, SA2, RAN; contact: Intel) | SA4 | noted | |
| RP-170024 | ITU_T_SG13_fgIMT2020-LS004-E | LS on the completion of ITU-T Focus Group on IMT-2020 and start of normative work in ITU-T Study Group 13 (ITU_T_SG13_fgIMT2020-LS004-E; to: CT, RAN, SA, ITU-R WP5D, IEEE 802.1/802.3, IEEE SA, ETSI ISG NFV, ARIB, ATIS, CCSA, TTA, TTC, OIF, ONF, IETF/IRTF, NGMN Alliance, GSMA; cc: -; contact: Huawei) | ITU-T SG13 Focus Group IMT-2020 | noted | |
| RP-170025 | ITU_T_SG12_COM12-LS11-E | LS on KPIs for mobile services (ITU_T_SG12_COM12-LS11-E; to: CT, RAN, SA; cc: ETSI TC STQ MOBILE; contact: ITU-T SG12 chairman) | ITU-T SG12 | noted | |
| RP-170026 | IEEE802.11-16_1573r4 | LS on Requesting status and technical information on radio-level integration between 3GPP and 802.11 systems (IEEE802.11-16_1573r4; to: RAN, SA; cc: IEEE 802 Executive Committee; contact: Interdigital) | IEEE 802.11 WG | replied to | RP-170853 |
| RP-170027 | ITS(17)000026r6 | Reply to RP-161919 on LTE-based vehicle-to-vehicle communications (ITS(17)000026r6; to: RAN; cc: -; contact: ETSI TC ITS chairman) | ETSI TC ITS | replied to | RP-170767 |
| RP-170028 | ITU-R WP1A/TEMP/41 | LS on Characteristics for use of visible light* for broadband communications (ITU-R WP1A/TEMP/41; to: RAN, SA, ARIB, TTC, ETSI, TTA, CCSA, IEEE; cc: -; contact: Counselor ITU-R SG1) | ITU-R WP1A | noted | |
| RP-170029 | ITU-R WP1A/TEMP/45 | LS on Preliminary draft revision of report ITU-R SM.2351-1 on Smart Grid utility management systems (ITU-R WP1A/TEMP/45; to: RAN, SA, 3GPP2, ARIB, ATIS, CCSA, CDG, ETSI, IEEE, ITRI, GSMA, TIA, TTA, Wi-Fi Alliance; cc: -; contact: Counselor ITU-R SG1) | ITU-R WP1A | replied to | RP-170802 |
| RP-170030 | S3i170035 | Reply LS to S2-170695 = RP-170022 on SA2 involvement for the light connection (S3i170035; to: SA2; cc: CT1, RAN2, RAN3, CT4, SA, RAN, CT; contact: BT) | SA3-LI | noted | |
| RP-170031 | R1-1704116 | LS Response to ETSI ITS LS ITS(17)000026r6 = RP-170027 on LTE-based vehicle-to-vehicle communications (R1-1704116; to: RAN; cc: RAN2, RAN4; contact: Huawei) | RAN1 | noted | |
| RP-170032 | R4-1702006 | Reply LS to RP-162346 on RMC configurations for NB-IoT RF tests (R4-1702006; to: RAN5; cc: RAN; contact: China Mobile) | RAN4 | noted | |
| RP-170033 | S2-171310 | LS on PWS support in 5G System (S2-171310; to: CT1; cc: CT, RAN, SA; contact: KDDI) | SA2 | noted | |
| RP-170034 | S2-171591 | LS on interworking and migration for 5GS and EPS (including Option 3) (S2-171591; to: SA, RAN; cc: RAN2, RAN3, CT; contact: NTT DOCOMO) | SA2 | noted | |
| RP-170035 | S2-171611 | LS on N2 and N3 reference points for 5G system (S2-171611; to: RAN, SA; cc: CT, RAN3, CT4, CT1, SA3, RAN2; contact: Nokia) | SA2 | noted | |



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| Document | Original | Title | From | Decision | Reply in |
|---|---|---|---|---|---|
| RP-170036 | ECC_PT1_LS_170120a | LS on Channeling arrangement and Least Restrictive Technical Conditions applicable to 1427-1518 MHz in CEPT (ECC_PT1_LS_170120a; to: RAN, RAN4; cc: -; contact: Ofcom) | ECC PT1 | noted | |
| RP-170037 | ECC_PT1_LS_170120b | Reply LS to R4-1610994 on Suitability of technical conditions of ECC DEC (11) 06 for 5G (ECC_PT1_LS_170120b; to: RAN4; cc: RAN; contact: Ofcom) | ECC PT1 | noted | |
| RP-170038 | C3-171255 | Reply LS to S4-170219 = RP-170023 on RAN-Assisted Codec Adaptation (C3-171255; to: SA4, RAN2; cc: RAN3, RAN, SA2; contact: Nokia) | CT3 | noted | |
| RP-170039 | R2-1702290 | Reply LS to S3-170485 on mobility enhancements for NB-IoT (R2-1702290; to: SA3, RAN; cc: RAN3, CT1, SA2; contact: Vodafone) | RAN2 | noted | |
| RP-170040 | R2-1702390 | LS on Capabilities for Category 1bis UE (R2-1702390; to: RAN; cc: RAN4; contact: Qualcomm) | RAN2 | noted | |
| RP-170041 | R4-1702510 | LS to RAN on RAN4 recommendation for NR spectra (R4-1702510; to: RAN; cc: -; contact: NTT DOCOMO) | RAN4 | noted | |
| RP-170042 | S1-171461 | LS on eV2X Normative Requirements Completion (S1-171461; to: RAN; cc: SA, CT; contact: LG) | SA1 | noted | |
| RP-170043 | ERM(17)61034r1 | LS on Harmonised Standard under Directive 2014/53/EU for “Broadband radio equipment used for Public Protection and Disaster Relief below 1 GHz” (ERM(17)61034r1; to: RAN, RAN4, CEPT ECC, ETSI TC TCCE WG4; cc: ETSI TC TCCE, ETSI TC MSG/ERM; contact: BMWi) | ETSI TC ERM | noted | |
| RP-170044 | ITU-R WP5D/TEMP/279 | LS on Further information on the inviation for submission of proposals for candidate radio interface technologies for the terrestrial components of the radio interface(s) for IMT-2020 and invitation to participate in their subsequent evaluation (ITU-R WP5D/TEMP/279; to: RAN, CT, SA, 3GPP2, ARIB, ATIS, CCSA, ETSI, IEEE, ITRI, TIA, TSDSI, TTA, TTC, WiMAX Forum, EBU, WWRF, 4G Americas, CDG, GSMA, UMTS Forum, Wi-Fi Alliance, Wireless Innovation Forum, XGP Forum, EU METIS Project, NGMN, 5G Innovation Centre, 5GMF, IMT 2020 Promotion Group, APT Wireless Group, 5G Infrastructure Public Private Partnership, NYU Wireless, 5GAA; cc: -; contact: Counselor ITU-R SG5) | ITU-R WP5D | replied to | RP-170761 |
| RP-170045 | ITU-R WP5D/TEMP/287 | LS on ITU-R WORKING PARTY 5D workshop on IMT-2020 (ITU-R WP5D/TEMP/287; to: RAN, CT, SA, 3GPP2, ARIB, ATIS, CCSA, ETSI, IEEE, ITRI, TIA, TSDSI, TTA, TTC, WiMAX Forum, EBU, WWRF, 4G Americas, CDG, GSMA, UMTS Forum, Wi-Fi Alliance, Wireless Innovation Forum, XGP Forum, EU METIS Project, NGMN, 5G Innovation Centre, 5GMF, IMT 2020 Promotion Group, APT Wireless Group, 5G Infrastructure Public Private Partnership, NYU Wireless, 5GAA; cc: -; Counselor ITU-R SG5) | ITU-R WP5D | replied to | RP-170761 |
| RP-170046 | ITU-R WP5D/TEMP/255r1 | LS on the schedule for updating Recommendation ITU-R M.1457 to revision 14 (ITU-R WP5D/TEMP/255r1; to: RAN, CT, SA, 3GPP2, ARIB, ATIS, CCSA, ETSI, IEEE, TIA, TSDSI, TTA, TTC, WiMAX Forum; cc: -; contact: Counselor ITU-R SG5) | ITU-R WP5D | replied to | RP-170762 |
| RP-170047 | RT-170005 | Draft reply LTI to ITU-R WP5A/TEMP/131(Rev.1) = RP-161979 on Intelligent Transport Systems (ITS) (RT-170005; to: RAN; cc: -; contact: Telecom Italia) | 3GPP ITU-R ad hoc | noted | |
| RP-170048 | NGMN_LS_170127 | LS on NGMN Recommendations regarding the Transparency of SEP Disclosures (NGMN_LS_170127; to: RAN, CT, SA, ATIS, ITU, ISO, IEC, ETSI, CEN/CENELEC, IEEE, BBF, TMF, MEF; cc: -; contact: Orange) | NGMN | noted | |
| RP-170049 | NGMN_LS_170122 | LS from NGMN V2X Task-Force to 3GPP (NGMN_LS_170122; to: RAN, SA; contact: CMCC) | NGMN | noted | |
| RP-170050 | NGMN_LS_170127b | LS on Test of Technology Building Blocks phase of the Trial and Testing Initiative (NGMN_LS_170227b; to: RAN, SA; cc: -; contact: KT) | NGMN | noted | |
| RP-170534 | R1-1704133 | LS on additional RRC parameters for PRACH resource configuration for high speed scenario (R1-1704133; to: RAN2; cc: RAN; contact: Huawei) | RAN1 | noted | |
| RP-170698 | GSMA_LS_170222 | LS on Definition of Wide hand Phantom within 3GPP for use in Antenna Performance measurements (GSMA_LS_170222; to: RAN, RAN4; cc: CTIA OTA WG, GCF SG; contact: China Unicom) | GSMA | noted | |



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| Document | Original | Title | From | Decision | Reply in |
|---|---|---|---|---|---|
| RP-170792 | NGP(17)000038 | LS requesting support for defining next generation protocol (NGP(17)000038; to: RAN, CT, SA, IETF; cc: -; contact: Vodafone) | ETSI ISG NGP | postponed | |

RP-170020 was handled by email in RAN after the RAN4 AH in Jan.17 in Spokane in order to prepare LSout RP-170021 to ITU-R WP5D.

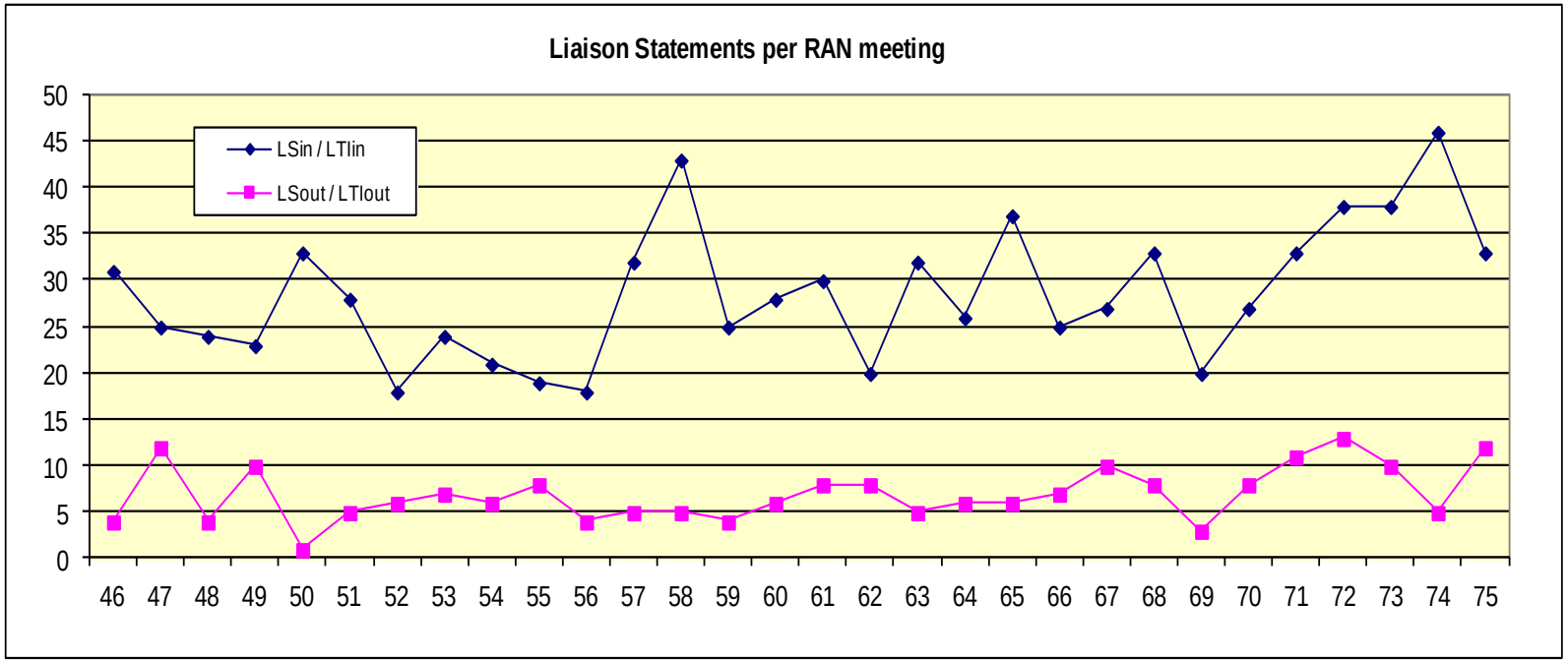



**Fig. C-1: Number of incoming/outgoing Liason Statements (LS) and Letter to ITU (LTI) per RAN meeting**



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# Annex D:
# Outgoing liaison statements (LSout)

Only final outgoing LSs are listed here. 12 outgoing LSs/LTIs of RAN #75 (1 of them approved by email):

| Document | Title | To | Cc | reply to i/c LS |
|---|---|---|---|---|
| RP-170021 | Reply LS to ITU-R WP5D/374 (Attachment 4.13) = ITU-R WP5D/TEMP/182(Rev.1) = RP-161966 on Characteristics of terrestrial IMT systems for frequency sharing/interference analysis in the frequency range between 24.25 GHz and 86 GHz (to: ITU-R WP5D; cc: -; contact: Ericsson) | ITU-R WP5D | - | ITU-R WP5D/TEMP/182(Rev.1) = RP-161966 |
| RP-170700 | Reply LS to ITU-T SG15/COM 15-LS405-E = RP-161984 on Requirements for mobile backhaul/fronthaul in a G.fast Deployment Environment (to: ITU-T SG15; cc: -; contact: Nokia) | ITU-T SG15 | - | ITU-T SG15/COM 15-LS405-E = RP-161984 |
| RP-170761 *** | Draft Reply LTI to ITU-R WP5D 5D/TEMP/279 = RP-170044 and ITU-R WP5D 5D/TEMP/287 = RP-170045 on Further information on the invitation for submission of proposals for candidate radio interface technologies for the terrestrial components of the radio interface(s) for IMT-2020 and invitation to participate in their subsequent evaluation (to: SA; cc:-; contact: Telecom Italia) | SA | - | ITU-R WP5D 5D/TEMP/279 = RP-170044, ITU-R WP5D 5D/TEMP/287 = RP-170045 |
| RP-170762 *** | Draft Reply to ITU-R WP5D/TEMP/255r1 = RP-170046 on the schedule for updating Recommendation ITU-R M.1457 to revision 14 (to: SA; cc: -; contact: Telecom Italia) | SA | - | ITU-R WP5D/TEMP/255r1 = RP-170046 |
| RP-170763 *** | Draft reply LTI to ITU-R WP5A/TEMP/131(Rev.1) = RP-161979 on Intelligent Transport Systems (ITS) (to: SA; cc: -; contact: Telecom Italia) | SA | - | ITU-R WP5A/TEMP/131(Rev.1) = RP-161979 |
| RP-170766 | LS on MIMO OTA (to: GCF CAG, GCF PAG; cc: -; contact: Intel) | GCF CAG, GCF PAG | - | - |
| RP-170767 | Reply LS to ITS(17)000026r6 = RP-170027 on LTE-based vehicle-to-vehicle communications (to: ETSI TC ITS; cc: -; contact: RAN chairman (Qualcomm) | ETSI TC ITS | - | ITS(17)000026r6 = RP-170027 |
| RP-170775 | Reply LS to S2-170518 on Multiple bearer capability handling independent of CIoT user plane optimization (to: SA2, CT1, RAN2; cc: -; contact: Qualcomm) | SA2, CT1, RAN2 | - | S2-170518 |
| RP-170802 *** | Draft reply to ITU-R WP1A/TEMP/45 = RP-170029 on Preliminary draft revision of report ITU-R SM.2351-1 on Smart Grid utility management systems (to: SA; cc: -; contact: Telecom Italia) | SA | - | ITU-R WP1A/TEMP/45 = RP-170029 |
| RP-170841 | LS on the support of Unicast and Groupcast transmission over PC5 for eV2X (to: SA2; cc: SA, SA1, SA3; contact: Huawei) | SA2 | SA, SA1, SA3 | - |
| RP-170850 *** | Draft response LS to ITU-R WP4B/TEMP/17 = RP-161971 and ITU-R 5D/TEMP/218 = RP-161965 on the integration of satellite-based solutions into IMT-2020 networks (to: SA; cc: -; Telecom Italia) | SA | - | ITU-R WP4B/TEMP/17 = RP-161971 ; ITU-R 5D/TEMP/218 = RP-161965 |
| RP-170853 | Reply LS to IEEE802.11-16_1573r4 = RP-170026 on Requesting status and technical information on radio-level integration between 3GPP and 802.11 systems (to: IEEE P802.11; cc: SA, IEEE 802 Executive Committee; contact: Intel) | IEEE P802.11 | SA, IEEE 802 Executive Committee | IEEE802.11-16_1573r4 = RP-170026 |

***: uses Letter to ITU template (LTI)

Note: LSout RP-170021 to ITU-R WP5D (which is a reply to RP-171966) was approved by email discussion before RAN #75 (20.-30.01.2017) based on LSin RP-170020 from RAN4 and sent out to ITU-R WP5D immediately afterwards (without further SA/PCG review) in order to meet ITU-R deadlines.



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# Annex E:
# List of Change Requests (CRs)

1495 CRs (incl. cat.A CRs) were handled at RAN #75 and 1476 CRs were approved.

A corresponding list of all CRs is included in the attached Tdoc list.

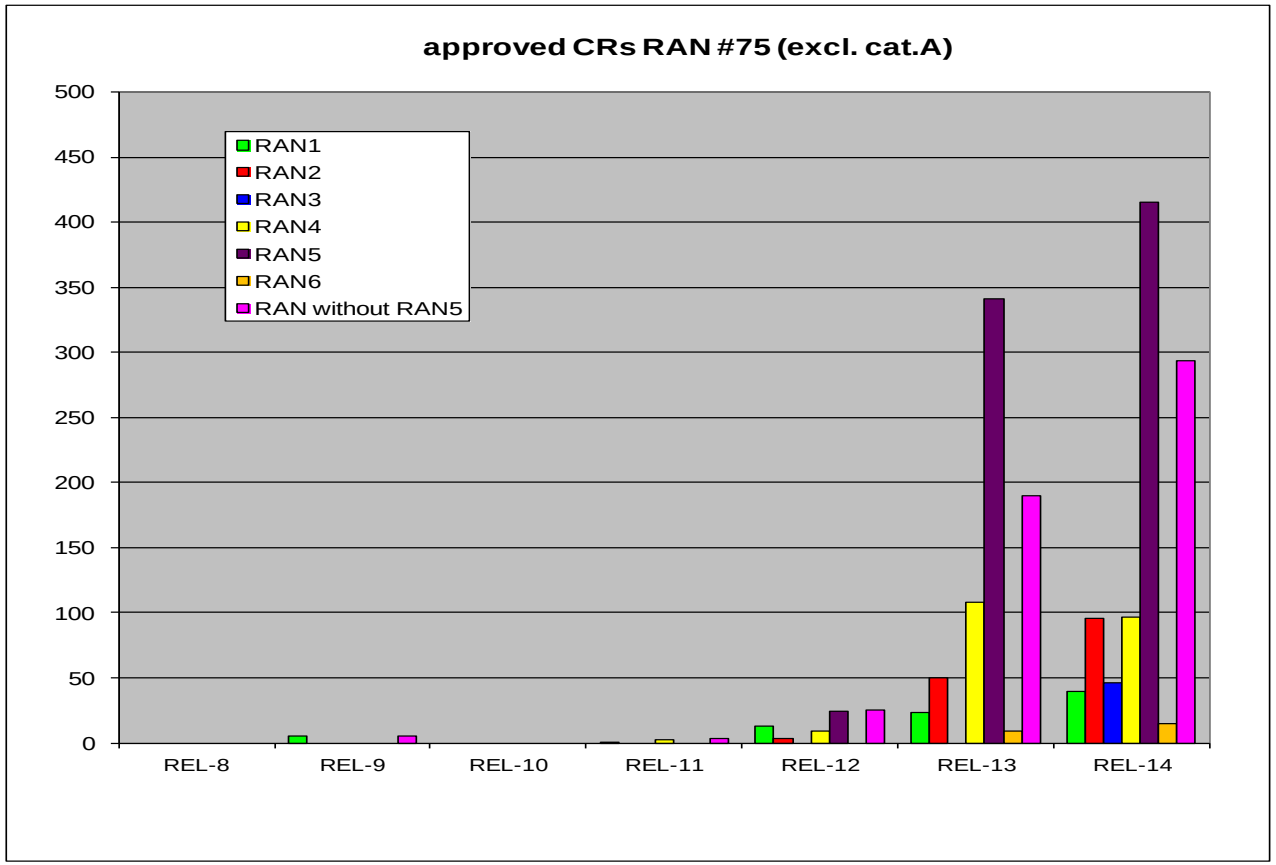



**Fig. E-1: Approved CRs (excluding category A CRs) of RAN #75 per WG and release**



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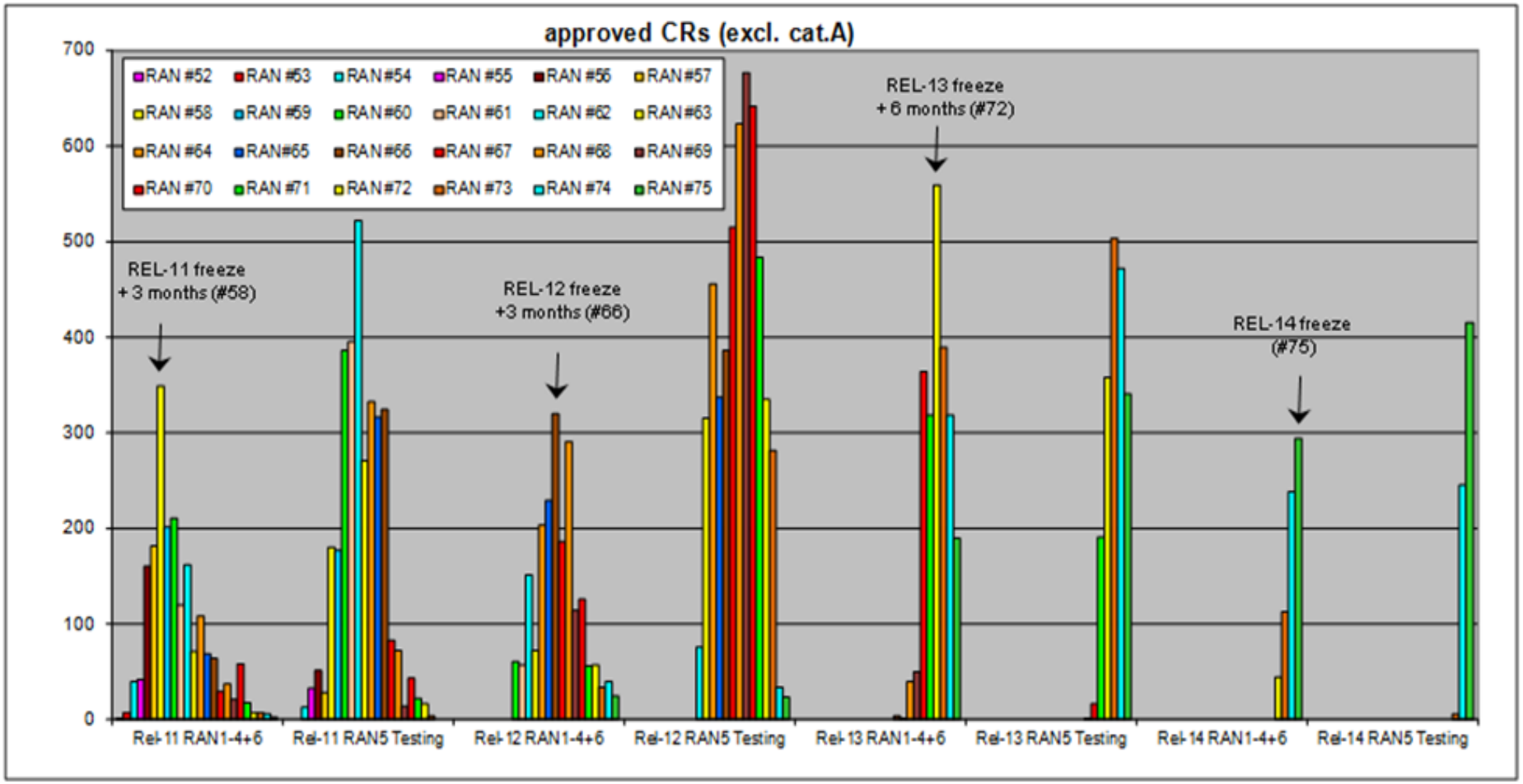



**Fig. E-2: Approved CRs (<u>excluding</u> category A CRs) of this and previous RAN meetings per release**
**<u>REL freeze</u>: REL-8: RAN #42, REL-9: RAN #46, REL-10: RAN #51, REL-11: RAN #57, REL-12: RAN #65, REL-13: RAN #70, REL-14: RAN #75**
**<u>ASN.1 freeze</u>: REL-8: RAN #43 (713 CRs* at #43), REL-9: RAN #47 (355 CRs* at #47), REL-10: RAN #52 (409 CRs* at #52) (apart from Un: #53), REL-11: RAN #59 (349 CRs* at #58), REL-12: RAN #67 (320 CRs* at #66), REL-13: RAN #71 (apart from NB-IOT: #72) (559 CRs* at #72), REL-14: planned for RAN #76**
***: peak number of CRs in this release (excl. cat.A)**



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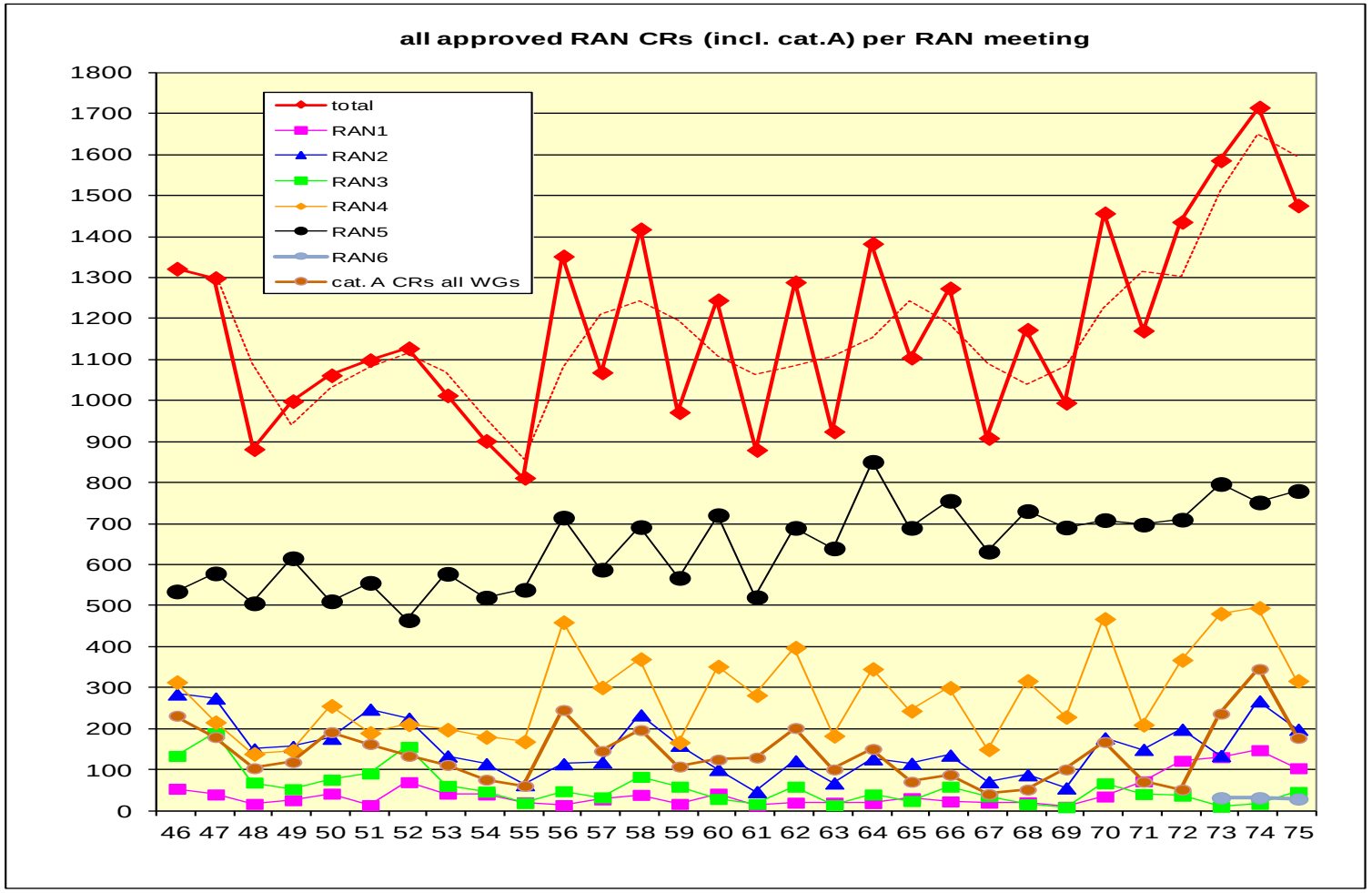



**Fig. E-3: Approved CRs (all releases <u>including</u> category A CRs) per RAN WG and per RAN meeting**
**<u>REL freeze</u>: REL-8: RAN #42, REL-9: RAN #46, REL-10: RAN #51, REL-11: RAN #57, REL-12: RAN #65, REL-13: RAN #70, REL-14: RAN #75**
**<u>ASN.1 freeze</u>: REL-8: RAN #43 (713 CRs* at #43), REL-9: RAN #47 (355 CRs* at #47), REL-10: RAN #52 (409 CRs* at #52) (apart from Un: #53), REL-11: RAN #59 (349 CRs* at #58), REL-12: RAN #67 (320 CRs* at #66), REL-13: RAN #71 (apart from NB-IOT: #72) (559 CRs* at #72), REL-14: planned for RAN #76**
***: peak number of CRs in this release (excl. cat.A)**



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# Annex F:
# Summary of RAN work items (WI) and study items (SI)

An overview of recent RAN work items and study items (starting from REL-9 and including the new WIs & SIs approved at this meeting) is attached to this report.

This overview is used as input for the 3GPP workplan which lists all 3GPP work and study items.

NOTE: REL-4, REL-5, REL-6 and REL-7 were closed after RAN #65, i.e. no CRs to specifications of these releases will be considered anymore.

| | | |
|---|---|---|
| REL-7: | | |
| REL-7 stage 1 freeze: | Sep.05 | TSG #29 |
| REL-7 stage 2 freeze: | Sep. 06 | TSG #33 |
| REL-7 freeze: | March 07 | TSG #35 |
| REL-7 ASN.1 freeze: | March 08 | TSG #39 |
| | | |
| REL-8: | 7 quarters | |
| REL-8 stage 1 freeze: | Dec.07 | TSG #38 |
| REL-8 stage 2 freeze: | June 08 | TSG #40 |
| REL-8 freeze: | Dec.08 | TSG #42 |
| REL-8 ASN.1 freeze: | March 09 | TSG #43 |
| | | |
| REL-9: | 4 quarters | |
| REL-9 stage 1 freeze: | Dec.08 | TSG #42 |
| REL-9 stage 2 freeze: | June 09 | TSG #44 |
| REL-9 freeze: | Dec.09 | TSG #46 |
| REL-9 ASN.1 freeze: | March 10 | TSG #47 |
| | | |
| REL-10: | 5 quarters | |
| REL-10 stage 1 freeze: | March 10 | TSG #47 |
| REL-10 stage 2 freeze: | Sep.10 | TSG #49 |
| REL-10 freeze: | March 11 | TSG #51 |
| REL-10 ASN.1 freeze: | June 11 | TSG #52 (apart from Un for Relays: frozen in Sep.11 at TSG #53) |
| | | |
| REL-11: | 6 quarters | |
| REL-11 stage 1 freeze: | Sep.11 | TSG #53 |
| REL-11 stage 2 freeze: | March 12 | TSG #55 |
| REL-11 freeze: | Sep.12 | TSG #57 |
| REL-11 ASN.1 freeze: | March 13 | TSG #59 |



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| | | |
|---|---|---|
| REL-12: | 8 quarters | |
| REL-12 stage 1 freeze: | March 13 | TSG #59 |
| REL-12 stage 2 freeze: | Dec.13 | TSG #62 |
| REL-12 freeze: | Sep.14 | TSG #65 |
| REL-12 ASN.1 freeze: | March 15 | TSG #67 |

| | | |
|---|---|---|
| REL-13: | 5 quarters | |
| REL-13 stage 1 freeze: | Sep.14 | TSG #65 |
| REL-13 stage 2 freeze: | June 15 | TSG #68 |
| REL-13 freeze: | Dec.15 | TSG #70 |
| REL-13 ASN.1 freeze: | March 16 | TSG #71 (apart from NB-IoT aspects in 36.331: frozen in June 16 at RAN #72) |

| | | |
|---|---|---|
| REL-14: | 5 quarters | |
| REL-14 stage 1 freeze: | March 16 | TSG #71 |
| REL-14 stage 2 freeze: | Sep.16 | TSG #73 |
| REL-14 freeze: | March 17 | TSG #75 (planned)** |
| REL-14 ASN.1 freeze: | June 17 | TSG #76 (planned)** |

**: These target dates were endorsed by SA #69 (in connection with proposal SP-150564), and with RP-152228 the REL-14 freeze date was confirmed.

| | | |
|---|---|---|
| REL-15: | 5 quarters | |
| REL-15 stage 1 freeze: | June 17 | TSG #76 (planned) |
| REL-15 stage 2 freeze: | Dec.17 | TSG #78 (planned), |
| REL-15 freeze: | June 18 | TSG #80 (planned), see RP-152228 |
| REL-15 ASN.1 freeze: | Sep.18 | TSG #81 (planned) |

note: Acc. to RP-170741: completion of stage 3 for Non-Standalone (NSA) 5G-NR eMBB (incl. low latency support) with Option 3 targeted for Dec.17

| | | |
|---|---|---|
| REL-16: | 6 quarters | |
| REL-16 stage 1 freeze: | Dec.18 | TSG #82 (planned) |
| REL-16 stage 2 freeze: | June 19 | TSG #84 (planned) |
| REL-16 freeze: | Dec.19 | TSG #86 (planned), see RP-152228 |
| REL-16 ASN.1 freeze: | March 20 | TSG #87 (planned) |



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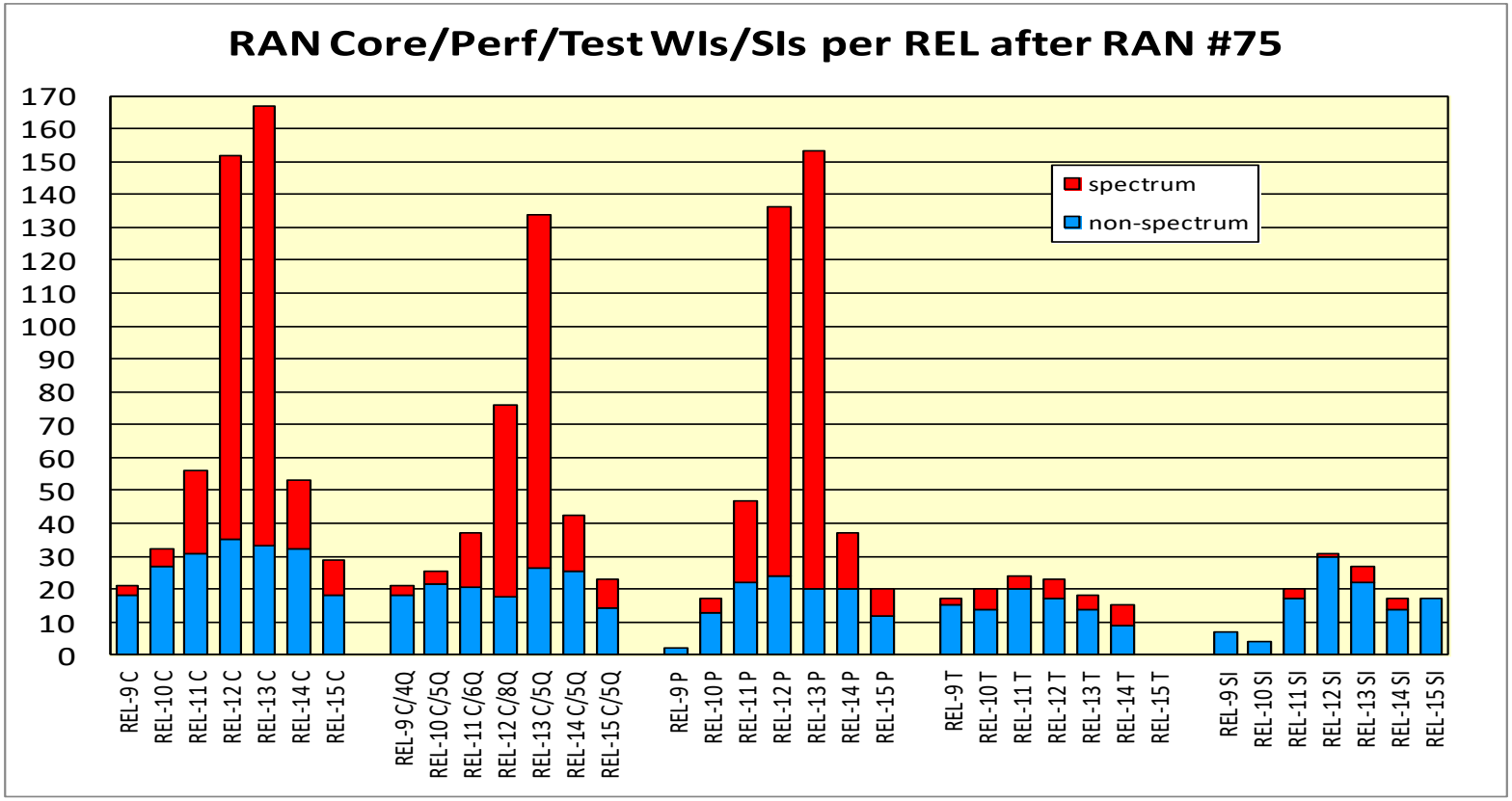



**Fig. F-1: Statistics of all approved RAN WIs/SIs of REL-9/10//11/12/13/14/15 split into spectrum and non-spectrum related topics (<u>including</u> already completed WIs/SIs)**
**Note: For REL-15 the planned freeze in June 18 was used in this figure.**



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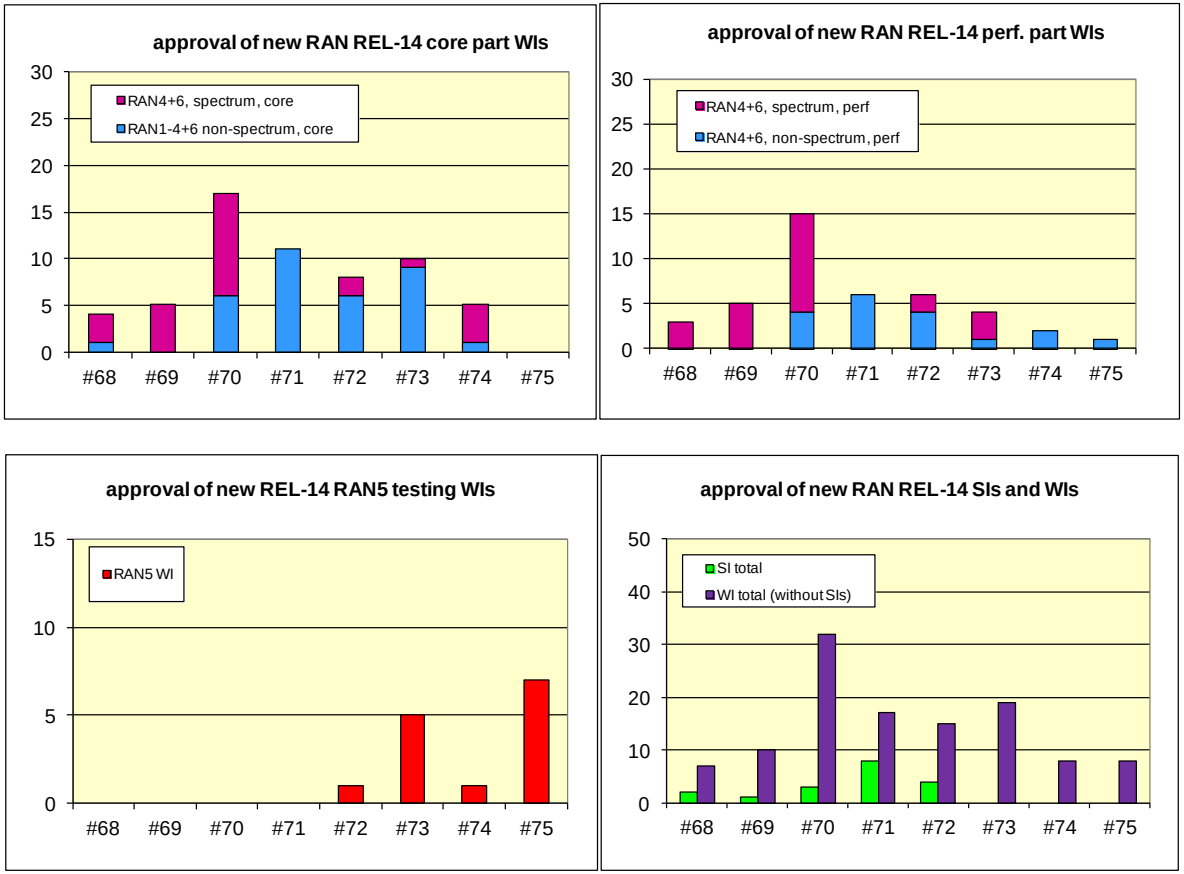



**Fig. F-3: Overview of <u>new</u> REL-14 WIs and SIs per RAN meeting**
**REL-13 freeze: RAN #70 (Dec.15), ASN.1 freeze: RAN #71 (March 16);**
**REL-14 freeze: RAN #75 (March 17), ASN.1 freeze: planned for RAN #76 (June 17);**
**(including WIs shifted from REL-13 to REL-14)**



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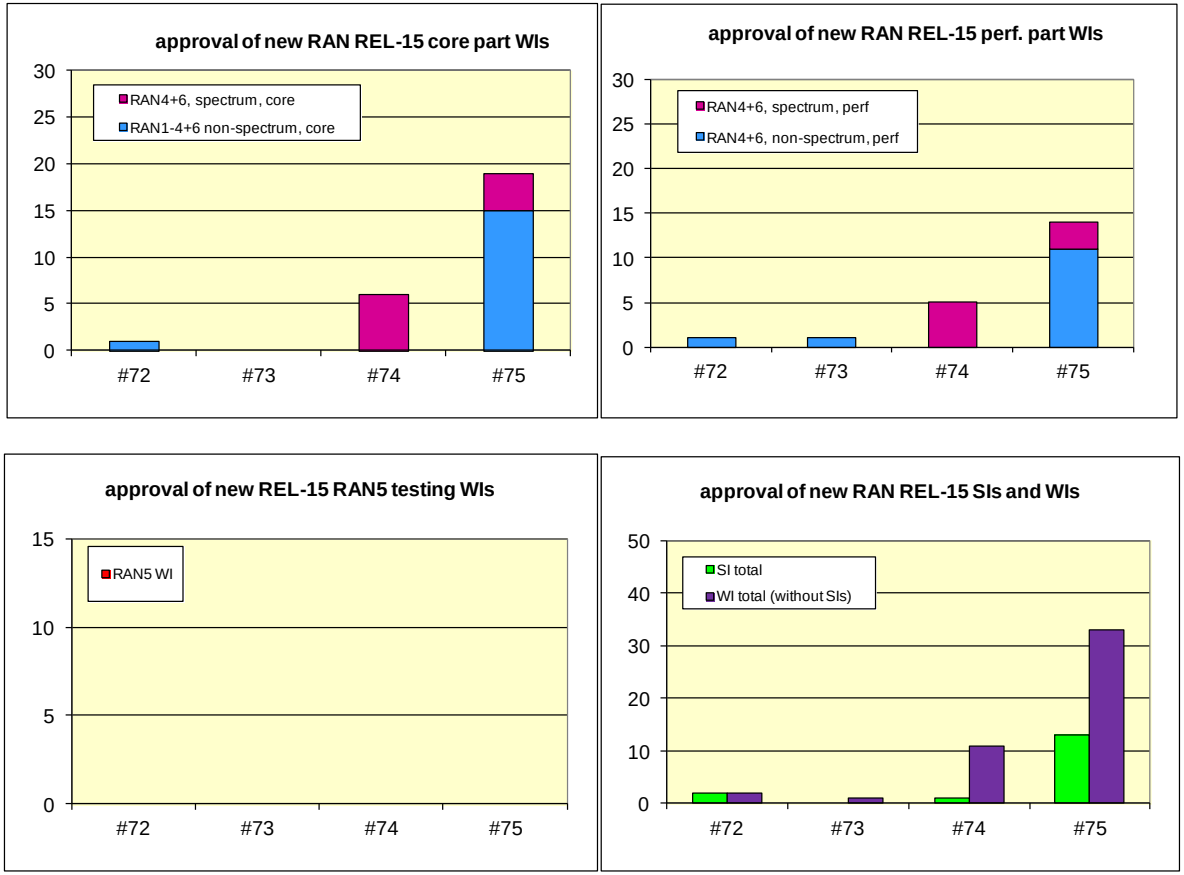



**Fig. F-3: Overview of <u>new</u> REL-15 WIs and SIs per RAN meeting**
**REL-14 freeze: RAN #75 (March 17), ASN.1 freeze: planned for RAN #76 (June 17);**
**REL-15 freeze: planned for RAN #80 (June 18), ASN.1 freeze: planned for RAN #81 (Sep.18);**
**(including WIs shifted from REL-14 to REL-15)**



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# Annex G:
# RAN email discussions between RAN #75 and RAN #76:

**1 week email discussion after RAN #75:**

1. Post RAN#75 time budgets (WG chairmen)
   Goal: Endorse WG time budget sheet based on meeting agreements

conclusion: Email discussion was kicked off on 15.03.2017 by the RAN2 chairman.
The endorsed time budget table was provided on 21.03.2017 in **RP-170822**.
Note: After the endorsement, Ericsson spotted a mistake in the target dates: LTE_eMTC4-Core: Dec.17 (correct is June 18) and LTE_eMTC4-Perf: March 18 (correct is Dec.18) which will be corrected at the start of RAN #76.

**Email discussion until RAN#76:**

2. [requirements] - review of ITU-R radio requirements (ITU-R ad hoc convener, Telecom Italia)
   Goal: To check if the radio requirements defined by ITU-R (see ITU-R WP5D/TEMP/300(Rev.1)) are supported by the 3GPP radio requirements in TR 38.913 and to create a CR to TR 38.913 REL-14 in case any ITU-R requirement is not supported by TR 38.913 (deadline for comments: 22.05.2017).

conclusion: Email discussion was kicked off by the ITU-R ad hoc convener on 14.03.2017.
A CR to TR 38.913 v14.2.0 was provided by the ITU-R ad hoc convener to RAN #76 in RP-170967.



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# Annex H:
# Actions decided by RAN #75

Nothing to report.



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# Annex I: History

| Document history | | |
|---|---|---|
| **Date** | **TSG RAN Tdoc** | **Subject** |
| 09.03.2017 | - | Draft report of RAN #75 provided directly after RAN #74 |
| 28.05.2017 | RP-170857 | Draft report of RAN #75 v1.0 provided for approval to RAN #76 |
| 05.06.2017 | RP-171409 | Report of RAN #75 as approved by RAN #76 |

In case of comments/questions/corrections please contact:

Author: **Dr. Joern Krause (3GPP TSG RAN MCC Support)**

ETSI Mobile Competence Centre (MCC)
Tel. +33-492-94 4261
email: Joern.Krause@etsi.org



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# Appendix 31a

## Tdoclist_RAN_75

| | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z | AA | AB | AC | AD | AE | AF | AG |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Secretary Remarks | Available | Decision | Agenda | Tdoc | Title | Source | Doc-type | Spec | CRnbr | CRev | CRcat | Version-Current | Release | WorkItem | Replaced-by | Replaces | Abstract | Report | originalLS | To | Cc | ReplyTo | ReplyIn | ReservationDate | AvailabilityDate | CRpack | Contact | ContactID | Order-within-agenda-item | Done | Withdrawn | Doc-for |
| 2 | | Yes | revised | 3 | RP-170001 | Agenda for RAN #75 held in Dubrovnik, Croatia, 05.03.-08.03.2017 | RAN chairman (Qualcomm) | agenda | - | - | - | - | .. | - | - | RP-170533 | | | | | - | - | | | 1/31/2017 21:27 | 1/31/2017 21:30 | | Joern Krause | 12578 | 10 | Yes | No | Approval |
| 3 | | Yes | revised | 4 | RP-170002 | Draft report of RAN #74 held in Vienna, Austria, 05.12.-08.12.2016 | ETSI MCC | report | - | - | - | - | .. | - | - | RP-170690 | | | no comments, final report will be in RP-170690 | | - | - | | | 1/31/2017 21:27 | 3/5/2017 21:53 | | Joern Krause | 12578 | 19360 | Yes | No | Approval |
| 4 | | Yes | noted | 5.1 | RP-170003 | Status Report RAN WG1 | RAN1 chairman (NTT DOCOMO) | report | - | - | - | - | .. | - | - | | | RAN1 specs for both LTE and HSPA up to and including Rel-13 are stable<br>Almost all Rel-14 LTE SI/WIs can be closed<br>All Rel-14 LTE RAN1 parts can be closed<br>Rel-14 NR SI can be closed | no questions/comments | | - | - | | | 1/31/2017 21:27 | 3/6/2017 9:18 | | Joern Krause | 12578 | 19370 | Yes | No | |
| 5 | | Yes | noted | 5.1 | RP-170004 | List of CRs from RAN WG1 | ETSI MCC | discussion | - | - | - | - | .. | - | - | | | | | | - | - | | | 1/31/2017 21:27 | 3/5/2017 21:53 | | Joern Krause | 12578 | 19380 | Yes | No | Information |
| 6 | | Yes | noted | 5.2 | RP-170005 | Status Report RAN WG2 | RAN2 chairman (Intel) | report | - | - | - | - | .. | - | - | | | Very busy Q1 2017 and anticipating being heavily loaded for rest of year with the start of NR WI, but scope to start some REl-15 LTE WIs in Q2 2017<br>NR Study Item complete from RAN2 point of view<br>LTE Rel-14 WIs complete from RAN2 point of view (apart from one aspect of eNB-IoT)<br>UMTS Rel-14 WIs complete from RAN2 point of view<br>LTE and UMTS ASN.1 reviews planned for Q2 2017 to enable ASN.1 freeze in June 2017 | LG: slide 51: 3 parallel streams in RAN2, what does the text in parenthesis mean?<br>Huawei: page 29, RAN1 sent an LS and we have a RAN2 company CR to RAN #75 to complete the work | | - | - | | | 1/31/2017 21:27 | 3/6/2017 12:28 | | Joern Krause | 12578 | 19390 | Yes | No | |
| 7 | | Yes | noted | 5.2 | RP-170006 | List of CRs from RAN WG2 | ETSI MCC | discussion | - | - | - | - | .. | - | - | | | | | | - | - | | | 1/31/2017 21:27 | 3/5/2017 21:53 | | Joern Krause | 12578 | 19400 | Yes | No | Information |
| 8 | | Yes | noted | 5.3 | RP-170007 | Status Report RAN WG3 | RAN3 chairman (Huawei) | report | - | - | - | - | .. | - | - | | | | | | - | - | | | 1/31/2017 21:27 | 3/5/2017 21:53 | | Joern Krause | 12578 | 19410 | Yes | No | |
| 9 | | Yes | noted | 5.3 | RP-170008 | List of CRs from RAN WG3 | ETSI MCC | discussion | - | - | - | - | .. | - | - | | | | | | - | - | | | 1/31/2017 21:27 | 3/5/2017 21:53 | | Joern Krause | 12578 | 19420 | Yes | No | Information |
| 10 | | Yes | noted | 5.4 | RP-170009 | Status Report RAN WG4 | RAN4 chairman (Samsung) | report | - | - | - | - | .. | - | - | | | | Telecom Italia: when is it planned to introduce REL-15 specifications?<br>RAN4 chair: earliest in Sep.17 but we can endorse the TR already<br>CableLabs: increasing TUs for LAA planned to finish the work?<br>RAN chair: we will discuss it later this week and completing with 0.5TUs will be difficult | | - | - | | | 1/31/2017 21:27 | 3/5/2017 21:53 | | Joern Krause | 12578 | 19430 | Yes | No | |
| 11 | | Yes | noted | 5.4 | RP-170010 | List of CRs from RAN WG4 | ETSI MCC | discussion | - | - | - | - | .. | - | - | | | | | | - | - | | | 1/31/2017 21:27 | 3/5/2017 21:53 | | Joern Krause | 12578 | 19440 | Yes | No | Information |
| 12 | | Yes | noted | 5.5 | RP-170011 | Status Report RAN WG5 | RAN5 chairman (Motorola Mobility) | report | - | - | - | - | .. | - | - | | | | | | - | - | | | 1/31/2017 21:27 | 3/5/2017 21:53 | | Joern Krause | 12578 | 19450 | Yes | No | |
| 13 | | Yes | noted | 5.5 | RP-170012 | List of CRs from RAN WG5 | ETSI MCC | discussion | - | - | - | - | .. | - | - | | | | | | - | - | | | 1/31/2017 21:27 | 3/6/2017 14:52 | | Joern Krause | 12578 | 19460 | Yes | No | Information |
| 14 | | Yes | approved | 5.5 | RP-170013 | Status Report MCC TF160 (for approval) | ETSI MCC TF160 Leader | report | - | - | - | - | .. | - | - | | | | RAN5 chairman: nothing to approve here this time<br>note: It was confirmed by MCC TF160 leader that this Tdoc requires approval | | - | - | | | 1/31/2017 21:27 | 3/5/2017 21:53 | | Joern Krause | 12578 | 19470 | Yes | No | Approval |
| 15 | | Yes | noted | 5.6 | RP-170014 | Status Report RAN WG6 | RAN6 chairman (Nokia) | report | - | - | - | - | .. | - | - | | | | | | - | - | | | 1/31/2017 21:27 | 3/5/2017 21:53 | | Joern Krause | 12578 | 19480 | Yes | No | |
| 16 | | Yes | noted | 5.6 | RP-170015 | List of CRs from RAN WG6 | ETSI MCC | discussion | - | - | - | - | .. | - | - | | | MCC: CR R6-170138 has WI code ePOS_GERAN-Perf and does not belong to CRpack RP-170061; it is therefore resubmitted in RP-170551 | | | - | - | | | 1/31/2017 21:27 | 2/24/2017 12:46 | | Joern Krause | 12578 | 19490 | Yes | No | Information |
| 17 | | Yes | noted | 6.1 | RP-170016 | TSG SA Report to TSG RAN - Questions for Advice and Requests | SA chairman (Samsung) | report | - | - | - | - | .. | - | - | | | | RAN chair: we will have a joint session on Wed to address the isssues indicated by the SA chairman<br>Huawei: we are waiting for an SA3 reply on NB-IOT enhancements<br>SA chairman: will with SA3 chairman | | - | - | | | 1/31/2017 21:27 | 3/5/2017 21:53 | | Joern Krause | 12578 | 19500 | Yes | No | |



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| | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z | AA | AB | AC | AD | AE | AF | AG |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 18 | | Yes | noted | 6.3 | RP-170017 | 3GPP Support Team Report | ETSI MCC | report | - | - | - | - | .. | - | - | | | | Telecom Italia: The awards are a bit hidden on the web page and there could be also a ceremony at the TSG for it<br>Specs manager: will provide these ideas to the Marcom Officer of 3GPP | | - | - | | | 1/31/2017 21:27 | 3/5/2017 21:53 | | Joern Krause | 12578 | 19510 | Yes | No | |
| 19 | | Yes | noted | 8.1 | RP-170018 | Status Report ITU-R Ad hoc | ITU-R Ad hoc Contact (Telecom Italia) | report | - | - | - | - | .. | - | - | | | | RAN chair: we will come back on Wed for other Tdocs of this agenda item<br>Huawei: there seem to be two points in ITU-R WP5D TR which are different from our TR 38.913<br><br>ITU-R ad hoc convener: should ITU-R ad hoc check the requirements from ITU-R vs. our TR 38.913?<br>Qualcomm: not clear what we would check<br>ITU-R ad hoc convener: we have to make sure that we fulfill all ITU-R requirements; if 3GPP has more requirements that's no problem<br><br>conclusion: email discussion on RAN reflector until RAN #76 to check if some ITU-R requirements are not met and a corresponding CR has then to be brought to RAN #76 to TR | | - | - | | | 1/31/2017 21:27 | 3/5/2017 21:53 | | Joern Krause | 12578 | 19520 | Yes | No | |
| 20 | | Yes | noted | 18 | RP-170019 | 3GPP Work Plan review at Plenary #75 | ETSI MCC | Work Plan | - | - | - | - | .. | - | - | | | | | | - | - | | | | 1/31/2017 21:27 | 3/8/2017 22:22 | | Joern Krause | 12578 | 19530 | Yes | No | Information |
| 21 | | Yes | noted | 8.2 | RP-170020 | LS for a proposed reply to ITU-R WP5D/TEMP/182(Rev.1) = RP-161966 = R4-1609014 on Characteristics of terrestrial IMT systems for frequency sharing/interference analysis in the frequency range between 24.25 GHz and 86 GHz (R4-1700305; to: RAN; cc: RAN1; contact: Ericsson) | RAN4 | LS in | - | - | - | - | .. | Rel-14 | FS_NR_new RAT | | | RAN action requested; LS is a proposed reply to ITU-R WP5D/TEMP/182(Rev.1) = RP-161966 = R4-1609014 and it was handled by email in RAN after RAN4 AH in Jan.17 in Spokane | | R4-1700305 | RAN | RAN1 | | | 1/31/2017 21:27 | 1/31/2017 21:30 | | Joern Krause | 12578 | 210 | Yes | No | |
| 22 | | Yes | approved | 8.2 | RP-170021 | Reply LS to ITU-R WP5D/374 (Attachment 4.13) = ITU-R WP5D/TEMP/182(Rev.1) = RP-161966 on Characteristics of terrestrial IMT systems for frequency sharing/interference analysis in the frequency range between 24.25 GHz and 86 GHz (to: ITU-R WP5D; cc: -; contact: Ericsson) | RAN | LS out | - | - | - | - | .. | Rel-14 | FS_NR_new RAT | | | | LSout RP-170021 is based on RAN4 LS RP-170020 = R4-1700305 and it was approved by email on 30.01.2017 via the RAN reflector (sent out without SA/PCG review) | | ITU-R WP5D | - | ITU-R WP5D/TEMP/182(Rev.1) = RP-161966 | | 1/31/2017 21:27 | 1/31/2017 21:30 | | Joern Krause | 12578 | 440 | Yes | No | Approval |
| 23 | | Yes | noted | 10.3.4 | RP-170022 | Response to LS C1-165447 on SA2 involvement for the light connection (S2-170695; to: CT1, RAN2, RAN3, SA3-LI, CT4, SA; cc: RAN, CT; contact: Ericsson) | SA2 | LS in | - | - | - | - | .. | Rel-14 | LTE_LIGHT_CON-Core | | | C1-165447 was not sent to/cc RAN; no RAN action requested | conclusion: no LS answer | S2-170695 | CT1, RAN2, RAN3, SA3-LI, CT4, SA | RAN, CT | C1-165447 | | 1/31/2017 21:27 | 1/31/2017 21:30 | | Joern Krause | 12578 | 220 | Yes | No | |
| 24 | | Yes | noted | 10.3.17 | RP-170023 | Reply LS to R2-169120 = RP-162344 on RAN-Assisted Codec Adaptation (S4-170219; to: RAN2, CT3; cc: RAN3, SA2, RAN; contact: Intel) | SA4 | LS in | - | - | - | - | .. | Rel-14 | LTE_VoLTE_ViLTE_enh-Core | | | no RAN action requested | no LS answer | S4-170219 | RAN2, CT3 | RAN3, SA2, RAN | R2-169120 = RP-162344 | | 1/31/2017 21:27 | 1/31/2017 21:30 | | Joern Krause | 12578 | 230 | Yes | No | |
| 25 | | Yes | noted | 9.2.1 | RP-170024 | LS on the completion of ITU-T Focus Group on IMT-2020 and start of normative work in ITU-T Study Group 13 (ITU_T_SG13_fgIMT2020-LS004-E; to: CT, RAN, SA, ITU-R WP5D, IEEE 802.1/802.3, IEEE SA, ETSI ISG NFV, ARIB, ATIS, CCSA, TTA, TTC, OIF, ONF, IETF/IRTF, NGMN Alliance, GSMA; cc: -; contact: Huawei) | ITU-T SG13 Focus Group IMT-2020 | LS in | - | - | - | - | .. | Rel-14 | FS_NR_new RAT | | | no RAN action requested | conclusion: no LS answer from RAN | ITU_T_SG13_fgIMT2020-LS004-E | CT, RAN, SA, ITU-R WP5D, IEEE 802.1/802.3, IEEE SA, ETSI ISG NFV, ARIB, ATIS, CCSA, TTA, TTC, OIF, ONF, IETF/IRTF, NGMN Alliance, GSMA | - | | | 1/31/2017 21:27 | 1/31/2017 21:30 | | Joern Krause | 12578 | 240 | Yes | No | |
| 26 | | Yes | noted | 7 | RP-170025 | LS on KPIs for mobile services (ITU_T_SG12_COM12-LS11-E; to: CT, RAN, SA; cc: ETSI TC STQ MOBILE; contact: ITU-T SG12 chairman) | ITU-T SG12 | LS in | - | - | - | - | .. | - | - | | | no explicit RAN action requested | conclusion: no LS answer from RAN | ITU_T_SG12_COM12-LS11-E | CT, RAN, SA | ETSI TC STQ MOBILE | | | 1/31/2017 21:27 | 1/31/2017 21:30 | | Joern Krause | 12578 | 250 | Yes | No | |

| | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z | AA | AB | AC | AD | AE | AF | AG |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 27 | | Yes | replied to | 7 | RP-170026 | LS on Requesting status and technical information on radio-level integration between 3GPP and 802.11 systems (IEEE802.11-16_1573r4; to: RAN, SA; cc: IEEE 802 Executive Committee; contact: Interdigital) | IEEE 802.11 WG | LS in | - | - | - | - | .. | - | - | | | related to RP-161804 and 3GPP/PCG#37(16)40; RAN action requested | Intel:this LS diserves an answer<br>RAN chair: Ok, Intel will collect comments and we will come back to the answer at the end of the week | IEEE802.11-16_1573r4 | RAN, SA | - | | RP-170699 | 1/31/2017 21:27 | 1/31/2017 21:30 | | Joern Krause | 12578 | 260 | Yes | No | |
| 28 | | Yes | replied to | 10.3.14 | RP-170027 | Reply to RP-161919 on LTE-based vehicle-to-vehicle communications (ITS(17)000026r6; to: RAN; cc: -; contact: ETSI TC ITS chairman) | ETSI TC ITS | LS in | - | - | - | - | .. | Rel-14 | LTE_V2X-Core | | | note: LS RP-161919 was sent out to ETSI TC ITS on 27.09.2016 not on 29.11.2016 as indicated in RP-170027; RAN action requested | | ITS(17)000026r6 | RAN | - | RP-161919 | RP-170767 | 1/31/2017 21:27 | 1/31/2017 21:30 | | Joern Krause | 12578 | 270 | Yes | No | |
| 29 | | Yes | noted | 8.5 | RP-170028 | LS on Characteristics for use of visible light* for broadband communications (ITU-R WP1A/TEMP/41; to: RAN, SA, ARIB, TTC, ETSI, TTA, CCSA, IEEE; cc: -; contact: Counselor ITU-R SG1) | ITU-R WP1A | LS in | - | - | - | - | .. | - | - | | | no explicit RAN action requested | conclusion: no LS answer from RAN | ITU-R WP1A/TEMP/41 | RAN, SA, ARIB, TTC, ETSI, TTA, CCSA, IEEE | - | | | 1/31/2017 21:27 | 1/31/2017 21:30 | | Joern Krause | 12578 | 280 | Yes | No | |
| 30 | | Yes | replied to | 8.5 | RP-170029 | LS on Preliminary draft revision of report ITU-R SM.2351-1 on Smart Grid utility management systems (ITU-R WP1A/TEMP/45; to: RAN, SA, 3GPP2, ARIB, ATIS, CCSA, CDG, ETSI, IEEE, ITRI, GSMA, TIA, TTA, Wi-Fi Alliance; cc: -; contact: Counselor ITU-R SG1) | ITU-R WP1A | LS in | - | - | - | - | .. | - | - | | | no explicit RAN action requested; but compare RP-161330 sent from RAN #72 via SA and PCG; see a related input in RP-170513 from Ericsson | | ITU-R WP1A/TEMP/45 | RAN, SA, 3GPP2, ARIB, ATIS, CCSA, CDG, ETSI, IEEE, ITRI, GSMA, TIA, TTA, Wi-Fi | - | | RP-170764 | 1/31/2017 21:27 | 1/31/2017 21:30 | | Joern Krause | 12578 | 290 | Yes | No | |
| 31 | | Yes | noted | 10.3.4 | RP-170030 | Reply LS to S2-170695 = RP-170022 on SA2 involvement for the light connection (S3i170035; to: SA2; cc: CT1, RAN2, RAN3, CT4, SA, RAN, CT; contact: BT) | SA3-LI | LS in | - | - | - | - | .. | Rel-14 | LTE_LIGHT_CON-Core | | | no RAN action requested | conclusion: no LS answer | S3i170035 | SA2 | CT1, RAN2, RAN3, CT4, SA, RAN, CT | S2-170695 = RP-170022 | | 1/31/2017 21:27 | 1/31/2017 21:30 | | Joern Krause | 12578 | 300 | Yes | No | |
| 32 | | Yes | noted | 10.3.14 | RP-170031 | LS Response to ETSI ITS LS ITS(17)000026r6 = RP-170027 on LTE-based vehicle-to-vehicle communications (R1-1704116; to: RAN; cc: RAN2, RAN4; contact: Huawei) | RAN1 | LS in | - | - | - | - | .. | Rel-14 | LTE_SL_V2V-Core | | | RAN action requested | moved from AI 10.8.1 to AI 10.3.14;<br>conclusion: no answer to RAN1 but used as basis for RP-170767 | R1-1704116 | RAN | RAN2, RAN4 | ETSI ITS LS ITS(17)000026r6 = RP-170027 | | 1/31/2017 21:27 | 2/21/2017 8:46 | | Joern Krause | 12578 | 271 | Yes | No | |
| 33 | | Yes | noted | 13.5.6 | RP-170032 | Reply LS to RP-162346 on RMC configurations for NB-IoT RF tests (R4-1702006; to: RAN5; cc: RAN; contact: China Mobile) | RAN4 | LS in | - | - | - | - | .. | Rel-13 | NB_IOT | | | no RAN action requested | RAN5 chair: is already addressed<br>conclusion: no LS answer from RAN | R4-1702006 | RAN5 | RAN | RP-162346 | | 1/31/2017 21:27 | 2/21/2017 8:46 | | Joern Krause | 12578 | 320 | Yes | No | |
| 34 | | Yes | noted | 9.1 | RP-170033 | LS on PWS support in 5G System (S2-171310; to: CT1; cc: CT, RAN, SA; contact: KDDI) | SA2 | LS in | - | - | - | - | .. | Rel-15 | 5GS_Ph1 | | | no RAN action requested | moved from AI 9.2.1 to AI 9.1<br>conclusion: no LS answer to SA2 but will clarify the support in the WID | S2-171310 | CT1 | CT, RAN, SA | | | 1/31/2017 21:27 | 2/21/2017 8:46 | | Joern Krause | 12578 | 2350 | Yes | No | |
| 35 | | Yes | noted | 9 | RP-170034 | LS on interworking and migration for 5GS and EPS (including Option 3) (S2-171591; to: SA, RAN; cc: RAN2, RAN3, CT; contact: NTT DOCOMO) | SA2 | LS in | - | - | - | - | .. | Rel-15 | 5GS_Ph1 | | | no explicit RAN action requested; previous LS S2-166288 = RP-161961 was received at RAN #74 | moved from AI 9.2.1 to AI 9<br>conclusion: no LS answer from RAN but we will treat this LS also in joint SA-RAN session on Wed | S2-171591 | SA, RAN | RAN2, RAN3, CT | | | 1/31/2017 21:27 | 3/5/2017 21:53 | | Joern Krause | 12578 | 6700 | Yes | No | |
| 36 | | Yes | noted | 9.2.1 | RP-170035 | LS on N2 and N3 reference points for 5G system (S2-171611; to: RAN, SA; cc: CT, RAN3, CT4, CT1, SA3, RAN2; contact: Nokia) | SA2 | LS in | - | - | - | - | .. | Rel-15 | 5GS_Ph1 | | | no explicit RAN action requested; | conclusion: no LS answer, will discuss this in joint session SA-RAN on Wed evening | S2-171611 | RAN, SA | CT, RAN3, CT4, CT1, SA3, RAN2 | | | 1/31/2017 21:27 | 2/21/2017 8:46 | | Joern Krause | 12578 | 5000 | Yes | No | |
| 37 | | Yes | noted | 10.13.5 | RP-170036 | LS on Channeling arrangement and Least Restrictive Technical Conditions applicable to 1427-1518 MHz in CEPT (ECC_PT1_LS_170120a; to: RAN, RAN4; cc: -; contact: Ofcom) | ECC PT1 | LS in | - | - | - | - | .. | Rel-15 | LTE_SDL_1500ext | | | no explicit RAN action requested; | conclusion: no LS answer | ECC_PT1_LS_170120a | RAN, RAN4 | - | | | 1/31/2017 21:27 | 2/21/2017 8:46 | | Joern Krause | 12578 | 360 | Yes | No | |
| 38 | | Yes | noted | 9.2.1 | RP-170037 | Reply LS to R4-1610994 on Suitability of technical conditions of ECC DEC (11) 06 for 5G (ECC_PT1_LS_170120b; to: RAN4; cc: RAN; contact: Ofcom) | ECC PT1 | LS in | - | - | - | - | .. | Rel-14 | FS_NR_new RAT | | | note: R4-1610994 was not sent to/cc RAN; no RAN action requested | conclusion: no LS answer from RAN | ECC_PT1_LS_170120b | RAN4 | RAN | R4-1610994 | | 1/31/2017 21:27 | 2/21/2017 8:46 | | Joern Krause | 12578 | 370 | Yes | No | |


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| | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z | AA | AB | AC | AD | AE | AF | AG |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 39 | | Yes | noted | 10.3.17 | RP-170038 | Reply LS to S4-170219 = RP-170023 on RAN-Assisted Codec Adaptation (C3-171255; to: SA4, RAN2; cc: RAN3, RAN, SA2; contact: Nokia) | CT3 | LS in | - | - | - | - | .. | Rel-14 | LTE_VoLTE_ViLTE_enh-S4 | | | no RAN action requested | no LS answer | C3-171255 | SA4, RAN2 | RAN3, RAN, SA2 | S4-170219 = RP-170023 | | 1/31/2017 21:27 | 2/21/2017 8:52 | | Joern Krause | 12578 | 380 | Yes | No | |
| 40 | | Yes | noted | 10.3.16 | RP-170039 | Reply LS to S3-170485 on mobility enhancements for NB-IoT (R2-1702290; to: SA3, RAN; cc: RAN3, CT1, SA2; contact: Vodafone) | RAN2 | LS in | - | - | - | - | .. | Rel-14 | NB_IOTenh-Core | | | no RAN action requested; LS S3-170485 was not sent to/cc RAN | Nokia: SA3 has not taken a position so far?<br>RAN chair: we can see at RAN #76 from SA3 results whether RAN needs to change something<br>conclusion: no LS answer | R2-1702290 | SA3, RAN | RAN3, CT1, SA2 | S3-170485 | | 1/31/2017 21:27 | 3/5/2017 21:53 | | Joern Krause | 12578 | 390 | Yes | No | |
| 41 | | Yes | noted | 10.3.20 | RP-170040 | LS on Capabilities for Category 1bis UE (R2-1702390; to: RAN; cc: RAN4; contact: Qualcomm) | RAN2 | LS in | - | - | - | - | .. | Rel-14 | LTE_UE_cat_1RX-Core | | | RAN action requested | Intel: IncMon should be optional as well, increases power consumption in idle mode<br>RAN2 chair: RAN has an action but does not need to reply<br>conclusion: no LS answer | R2-1702390 | RAN | RAN4 | | | 1/31/2017 21:27 | 3/5/2017 21:53 | | Joern Krause | 12578 | 400 | Yes | No | |
| 42 | | Yes | noted | 9.2.1 | RP-170041 | LS to RAN on RAN4 recommendation for NR spectra (R4-1702510; to: RAN; cc: -; contact: NTT DOCOMO) | RAN4 | LS in | - | - | - | - | .. | Rel-14 | FS_NR_new RAT | | | no explicit RAN action requested; | no LS answer | R4-1702510 | RAN | - | | | 1/31/2017 21:27 | 3/5/2017 21:53 | | Joern Krause | 12578 | 77100 | Yes | No | |
| 43 | | Yes | noted | 10.3.14 | RP-170042 | LS on eV2X Normative Requirements Completion (S1-171461; to: RAN; cc: SA, CT; contact: LG) | SA1 | LS in | - | - | - | - | .. | Rel-15 | FS_eV2X | | | no explicit RAN action requested; note: SA1 is working already on REL-15 | conclusion: no LS answer | S1-171461 | RAN | SA, CT | | | 1/31/2017 21:27 | 3/5/2017 21:53 | | Joern Krause | 12578 | 420 | Yes | No | |
| 44 | | Yes | noted | 7 | RP-170043 | LS on Harmonised Standard under Directive 2014/53/EU for "Broadband radio equipment used for Public Protection and Disaster Relief below 1 GHz" (ERM(17)61034r1; to: RAN, RAN4, CEPT ECC, ETSI TC TCCE WG4; cc: ETSI TC TCCE, ETSI TC MSG/ERM; contact: BMWi) | ETSI TC ERM | LS in | - | - | - | - | .. | - | - | | | no RAN action requested | conclusion: no LS answer to ETSI TC ERM from RAN | ERM(17)61034r1 | RAN, RAN4, CEPT ECC, ETSI TC TCCE WG4 | ETSI TC TCCE, ETSI TC MSG/ERM | | | 1/31/2017 21:27 | 3/5/2017 21:53 | | Joern Krause | 12578 | 430 | Yes | No | |
| 45 | | Yes | replied to | 8.2 | RP-170044 | LS on Further information on the inviation for submission of proposals for candidate radio interface technologies for the terrestrial components of the radio interface(s) for IMT-2020 and invitation to participate in their subsequent evaluation (ITU-R WP5D/TEMP/279; to: RAN, CT, SA, 3GPP2, ARIB, ATIS, CCSA, ETSI, IEEE, ITRI, TIA, TSDSI, TTA, TTC, WiMAX Forum, EBU, WWRF, 4G Americas, CDG, GSMA, UMTS Forum, Wi-Fi Alliance, Wireless Innovation Forum, XGP Forum, EU METIS Project, NGMN, 5G Innovation Centre, 5GMF, IMT 2020 Promotion Group, APT Wireless Group, 5G Infrastructure Public Private Partnership, NYU Wireless, 5GAA; cc: -; contact: Counselor ITU-R SG5) | ITU-R WP5D | LS in | - | - | - | - | .. | - | - | | | RAN action requested; note: The link "further relevant information including the availability of Document IMT-2020/2" does not work; | | ITU-R WP5D/TEMP/279 | RAN, CT, SA, 3GPP2, ARIB, ATIS, CCSA, ETSI, IEEE, ITRI, TIA, TSDSI, TTA, TTC, WiMAX Forum, EBU, WWRF, 4G Americas, CDG, GSMA, UMTS Forum, Wi-Fi Alliance, Wireless Innovation Forum, XGP Forum, EU METIS Project | - | | RP-170757 | 1/31/2017 21:27 | 3/5/2017 21:53 | | Joern Krause | 12578 | 450 | Yes | No | |

| | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z | AA | AB | AC | AD | AE | AF | AG |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 46 | | Yes | replied to | 8.2 | RP-170045 | LS on ITU-R WORKING PARTY 5D workshop on IMT-2020 (ITU-R WP5D/TEMP/287; to: RAN, CT, SA, 3GPP2, ARIB, ATIS, CCSA, ETSI, IEEE, ITRI, TIA, TSDSI, TTA, TTC, WiMAX Forum, EBU, WWRF, 4G Americas, CDG, GSMA, UMTS Forum, Wi-Fi Alliance, Wireless Innovation Forum, XGP Forum, EU METIS Project, NGMN, 5G Innovation Centre, 5GMF, IMT 2020 Promotion Group, APT Wireless Group, 5G Infrastructure Public Private Partnership, NYU Wireless, 5GAA; cc: -; Counselor ITU-R SG5) | ITU-R WP5D | LS in | - | - | - | - | .. | - | - | | | RAN action requested | ITU-R ad hoc convener: suggests that new RAN chairman or another representative of 3GPP will present the 3GPP status for IMT-2020 at the workshop in Oct.2017 (probably in Canada) | ITU-R WP5D/TEMP/287 | RAN, CT, SA, 3GPP2, ARIB, ATIS, CCSA, ETSI, IEEE, ITRI, TIA, TSDSI, TTA, TTC, WiMAX Forum, EBU, WWRF, 4G Americas, CDG, GSMA, UMTS Forum, Wi-Fi Alliance, Wireless Innovation Forum, XGP Forum, EU METIS Project | - | | RP-170757 | 1/31/2017 21:27 | 3/5/2017 21:53 | | Joern Krause | 12578 | 451 | Yes | No | |
| 47 | | Yes | replied to | 8.3 | RP-170046 | LS on the schedule for updating Recommendation ITU-R M.1457 to revision 14 (ITU-R WP5D/TEMP/255r1; to: RAN, CT, SA, 3GPP2, ARIB, ATIS, CCSA, ETSI, IEEE, TIA, TSDSI, TTA, TTC, WiMAX Forum; cc: -; contact: Counselor ITU-R SG5) | ITU-R WP5D | LS in | - | - | - | - | .. | - | - | | | note: The link "The procedure outlined in Document IMT-2000/3(Rev.2)" does not work. | conclusions: agreements:<br>- we will contribute<br>- 3 inputs<br>RAN75: first input, see RP-170734<br>RAN #78: 2nd input<br>RAN #79: final input<br>- REL-13/REL-14 specifications will be provided | ITU-R WP5D/TEMP/255r1 | RAN, CT, SA, 3GPP2, ARIB, ATIS, CCSA, ETSI, IEEE, TIA, TSDSI, TTA, TTC, WiMAX Forum | - | | RP-170734 | 1/31/2017 21:27 | 3/5/2017 21:53 | | Joern Krause | 12578 | 460 | Yes | No | |
| 48 | | Yes | noted | 8.4 | RP-170047 | Draft reply LTI to ITU-R WP5A/TEMP/131(Rev.1) = RP-161979 on Intelligent Transport Systems (ITS) (RT-170005; to: RAN; cc: -; contact: Telecom Italia) | 3GPP ITU-R ad hoc | LS in | - | - | - | - | .. | - | - | | | RT-170005 = RP-170047 is preparing a reply LS to ITU-R WP5A 5A/TEMP/131(Rev.1) = RP-161979; RAN action requested; result from RAN has to be send to SA for review and from there to PCG for review and PCG will send it out to: ITU-R WP5A; cc: ITU-R WP5D, CCSA | conclusion: noted, no LS answer to ITU-R ad hoc but RP-170047 is used as a basis for the LSout RP-170763 | RT-170005 | RAN | - | | | 1/31/2017 21:27 | 3/5/2017 21:53 | | Joern Krause | 12578 | 470 | Yes | No | |
| 49 | | Yes | noted | 7 | RP-170048 | LS on NGMN Recommendations regarding the Transparency of SEP Disclosures (NGMN_LS_170127; to: RAN, CT, SA, ATIS, ITU, ISO, IEC, ETSI, CEN/CENELEC, IEEE, BBF, TMF, MEF; cc: -; contact: Orange) | NGMN | LS in | - | - | - | - | .. | - | - | | | no RAN action requested; note: The reference document "5G White Paper" cannot be attached ("No part of this document may be reproduced or transmitted in any form or by any means without prior written permission from NGMN Ltd.") | presented by Telecom Italia;<br>conclusion: no LS answer to NGMN from RAN | NGMN_LS_170127 | RAN, CT, SA, ATIS, ITU, ISO, IEC, ETSI, CEN/CENELEC, IEEE, BBF, TMF, MEF | - | | | 1/31/2017 21:27 | 3/5/2017 21:53 | | Joern Krause | 12578 | 480 | Yes | No | |
| 50 | | Yes | noted | 10.3.14 | RP-170049 | LS from NGMN V2X Task-Force to 3GPP (NGMN_LS_170122; to: RAN, SA; contact: CMCC) | NGMN | LS in | - | - | - | - | .. | Rel-14 | LTE_V2X | | | | conclusion: no LS answer | NGMN_LS_170122 | RAN, SA | - | | | 1/31/2017 21:27 | 3/5/2017 21:53 | | Joern Krause | 12578 | 490 | Yes | No | |
| 51 | | Yes | noted | 7 | RP-170050 | LS on Test of Technology Building Blocks phase of the Trial and Testing Initiative (NGMN_LS_170227b; to: RAN, SA; cc: -; contact: KT) | NGMN | LS in | - | - | - | - | .. | - | - | | | no RAN action requested | conclusion: no LS answer to NGMN from RAN | NGMN_LS_170127b | RAN, SA | - | | | 2/2/2017 20:54 | 3/5/2017 21:53 | | Joern Krause | 12578 | 500 | Yes | No | |
| 52 | RAN4 | Yes | revised | 10.1.5 | RP-170051 | New WI: US 600 MHz Band for LTE | T-Mobile USA Inc. | WID new | - | - | - | - | .. | Rel-15 | - | RP-170740 | | new WI for LTE; leading WG: RAN4 | | | - | - | | | 2/3/2017 15:27 | 2/21/2017 8:18 | | Scott Migaldi | 66486 | 510 | Yes | No | Approval |

| | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z | AA | AB | AC | AD | AE | AF | AG |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 53 | RAN4 | Yes | revised | 10.5.10 | RP-170052 | Revised WID: Core part: Addition of 1.4 and 3 MHz Channel Bandwidth to E-UTRA operating band 65 for CGC (Complementary Ground Component) operations in Region 1 | HUGHES Network Systems Ltd | WID revised | - | - | - | - | .. | Rel-14 | LTE_1980_2170_REG1_addBWs-Core | RP-170235 | RP-162515 | last approved WID: RP-162515 | | | - | - | | | 2/7/2017 18:50 | 2/7/2017 19:08 | | Seth Parkoff | 49571 | 2350 | Yes | No | Approval |
| 54 | | No | withdrawn | 9.1 | RP-170053 | Spectrum needs for NR Release 15 | T-Mobile USA Inc. | discussion | - | - | - | - | .. | Rel-15 | - | | | Initial spectrum needed to be developed into bands for NR in Release 15 including discussion on refarming LTE bands for NR support. | moved from AI 9.4 to AI 9.1 | | - | - | | | 2/16/2017 21:01 | | | Scott Migaldi | 66486 | 2440 | Yes | Yes | Decision |
| 55 | | Yes | noted | 13.5.8 | RP-170054 | Status report for UE Conformance Test Aspects - Further Enhancements of Minimization of Drive Tests for E-UTRAN (Rel-13) | Intel Corporation (UK) Ltd | WI status report | - | - | - | - | .. | Rel-13 | LTE_eMDT2-UEConTest | | | | conclusion: noted; approved: 100%, March 17; WI completed | | - | - | | | 2/16/2017 22:18 | 2/23/2017 19:13 | | Anjali Mishra | 49861 | 540 | Yes | No | |
| 56 | | Yes | noted | 13.5.5 | RP-170055 | Status report for UE Conformance Test Aspects – Wireless Local Area Network (WLAN) – 3GPP Radio Level Integration and Interworking Enhancements (Rel-13) | Intel Corporation (UK) Ltd | WI status report | - | - | - | - | .. | Rel-13 | LTE_WLAN_radio-UEConTest | | | | conclusion: noted; approved: 27%, Sep.17 | | - | - | | | 2/16/2017 23:05 | 2/23/2017 19:16 | | Anjali Mishra | 49861 | 550 | Yes | No | |
| 57 | | Yes | noted | 13.6.5 | RP-170056 | Status report for UE Conformance Test Aspects – Enhanced LAA for LTE | Intel Corporation (UK) Ltd | WI status report | - | - | - | - | .. | Rel-14 | LTE_eLAA-UEConTest | | | | conclusion: noted; approved: 5%, Sep.17 | | - | - | | | 2/17/2017 0:19 | 2/23/2017 19:12 | | Anjali Mishra | 49861 | 560 | Yes | No | |
| 58 | RAN6 | Yes | approved | 12.2.1 | RP-170057 | WI exception request for Core part: Positioning Enhancements for GERAN | Ericsson | WI exception request | - | - | - | - | .. | Rel-14 | ePOS_GERAN-Core | | | | | | - | - | | | 2/21/2017 14:45 | 2/24/2017 12:46 | | Paolino Usai | 3209 | 5510 | Yes | No | Approval |
| 59 | RAN6 | Yes | approved | 12.2.2 | RP-170058 | WI exception request for Core part: Radio Interface Enhancements for Extended Coverage GSM for support of Cellular Internet of Things | Nokia | WI exception request | - | - | - | - | .. | Rel-14 | CIoT_EC_GSM_radio_enh-Core | | | | | | - | - | | | 2/21/2017 14:47 | 2/24/2017 12:46 | | Paolino Usai | 3209 | 4740 | Yes | No | Approval |
| 60 | | Yes | noted | 10.13.1 | RP-170059 | Status report of WI 450MHz E-UTRA FDD Band for LTE PPDR and PMR/PAMR in Europe; rapporteur: Airbus DS SLC | RAN4 | WI status report | - | - | - | - | .. | Rel-15 | LTE450_Europe_PPDR | | | | conclusion: noted; approved: Core: 10%, Sep.17; Perf.: 0%, March 17; Perf. part is stopped | | - | - | | | 2/21/2017 14:48 | 3/5/2017 21:53 | | Eric Georgeaux | 38175 | 590 | Yes | No | |
| 61 | | Yes | approved | 12.2.1 | RP-170060 | RAN6 agreed CRs for REL-14 WI: Positioning Enhancements for GERAN (ePOS_GERAN-Core) | RAN6 | CR pack | - | - | - | - | .. | Rel-14 | ePOS_GERAN-Core | | | | | | - | - | | | 2/21/2017 14:49 | 2/24/2017 12:47 | | Paolino Usai | 3209 | 600 | Yes | No | Approval |
| 62 | flag M | Yes | partially approved | 12.2.2 | RP-170061 | RAN6 agreed CRs for REL-14 WI: Radio Interface Enhancements for Extended Coverage GSM for support of Cellular Internet of Things (CIoT_EC_GSM_radio_enh) | RAN6 | CR pack | - | - | - | - | .. | Rel-14 | CIoT_EC_GSM_radio_enh | | | MCC: CR R6-170138 has WI code ePOS_GERAN-Perf and does not belong into this CRpack; it is therefore reissued in RP-170551 | conclusion: all CRs approved except R6-170138 which is reissued in RP-170551 | | - | - | | | 2/21/2017 14:51 | 2/24/2017 12:47 | | Paolino Usai | 3209 | 610 | Yes | No | Approval |
| 63 | | Yes | approved | 12.3 | RP-170062 | RAN6 agreed CRs for REL-14 WI Small Technical Enhancements and Improvements for REL-14 (TEI14) | RAN6 | CR pack | - | - | - | - | .. | Rel-14 | TEI14 | | | | | | - | - | | | 2/21/2017 14:52 | 2/24/2017 12:47 | | Paolino Usai | 3209 | 620 | Yes | No | Approval |
| 64 | | Yes | approved | 14.6.6 | RP-170063 | RAN6 agreed CRs for REL-13 WI Core Part: Extended DRX (eDRX) for GSM (eDRX_GSM) | RAN6 | CR pack | - | - | - | - | .. | Rel-13 | eDRX_GSM | | | | | | - | - | | | 2/21/2017 14:53 | 2/24/2017 12:47 | | Paolino Usai | 3209 | 630 | Yes | No | Approval |
| 65 | | Yes | approved | 14.6.6 | RP-170064 | RAN6 agreed CRs for REL-13 WI: Extended Coverage GSM (EC-GSM) for support of Cellular Internet of Things (CIoT_EC_GSM) | RAN6 | CR pack | - | - | - | - | .. | Rel-13 | CIoT_EC_GSM | | | | | | - | - | | | 2/21/2017 14:54 | 2/24/2017 12:48 | | Paolino Usai | 3209 | 640 | Yes | No | Approval |
| 66 | | Yes | noted | 10.13.2 | RP-170065 | Status report of WI E-UTRA 700MHz in Europe for Broadband-PPDR; rapporteur: Airbus DS SLC | RAN4 | WI status report | - | - | - | - | .. | Rel-15 | LTE700_Europe_PPDR | | | | conclusion: noted; approved: Core: 25%, Sep.17; Perf.: 0%, Sep.17 | | - | - | | | 2/21/2017 15:49 | 3/5/2017 21:53 | | Eric Georgeaux | 38175 | 650 | Yes | No | |
| 67 | | Yes | approved | 13.3.1 | RP-170066 | RAN5 agreed non TTCN CR(s) WI UE Conformance Test Aspects – Multimedia Telephony Services for IMS (MTSI) over fixed access(MTSI_FIXED_ACCESS-UEConTest) | RAN5 | CR pack | - | - | - | - | .. | Rel-7 | MTSI_FIXED_ACCESS-UEConTest | | | | | | - | - | | | 2/21/2017 18:02 | 3/5/2017 21:53 | | Ingbert Sigovich | 28887 | 1350 | Yes | No | Approval |


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| | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z | AA | AB | AC | AD | AE | AF | AG |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 68 | | Yes | approved | 13.4.1 | RP-170067 | RAN5 agreed non TTCN CR(s) WI UE Conformance Test Aspects – UE Conformance Test Aspects – LTE Device-to-Device Proximity Services (LTE_D2D_PROX-UEConTest) | RAN5 | CR pack | - | - | - | - | .. | Rel-12 | LTE_D2D_Prox-UEConTest | | | | | | - | - | | | 2/21/2017 18:02 | 3/5/2017 21:53 | | Ingbert Sigovich | 28887 | 2540 | Yes | No | Approval |
| 69 | | Yes | approved | 13.4.2 | RP-170068 | RAN5 agreed non TTCN CR(s) WI UE Conformance Test Aspects - E-UTRA Small cell enhancements - Physical layer aspects (LTE_SC_enh_L1-UEConTest) | RAN5 | CR pack | - | - | - | - | .. | Rel-12 | LTE_SC_enh_L1-UEConTest | | | | | | - | - | | | 2/21/2017 18:02 | 3/5/2017 21:53 | | Ingbert Sigovich | 28887 | 3140 | Yes | No | Approval |
| 70 | | Yes | approved | 13.4.3 | RP-170069 | RAN5 agreed non TTCN CR(s) WI UE Conformance Test Aspects - Dual connectivity for LTE (LTE_SC_enh_dualC-UEConTest) | RAN5 | CR pack | - | - | - | - | .. | Rel-12 | LTE_SC_enh_dualC-UEConTest | | | | | | - | - | | | 2/21/2017 18:02 | 3/5/2017 21:53 | | Ingbert Sigovich | 28887 | 4970 | Yes | No | Approval |
| 71 | | Yes | approved | 13.4.4 | RP-170070 | RAN5 agreed non TTCN CR(s) WI UE Conformance Test Aspects: Network-Assisted Interference Cancellation and Suppression for LTE (LTE_NAICS-UEConTest) | RAN5 | CR pack | - | - | - | - | .. | Rel-12 | LTE_NAICS-UEConTest | | | | | | - | - | | | 2/21/2017 18:02 | 3/5/2017 21:53 | | Ingbert Sigovich | 28887 | 4670 | Yes | No | Approval |
| 72 | | Yes | approved | 13.4.6 | RP-170071 | RAN5 agreed non TTCN CR(s) WI UE Conformance Test Aspects: Increasing the minimum number of carriers for UE monitoring in UTRA and E-UTRA (LTE_UTRA_IncMon-UEConTest) | RAN5 | CR pack | - | - | - | - | .. | Rel-12 | LTE_UTRA_IncMon-UEConTest | | | | | | - | - | | | 2/21/2017 18:02 | 3/5/2017 21:53 | | Ingbert Sigovich | 28887 | 4980 | Yes | No | Approval |
| 73 | | Yes | approved | 13.5.1 | RP-170072 | RAN5 agreed non TTCN CR(s) WI UE Conformance Test Aspects - Rel-13 LTE CA configurations (LTE_CA_Rel13-UEConTest) (Batch 1) | RAN5 | CR pack | - | - | - | - | .. | Rel-13 | LTE_CA_Rel13-UEConTest | | | | | | - | - | | | 2/21/2017 18:02 | 3/5/2017 21:53 | | Ingbert Sigovich | 28887 | 720 | Yes | No | Approval |
| 74 | | Yes | approved | 13.5.1 | RP-170073 | RAN5 agreed non TTCN CR(s) WI UE Conformance Test Aspects - Rel-13 LTE CA configurations (LTE_CA_Rel13-UEConTest) (Batch 2) | RAN5 | CR pack | - | - | - | - | .. | Rel-13 | LTE_CA_Rel13-UEConTest | | | | | | - | - | | | 2/21/2017 18:02 | 3/5/2017 21:53 | | Ingbert Sigovich | 28887 | 740 | Yes | No | Approval |
| 75 | | Yes | approved | 13.5.1 | RP-170074 | RAN5 agreed non TTCN CR(s) WI UE Conformance Test Aspects - Rel-13 LTE CA configurations (LTE_CA_Rel13-UEConTest) (Batch 3) | RAN5 | CR pack | - | - | - | - | .. | Rel-13 | LTE_CA_Rel13-UEConTest | | | | | | - | - | | | 2/21/2017 18:02 | 3/5/2017 21:53 | | Ingbert Sigovich | 28887 | 4990 | Yes | No | Approval |
| 76 | | Yes | approved | 13.5.2 | RP-170075 | RAN5 agreed non TTCN CR(s) WI UE Conformance Test Aspects - LTE DL 4 Rx antenna ports (LTE_4Rx_AP_DL-UEConTest) | RAN5 | CR pack | - | - | - | - | .. | Rel-13 | LTE_4Rx_AP_DL-UEConTest | | | | | | - | - | | | 2/21/2017 18:02 | 3/5/2017 21:53 | | Ingbert Sigovich | 28887 | 5000 | Yes | No | Approval |
| 77 | | Yes | approved | 13.5.3 | RP-170076 | RAN5 agreed non TTCN CR(s) WI UE Conformance Test Aspects - Licensed-Assisted Access using LTE (LTE_LAA-UEConTest) | RAN5 | CR pack | - | - | - | - | .. | Rel-13 | LTE_LAA-UEConTest | | | | | | - | - | | | 2/21/2017 18:02 | 3/5/2017 21:53 | | Ingbert Sigovich | 28887 | 2550 | Yes | No | Approval |
| 78 | | Yes | approved | 13.5.4 | RP-170077 | RAN5 agreed non TTCN CR(s) WI UE Conformance Test Aspects - Further LTE Physical Layer Enhancements for MTC (LTE_MTCe2_L1-UEConTest) (Batch 1) | RAN5 | CR pack | - | - | - | - | .. | Rel-13 | LTE_MTCe2_L1-UEConTest | | | | | | - | - | | | 2/21/2017 18:02 | 3/5/2017 21:53 | | Ingbert Sigovich | 28887 | 780 | Yes | No | Approval |
| 79 | | Yes | approved | 13.5.4 | RP-170078 | RAN5 agreed non TTCN CR(s) WI UE Conformance Test Aspects - Further LTE Physical Layer Enhancements for MTC (LTE_MTCe2_L1-UEConTest) (Batch 2) | RAN5 | CR pack | - | - | - | - | .. | Rel-13 | LTE_MTCe2_L1-UEConTest | | | | | | - | - | | | 2/21/2017 18:02 | 3/5/2017 21:53 | | Ingbert Sigovich | 28887 | 790 | Yes | No | Approval |

| | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z | AA | AB | AC | AD | AE | AF | AG |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 80 | | Yes | approved | 13.5.4 | RP-170079 | RAN5 agreed non TTCN CR(s) WI UE Conformance Test Aspects - Further LTE Physical Layer Enhancements for MTC (LTE_MTCe2_L1-UEConTest) (Batch 3) | RAN5 | CR pack | - | - | - | - | .. | Rel-13 | LTE_MTCe2_L1-UEConTest | | | | | | - | - | | | 2/21/2017 18:02 | 3/5/2017 21:53 | | Ingbert Sigovich | 28887 | 800 | Yes | No | Approval |
| 81 | | Yes | approved | 13.5.4 | RP-170080 | RAN5 agreed non TTCN CR(s) WI UE Conformance Test Aspects - Further LTE Physical Layer Enhancements for MTC (LTE_MTCe2_L1-UEConTest) (Batch 4) | RAN5 | CR pack | - | - | - | - | .. | Rel-13 | LTE_MTCe2_L1-UEConTest | | | | | | - | - | | | 2/21/2017 18:02 | 3/5/2017 21:53 | | Ingbert Sigovich | 28887 | 5010 | Yes | No | Approval |
| 82 | | Yes | approved | 13.5.5 | RP-170081 | RAN5 agreed non TTCN CR(s) WI UE Conformance Test Aspects - WLAN/3GPP Radio Level Integration and Interworking Enhancement Interworking (LTE_WLAN_radio-UEConTest) | RAN5 | CR pack | - | - | - | - | .. | Rel-13 | LTE_WLAN_radio-UEConTest | | | | | | - | - | | | 2/21/2017 18:02 | 3/5/2017 21:53 | | Ingbert Sigovich | 28887 | 810 | Yes | No | Approval |
| 83 | | Yes | approved | 13.5.6 | RP-170082 | RAN5 agreed non TTCN CR(s) WI UE Conformance Test Aspects - Narrowband Internet of Things (NB-IOT) (NB_IOT-UEConTest) (Batch 1) | RAN5 | CR pack | - | - | - | - | .. | Rel-13 | NB_IOT-UEConTest | | | | | | - | - | | | 2/21/2017 18:02 | 3/5/2017 21:53 | | Ingbert Sigovich | 28887 | 830 | Yes | No | Approval |
| 84 | | Yes | partially approved | 13.5.6 | RP-170083 | RAN5 agreed non TTCN CR(s) WI UE Conformance Test Aspects - Narrowband Internet of Things (NB-IOT) (NB_IOT-UEConTest) (Batch 2) | RAN5 | CR pack | - | - | - | - | .. | Rel-13 | NB_IOT-UEConTest | | | | MCC: it turned out that R5-170946 was at the end not agreed by RAN5<br>conclusion: All CRs of RP-170083 are approved except R5-170946 which is withdrawn | | - | - | | | 2/21/2017 18:02 | 3/5/2017 21:53 | | Ingbert Sigovich | 28887 | 840 | Yes | No | Approval |
| 85 | | Yes | approved | 13.5.6 | RP-170084 | RAN5 agreed non TTCN CR(s) WI UE Conformance Test Aspects - Narrowband Internet of Things (NB-IOT) (NB_IOT-UEConTest) (Batch 3) | RAN5 | CR pack | - | - | - | - | .. | Rel-13 | NB_IOT-UEConTest | | | | | | - | - | | | 2/21/2017 18:02 | 3/5/2017 21:53 | | Ingbert Sigovich | 28887 | 850 | Yes | No | Approval |
| 86 | | Yes | approved | 13.5.6 | RP-170085 | RAN5 agreed non TTCN CR(s) WI UE Conformance Test Aspects - Narrowband Internet of Things (NB-IOT) (NB_IOT-UEConTest) (Batch 4) | RAN5 | CR pack | - | - | - | - | .. | Rel-13 | NB_IOT-UEConTest | | | | | | - | - | | | 2/21/2017 18:02 | 3/5/2017 21:53 | | Ingbert Sigovich | 28887 | 3660 | Yes | No | Approval |
| 87 | | Yes | approved | 13.5.7 | RP-170086 | RAN5 agreed non TTCN CR(s) WI UE Conformance Test Aspects – Indoor Positioning Enhancement Support for LTE and UMTS (UTRA_LTE_iPos_enh-UEConTest) | RAN5 | CR pack | - | - | - | - | .. | Rel-13 | UTRA_LTE_iPos_enh-UEConTest | | | | | | - | - | | | 2/21/2017 18:02 | 3/5/2017 21:53 | | Ingbert Sigovich | 28887 | 860 | Yes | No | Approval |
| 88 | | Yes | approved | 13.5.8 | RP-170087 | RAN5 agreed non TTCN CR(s) WI MS Conformance Test Aspects - Further Enhancements of Minimization of Drive Tests for E-UTRAN (LTE_eMDT2-UEConTest) | RAN5 | CR pack | - | - | - | - | .. | Rel-13 | LTE_eMDT2-UEConTest | | | | | | - | - | | | 2/21/2017 18:02 | 3/5/2017 21:53 | | Ingbert Sigovich | 28887 | 870 | Yes | No | Approval |
| 89 | | Yes | approved | 13.6.1 | RP-170088 | RAN5 agreed non TTCN CR(s) WI MS Conformance Test Aspects - LTE UE TRP and TRS and UTRA Hand Phantom (LTE_UTRA_TRP_TRS-UEConTest) | RAN5 | CR pack | - | - | - | - | .. | Rel-14 | LTE_UTRA_TRP_TRS-UEConTest | | | | | | - | - | | | 2/21/2017 18:02 | 3/5/2017 21:53 | | Ingbert Sigovich | 28887 | 2250 | Yes | No | Approval |
| 90 | | Yes | approved | 13.6.2 | RP-170089 | RAN5 agreed non TTCN CR(s) WI UE Conformance Test Aspects - Rel-14 CA configurations (LTE_CA_R14-UEConTest) | RAN5 | CR pack | - | - | - | - | .. | Rel-14 | LTE_CA_R14-UEConTest | | | | | | - | - | | | 2/21/2017 18:02 | 3/5/2017 21:53 | | Ingbert Sigovich | 28887 | 5020 | Yes | No | Approval |
| 91 | | Yes | approved | 13.6.3 | RP-170090 | RAN5 agreed non TTCN CR(s) WI MS Conformance Test Aspects - x (LTE_MIMO_OTA-UEConTest) | RAN5 | CR pack | - | - | - | - | .. | Rel-14 | LTE_MIMO_OTA-UEConTest | | | | | | - | - | | | 2/21/2017 18:02 | 3/5/2017 21:53 | | Ingbert Sigovich | 28887 | 1180 | Yes | No | Approval |
| 92 | | Yes | approved | 13.6.4 | RP-170091 | RAN5 agreed non TTCN CR(s) WI MS Conformance Test Aspects - Support for V2V services based on LTE sidelink (LTE_SL_V2V-UEConTest) | RAN5 | CR pack | - | - | - | - | .. | Rel-14 | LTE_SL_V2V-UEConTest | | | | | | - | - | | | 2/21/2017 18:02 | 3/5/2017 21:53 | | Ingbert Sigovich | 28887 | 3150 | Yes | No | Approval |



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| | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z | AA | AB | AC | AD | AE | AF | AG |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 93 | | Yes | approved | 13.6.6 | RP-170092 | RAN5 agreed non TTCN CR(s) WI MS Conformance Test Aspects - LTE Band 41 UE power class 2 operation (LTE_B41_UE_PC2-UEConTest) | RAN5 | CR pack | - | - | - | - | .. | Rel-14 | LTE_B41_UE_PC2-UEConTest | | | | | | - | - | | | 2/21/2017 18:02 | 3/5/2017 21:53 | | Ingbert Sigovich | 28887 | 2240 | Yes | No | Approval |
| 94 | | Yes | approved | 13.6.7 | RP-170093 | RAN5 agreed non TTCN CR(s) under WI UE Conformance Test Aspects – Citizens Broadband Radio Service (CBRS) 3.5GHz Band for LTE in the United States (Band 48) (LTE_TDD_3550_CBRS_US-UEConTest) | RAN5 | CR pack | - | - | - | - | .. | Rel-14 | LTE_TDD_3550_CBRS_US-UEConTest | | | | | | - | - | | | 2/21/2017 18:02 | 3/5/2017 21:53 | | Ingbert Sigovich | 28887 | 5050 | Yes | No | Approval |
| 95 | | Yes | approved | 14.5.1 | RP-170094 | RAN5 agreed non TTCN CR(s) under WI Small Technical Enhancements and Improvements for Rel 99 Conformance Testing(TEI_Test) | RAN5 | CR pack | - | - | - | - | .. | Rel-4 | TEI_Test | | | | | | - | - | | | 2/21/2017 18:02 | 3/5/2017 21:53 | | Ingbert Sigovich | 28887 | 940 | Yes | No | Approval |
| 96 | | Yes | approved | 14.5.1 | RP-170095 | RAN5 agreed non TTCN CR(s) under WI Small Technical Enhancements and Improvements for Rel-8 Conformance Testing(TEI8_Test) (Batch 1) | RAN5 | CR pack | - | - | - | - | .. | Rel-8 | TEI8_Test | | | | | | - | - | | | 2/21/2017 18:02 | 3/5/2017 21:53 | | Ingbert Sigovich | 28887 | 950 | Yes | No | Approval |
| 97 | | Yes | approved | 14.5.1 | RP-170096 | RAN5 agreed non TTCN CR(s) under WI Small Technical Enhancements and Improvements for Rel-8 Conformance Testing(TEI8_Test) (Batch 2) | RAN5 | CR pack | - | - | - | - | .. | Rel-8 | TEI8_Test | | | | | | - | - | | | 2/21/2017 18:02 | 3/5/2017 21:53 | | Ingbert Sigovich | 28887 | 960 | Yes | No | Approval |
| 98 | | Yes | approved | 14.5.1 | RP-170097 | RAN5 agreed non TTCN CR(s) under WI Small Technical Enhancements and Improvements for Rel-9 Conformance Testing(TEI9_Test) | RAN5 | CR pack | - | - | - | - | .. | Rel-9 | TEI9_Test | | | | | | - | - | | | 2/21/2017 18:02 | 3/5/2017 21:53 | | Ingbert Sigovich | 28887 | 970 | Yes | No | Approval |
| 99 | WI code? | Yes | approved | 14.5.4 | RP-170098 | CR to 34.229-3: Add new verified and e-mail agreed TTCN test cases in the TC lists in 34.229-3 (prose), Annex A | RAN5 | CR pack | 34.229-3 | - | - | - | .. | Rel-13 | - | | | | | | - | - | | | 2/21/2017 18:02 | 3/5/2017 21:53 | | Ingbert Sigovich | 28887 | 980 | Yes | No | Approval |
| 100 | WI code? | Yes | approved | 14.5.4 | RP-170099 | CR to 34.229-3: Add new verified and e-mail agreed TTCN test cases in the TC lists in 34.229-3 (TTCN), Annex A | RAN5 | CR pack | 34.229-3 | - | - | - | .. | Rel-13 | - | | | | | | - | - | | | 2/21/2017 18:02 | 3/5/2017 21:53 | | Ingbert Sigovich | 28887 | 990 | Yes | No | Approval |
| 101 | WI code? | Yes | approved | 14.5.4 | RP-170100 | CR to 34.123-3: Add new verified and e-mail agreed TTCN test cases in the TC lists in 34.123-3 (prose), Annex A | RAN5 | CR pack | 34.123-3 | - | - | - | .. | Rel-13 | - | | | | | | - | - | | | 2/21/2017 18:02 | 3/5/2017 21:53 | | Ingbert Sigovich | 28887 | 1000 | Yes | No | Approval |
| 102 | WI code? | Yes | approved | 14.5.4 | RP-170101 | CR to 34.123-3: Add new verified and e-mail agreed TTCN test cases in the TC lists in 34.123-3 (TTCN), Annex A | RAN5 | CR pack | 34.123-3 | - | - | - | .. | Rel-13 | - | | | | | | - | - | | | 2/21/2017 18:02 | 3/5/2017 21:53 | | Ingbert Sigovich | 28887 | 1010 | Yes | No | Approval |
| 103 | WI code? | Yes | approved | 14.5.4 | RP-170102 | CR to 36.523-3: Add new verified and e-mail agreed TTCN test cases in the TC lists in 36.523-3 (prose), Annex A | RAN5 | CR pack | 36.523-3 | - | - | - | .. | Rel-13 | - | | | | | | - | - | | | 2/21/2017 18:02 | 3/5/2017 21:53 | | Ingbert Sigovich | 28887 | 1020 | Yes | No | Approval |
| 104 | WI code? | Yes | approved | 14.5.4 | RP-170103 | CR to 36.523-3: Add new verified and e-mail agreed TTCN test cases in the TC lists in 36.523-3 (TTCN), Annex A | RAN5 | CR pack | 36.523-3 | - | - | - | .. | Rel-13 | - | | | | | | - | - | | | 2/21/2017 18:02 | 3/5/2017 21:53 | | Ingbert Sigovich | 28887 | 1030 | Yes | No | Approval |
| 105 | WI code? | Yes | approved | 14.5.4 | RP-170104 | CR to 37.751-4: Add new verified and e-mail agreed TTCN test cases in the TC lists in 37.571-4 (prose), Annex A | RAN5 | CR pack | 37.571-4 | - | - | - | .. | Rel-13 | - | | | | | | - | - | | | 2/21/2017 18:02 | 3/5/2017 21:53 | | Ingbert Sigovich | 28887 | 1040 | Yes | No | Approval |
| 106 | WI code? | Yes | approved | 14.5.4 | RP-170105 | CR to 37.571-4: Add new verified and e-mail agreed TTCN test cases in the TC lists in 37.571-4 (TTCN), Annex A | RAN5 | CR pack | 37.571-4 | - | - | - | .. | Rel-13 | - | | | | | | - | - | | | 2/21/2017 18:02 | 3/5/2017 21:53 | | Ingbert Sigovich | 28887 | 1050 | Yes | No | Approval |
| 107 | | Yes | approved | 14.5.1 | RP-170106 | RAN5 agreed non TTCN CR(s) under WI Small Technical Enhancements and Improvements for Rel-10 Conformance Testing (TEI10_Test) | RAN5 | CR pack | - | - | - | - | .. | Rel-10 | TEI10_Test | | | | | | - | - | | | 2/21/2017 18:02 | 3/5/2017 21:53 | | Ingbert Sigovich | 28887 | 1060 | Yes | No | Approval |

| | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z | AA | AB | AC | AD | AE | AF | AG |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 108 | | Yes | approved | 14.5.2 | RP-170107 | RAN5 agreed non TTCN CR(s) under WI Small Technical Enhancements and Improvements for Rel-11 Conformance Testing (TEI11_Test) | RAN5 | CR pack | - | - | - | - | .. | Rel-11 | TEI11_Test | | | | | | - | - | | | 2/21/2017 18:02 | 3/5/2017 21:53 | | Ingbert Sigovich | 28887 | 1070 | Yes | No | Approval |
| 109 | | Yes | approved | 14.5.3 | RP-170108 | RAN5 agreed non TTCN CR(s) under WI Small Technical Enhancements and Improvements for Rel-12 Conformance Testing (TEI12_Test) | RAN5 | CR pack | - | - | - | - | .. | Rel-12 | TEI12_Test | | | | | | - | - | | | 2/21/2017 18:02 | 3/5/2017 21:53 | | Ingbert Sigovich | 28887 | 1080 | Yes | No | Approval |
| 110 | | Yes | approved | 14.5.4 | RP-170109 | RAN5 agreed non TTCN CR(s) under WI Small Technical Enhancements and Improvements for Rel-13 Conformance Testing (TEI13_Test) | RAN5 | CR pack | - | - | - | - | .. | Rel-13 | TEI13_Test | | | | | | - | - | | | 2/21/2017 18:02 | 3/5/2017 21:53 | | Ingbert Sigovich | 28887 | 1090 | Yes | No | Approval |
| 111 | | Yes | approved | 13.6.8 | RP-170110 | RAN5 agreed non TTCN CR(s) under WI Small Technical Enhancements and Improvements for Rel-14 Conformance Testing (TEI14_Test) | RAN5 | CR pack | - | - | - | - | .. | Rel-14 | TEI14_Test | | | | | | - | - | | | 2/21/2017 18:02 | 3/5/2017 21:53 | | Ingbert Sigovich | 28887 | 1100 | Yes | No | Approval |
| 112 | | Yes | noted | 10.5.10 | RP-170111 | Status Report for WICore part: Addition of 1.4 and 3 MHz Channel Bandwidth to E-UTRA operating band 65 for CGC (Complementary Ground Component) operations in Region 1 | HUGHES Network Systems Ltd | WI status report | - | - | - | - | .. | Rel-14 | LTE_1980_2170_REG1_adBWs-Core | | | Status report to TSG for 100% completion of Work Item related to addition of 1.4 and 3 MHz channel bandwidth to Band 65 | conclusion: noted, approved: Core: 100%, March 17; Core part WI completed | | - | - | | | 2/21/2017 21:30 | 2/23/2017 22:43 | | Seth Parkoff | 49571 | 520 | Yes | No | |
| 113 | | Yes | revised | 10.12.1 | RP-170112 | Status report for Shortened TTI and processing time for LTE; rapporteur: Ericsson | RAN1 | WI status report | - | - | - | - | .. | Rel-15 | LTE_sTTIandPT | RP-170800 | | | note: Rapporteur confirmed that Perf. part stays at 0%;<br>conclusion: noted; approved: Core: 30%, Sep.17; Perf.: 0%, March 18 | | - | - | | | 2/21/2017 22:03 | 3/5/2017 21:53 | | Daniel Larsson | 39861 | 1120 | Yes | No | |
| 114 | RAN1 | Yes | approved | 10.12.1 | RP-170113 | Revised WID: Shortened TTI and processing time for LTE | Ericsson | WID revised | - | - | - | - | .. | Rel-15 | LTE_sTTIandPT | | RP-162014 | last approved WID: RP-162014 | | | - | - | | | 2/21/2017 22:22 | 3/5/2017 21:53 | | Daniel Larsson | 39861 | 4870 | Yes | No | Approval |
| 115 | | Yes | noted | 10.3.9 | RP-170114 | Status report for Uplink Capacity Enhancements for LTE; rapporteur: Ericsson | RAN1 | WI status report | - | - | - | - | .. | Rel-14 | LTE_UL_CAP_enh | | | | conclusion: noted; approved: Core: 100%, March 17; Perf.: 20%, Sep.17; Core part completed | | - | - | | | 2/21/2017 22:24 | 3/5/2017 21:53 | | Daniel Larsson | 39861 | 1140 | Yes | No | |
| 116 | RAN1 | Yes | noted | 10.3.9 | RP-170115 | Summary for WI Uplink Capacity Enhancements for LTE | Ericsson, CMCC | WI summary | - | - | - | - | .. | Rel-14 | LTE_UL_CAP_enh-Core | | | | | | - | - | | | 2/21/2017 22:26 | 3/5/2017 21:53 | | Daniel Larsson | 39861 | 66800 | Yes | No | |
| 117 | RAN1 | Yes | revised | 9.1 | RP-170116 | New SID on Study on Ultra-Reliable and Low Latency Communications with New Radio | Ericsson LM | SID new | - | - | - | - | .. | Rel-15 | - | RP-170693 | | new SI for NR; leading WG: RAN1 | | | - | - | | | 2/21/2017 22:29 | 3/5/2017 21:53 | | Daniel Larsson | 39861 | 1311 | Yes | No | Approval |
| 118 | motiv | Yes | noted | 9.1 | RP-170117 | Motivation for SID on Ultra-Reliable and Low Latency Communications with New Radio | Ericsson LM | discussion | - | - | - | - | .. | Rel-15 | - | | | | Mediatek: unclear what it means for the SI, some duplication? | | - | - | | | 2/21/2017 22:30 | 3/5/2017 21:53 | | Daniel Larsson | 39861 | 1310 | Yes | No | Discussion |
| 119 | | Yes | noted | 13.6.3 | RP-170118 | Status Report of WI: UE Conformance Test Aspects – Radiated Performance of Multiple-antenna Receivers in the UE; rapporteur: Intel Corporation | Intel Corporation (UK) Ltd | WI status report | - | - | - | - | .. | Rel-14 | LTE_MIMO_OTA-UEConTest | | | | conclusion: noted; approved: 20%, June 17 | | - | - | | | 2/21/2017 22:30 | 2/23/2017 1:03 | | Hassan Yaghoobi | 34546 | 900 | Yes | No | |
| 120 | RAN1 | Yes | revised | 10.1.1 | RP-170119 | New WI: Highly Reliable Low Latency Communication for LTE | Ericsson LM | WID new | - | - | - | - | .. | Rel-15 | - | RP-170694 | | new WI for LTE; leading WG: RAN1; WI code to be used: LTE_HRLLC; compare RP-170242 | | | - | - | | | 2/21/2017 22:32 | 3/5/2017 21:53 | | Daniel Larsson | 39861 | 1791 | Yes | No | Approval |
| 121 | motiv | Yes | noted | 10.1.1 | RP-170120 | Motivation for WI on Highly Reliable Low Latency Communication for LTE | Ericsson LM | discussion | - | - | - | - | .. | Rel-15 | - | | | | | | - | - | | | 3/6/2017 0:26 | 3/5/2017 21:53 | | Daniel Larsson | 39861 | 1790 | Yes | No | Discussion |
| 122 | RAN5 | Yes | approved | 13.1 | RP-170121 | New WID on UE Conformance Test Aspects – Interference Mitigation for Downlink Control Channels of LTE | Intel Corporation (UK) Ltd | WID new | - | - | - | - | .. | Rel-13 | - | | | new WI for LTE only; leading WG: RAN5; tested: REL-13 LTE_IM_DLCCH-Perf (note: WI had no Core part); WI code to be used: LTE_IM_DLCCH-UEConTest | | | - | - | | | 2/21/2017 22:38 | 2/23/2017 1:03 | | Hassan Yaghoobi | 34546 | 1210 | Yes | No | Approval |
| 123 | | Yes | noted | 10.13.6 | RP-170122 | Status report for WI Core part: Add UE Power Class 2 to band 41 intra-band contiguous LTE Carrier Aggregation; rapporteur: Sprint | RAN4 | WI status report | - | - | - | - | .. | Rel-15 | LTE_CA_C_B41_PC2-Core | | | | conclusion: noted; approved: Core: 5%, June 17 | | - | - | | | 2/21/2017 23:00 | 3/5/2017 21:53 | | John Humbert | 40476 | 1220 | Yes | No | |
| 124 | RAN4 | Yes | approved | 10.5.2 | RP-170123 | Revision of WID: LTE Advanced inter-band CA Rel-14 for 2DL/1UL | Qualcomm Incorporated | WID revised | - | - | - | - | .. | Rel-14 | LTE_CA_R14_2DL1UL | | | last approved WID: RP-161996; adds more CA configurations. | | | - | - | | | 2/22/2017 0:59 | 3/5/2017 21:53 | | Ville Vintola | 44963 | 1260 | Yes | No | Approval |


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| | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z | AA | AB | AC | AD | AE | AF | AG |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 125 | | Yes | noted | 10.5.2 | RP-170124 | Status Report to TSG: LTE Advanced inter-band CA Rel-14 for 2DL/1UL; rapporteur: Qualcomm | RAN4 | WI status report | - | - | - | - | .. | Rel-14 | LTE_CA_R14_2DL1UL | | | | conclusion: noted; approved: Core: 80%, June 17; Perf.: 80%, June 17 | | - | - | | | 2/22/2017 1:02 | 3/5/2017 21:53 | | Ville Vintola | 44963 | 1230 | Yes | No | |
| 126 | RAN4 | Yes | approved | 10.5.2 | RP-170125 | WI exception request for WI Core part: LTE Advanced inter-band CA Rel-14 for 2DL/1UL | Qualcomm Incorporated | WI exception request | - | - | - | - | .. | Rel-14 | LTE_CA_R14_2DL1UL-Core | | | | | | - | - | | | 2/22/2017 1:05 | 3/5/2017 21:53 | | Ville Vintola | 44963 | 5660 | Yes | No | Approval |
| 127 | RAN4 | No | withdrawn | 10.5.2 | RP-170126 | TR 36.714-02-01 v0.5.1 LTE Advanced inter-band CA for 2DL/1UL Rel-14 | Qualcomm Incorporated | draft TR | 36.714-02-01 | - | - | - | 0.5.1 | Rel-14 | LTE_CA_R14_2DL1UL-Core | | | RAN4 basket CA TR 36.714-02-01 is provided for information | | | - | - | | | 2/22/2017 1:53 | | | Ville Vintola | 44963 | 1240 | Yes | Yes | Information |
| 128 | RAN4 | Yes | approved | 10.3.14 | RP-170127 | TR 36.786 v1.0.0 on V2X Services based on LTE; User Equipment (UE) radio transmission and reception | LG Electronics Inc. | draft TR | 36.786 | - | - | - | 1.0.0 | Rel-14 | LTE_V2X-Core | | | RAN4 TR 36.786 is provided for 1-step approval | conclusion: approved as REL-14 TR | | - | - | | | 2/22/2017 7:47 | 3/5/2017 21:53 | | Suhwan Lim | 46654 | 6220 | Yes | No | Approval |
| 129 | RAN4 | Yes | approved | 10.5.7 | RP-170128 | Revised WID: LTE Advanced inter-band CA Rel-14 for xDL/2UL with x=3,4,5 | LG Electronics Inc. | WID revised | - | - | - | - | .. | Rel-14 | LTE_CA_R14_xDL2UL | | | last approved WID: RP-162036; to add new xDL/2UL CA band combination and changed status; RAN4 agreed to extend CA basket WI until June so changed TU budget is requested in SR | | | - | - | | | 2/22/2017 7:53 | 3/5/2017 21:53 | | Suhwan Lim | 46654 | 1520 | Yes | No | Approval |
| 130 | | Yes | noted | 10.5.7 | RP-170129 | Status report for WI LTE Advanced inter-band Carrier Aggregation Rel-14 for xDL/2UL with x=3,4,5; rapporteur: LG Electronics | RAN4 | WI status report | - | - | - | - | .. | Rel-14 | LTE_CA_R14_xDL2UL, LTE_CA_R14_xDL2UL-Core, LTE_CA_R14_xDL2UL-Perf | | | requesting TU budget to complete xDL/2UL CA at RAN4 #82bis and #83. | MCC: 0% for Perf. part i.e. no CRs to 36.133 and 36.141 sounds strange; conclusion: noted; approved: Core: 95%, June 17; Perf.: 0%, June 17 | | - | - | | | 2/22/2017 8:01 | 3/5/2017 21:53 | | Suhwan Lim | 46654 | 1280 | Yes | No | |
| 131 | | Yes | noted | 10.3.2 | RP-170130 | Status report of WI Perf. part: Support for V2V services based on LTE sidelink; rapporteur: LG Electronics | LG Electronics Inc. | WI status report | - | - | - | - | .. | Rel-14 | LTE_SL_V2V-Perf | | | Core part was completed in Sep.16; requesting TU budget to extend V2V perf. part until June17 | conclusion: noted; approved: Perf: 80%, June 17 | | - | - | | | 2/22/2017 8:06 | 3/5/2017 21:53 | | Suhwan Lim | 46654 | 1300 | Yes | No | |
| 132 | RAN1 | Yes | postponed | 9.1 | RP-170131 | New SI: Study on MBMS for NR | EBU | SID new | - | - | - | - | .. | Rel-15 | - | | | new SI for NR; leading WG: RAN1 | | | - | - | | | 2/22/2017 9:26 | 3/5/2017 21:53 | | Darko Ratkaj | 21485 | 1560 | Yes | No | Approval |
| 133 | RAN1 | Yes | revised | 9.1 | RP-170132 | New SI: Study on NR to support Non-Terrestrial Networks | THALES | SID new | - | - | - | - | .. | Rel-15 | - | RP-170689 | | new SI for NR; leading WG: RAN1; define channel models, study NR radio interface impacts for operation in non-terrestrial networks (airborne and spaceborne based) | | | - | - | | | 2/22/2017 10:17 | 3/5/2017 21:53 | | Nicolas Chuberre | 21633 | 1411 | Yes | No | Approval |
| 134 | motiv | Yes | noted | 9.1 | RP-170133 | Motivation for a study on 5G to support non-terrestrial networks | THALES | discussion | - | - | - | - | .. | Rel-15 | - | | | Motivation paper identifying the non terrestrial network use cases in 5G and the rational to use NR in Non-terrestrial networks | | | - | - | | | 2/22/2017 10:24 | 3/5/2017 21:53 | | Nicolas Chuberre | 21633 | 1410 | Yes | No | Discussion |
| 135 | | Yes | noted | 13.2.1 | RP-170134 | STatus report for UE Conformance Test Aspects - IMS for Converged IP Communications; rapporteur: ROHDE & SCHWARZ | RAN5 | WI status report | - | - | - | - | .. | Rel-14 | IMS_CONV_IP_COM-UEConTest | | | 12 test cases planned, current status is: 0 out of 12 test cases completed. | conclusion: noted; approved: 5%, Dec.17 | | - | - | | | 2/22/2017 11:05 | 2/22/2017 13:20 | | Uwe Baeder | 31098 | 1340 | Yes | No | |
| 136 | | Yes | noted | 13.3.1 | RP-170135 | Status report for UE Conformance Test Aspects – Multimedia Telephony Services for IMS (MTSI) over fixed access; rapporteur: Telecom Italia | RAN5 | WI status report | - | - | - | - | .. | Rel-7 | MTSI_FIXED_ACCESS-UEConTest | | | | conclusion: noted; approved: 100%, March 17, WI completed | | - | - | | | 2/22/2017 11:10 | 2/23/2017 8:48 | | Massimiliano Ubicini | 30837 | 660 | Yes | No | |
| 137 | | Yes | noted | 10.3.19 | RP-170136 | Status Report of WI: Perf. part 4 receiver (RX) antenna ports with Carrier Aggregation (CA) for LTE downlink (DL); rapporteur: Ericsson | RAN4 | WI status report | - | - | - | - | .. | Rel-14 | LTE_4Rx_AP_DL_CA, LTE_4Rx_AP_DL_CA-Core, LTE_4Rx_AP_DL_CA-Perf | | | Core part was completed in Dec.16 | moved from AI 10.1.4 to AI 10.3.19 conclusion: noted; approved: Perf.: 50%, Sep.17 | | - | - | | | 2/22/2017 11:16 | 3/5/2017 21:53 | | Maomao Chen | 46060 | 1360 | Yes | No | |

| | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z | AA | AB | AC | AD | AE | AF | AG |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 138 | RAN | Yes | agreed | 9.2.1 | RP-170137 | Skeleton TR 38.805 v0.0.1 "Study on New Radio Access Technology; 60 GHz Unlicensed Spectrum" | Nokia Corporation | draft TR | 38.805 | - | - | - | 0.0.1 | Rel-14 | FS_NR_new RAT | | | TR 38.805 is under RAN control; skeleton TR to capture requirements on the unlicensed bands of initial interest based on RAN reflector email discussion survey on 60 GHz regulatory landscape. | | | - | - | | | 2/22/2017 12:35 | 3/5/2017 21:53 | | Tuomo Säynäjäkangas | 69937 | 4391 | Yes | No | Agreement |
| 139 | | Yes | approved | 9.2.1 | RP-170138 | pCR for TR 38.805 on regulatory landscape of the 60GHz band | Nokia Corporation | pCR | 38.805 | - | - | - | 0.0.1 | Rel-14 | FS_NR_new RAT | | | Skeleton TR 38.805 v0.0.1 is submitted in RP-170137; it is proposed to approve the pCR to TR 38.805 v0.0.1 covering information related to different regions. | | | - | - | | | 2/22/2017 12:40 | 3/5/2017 21:53 | | Tuomo Säynäjäkangas | 69937 | 4770 | Yes | No | Approval |
| 140 | RAN4 | Yes | approved | 10.5.9 | RP-170139 | Updated WID "New band support for Rel-14 NB-IoT" | Ericsson | WID revised | - | - | - | - | .. | Rel-14 | NB_IOT_R14_bands | | | last approved WID: RP-161890; based on a request from NTT DoCoMo band 21 is added to the WI | | | - | - | | | 2/22/2017 13:09 | 3/5/2017 21:53 | | Ali Behravan | 45979 | 1410 | Yes | No | Approval |
| 141 | | Yes | noted | 10.5.9 | RP-170140 | Status report for WI New band support for Rel-14 NB-IoT; rapporteur: Ericsson | RAN4 | WI status report | - | - | - | - | .. | Rel-14 | NB_IOT_R14_bands | | | | MCC: Perf. part was already at 99% at RAN #74<br>conclusion: noted; approved: Core: 99%, June 17; Perf.: 70%, June 17 | | - | - | | | 2/22/2017 13:09 | 3/5/2017 21:53 | | Ali Behravan | 45979 | 1390 | Yes | No | |
| 142 | RAN4 | Yes | approved | 10.5.9 | RP-170141 | WI exception request for Core part: New band support for Rel-14 Narrowband Internet of Things (NB-IOT) | Ericsson | WI exception request | - | - | - | - | .. | Rel-14 | NB_IOT_R14_bands-Core | | | exception due to addition of band 21 | | | - | - | | | 2/22/2017 13:09 | 3/5/2017 21:53 | | Ali Behravan | 45979 | 5720 | Yes | No | Approval |
| 143 | RAN4 | Yes | approved | 10.5.5 | RP-170142 | WI exception request for Core part: LTE Advanced inter-band CA Rel-14 for 5DL/1UL | Nokia | WI exception request | - | - | - | - | .. | Rel-14 | LTE_CA_R14_5DL1UL-Core | | | | | | - | - | | | 2/22/2017 14:31 | 3/5/2017 21:53 | | Iwajlo Angelow | 68260 | 5690 | Yes | No | Approval |
| 144 | RAN4 | Yes | approved | 10.5.5 | RP-170143 | Revised WI: LTE Advanced inter-band CA Rel-14 for 5DL/1UL | Nokia | WID revised | - | - | - | - | .. | Rel-14 | LTE_CA_R14_5DL1UL | | | last approved WID: RP-162005 | | | - | - | | | 2/22/2017 14:31 | 3/5/2017 21:53 | | Iwajlo Angelow | 68260 | 1440 | Yes | No | Approval |
| 145 | | Yes | noted | 10.5.5 | RP-170144 | Status Report: LTE Advanced inter-band CA Rel-14 for 5DL/1UL; rapporteur: Nokia | RAN4 | WI status report | - | - | - | - | .. | - | LTE_CA_R14_5DL1UL | | | | conclusion: noted; approved: Core: 95%, June 17; Perf.: 95%, June 17 | | - | - | | | 2/22/2017 14:31 | 3/5/2017 21:53 | | Iwajlo Angelow | 68260 | 1420 | Yes | No | |
| 146 | RAN4 | Yes | postponed | 10.1.4 | RP-170145 | WID on UE requirements for network-based CRS mitigation in LTE | Ericsson LM | WID new | - | - | - | - | .. | Rel-15 | - | | | new WI for LTE only; leading WG: RAN4; CRS = Cell-specific Reference Signal; a new WI proposal aiming at increasing resource utilization at the network and at the same time reducing the interference from CRS signals and hereby increasing UE performance. The approach has been already tested in life networks and demonstrated up to 80% increased throughput at low and medium traffic load levels. Special attention is paid to supporting legacy UEs. | RAN4 chair: no time budget for RRM session left<br>RAN chair: ok then we look more for RF topics | | - | - | | | 2/22/2017 15:07 | 3/5/2017 21:53 | | Iana Siomina | 42857 | 1460 | Yes | No | Approval |
| 147 | motiv | Yes | noted | 10.1.4 | RP-170146 | Motivation for new WI on UE requirements for network-based CRS mitigation | Ericsson LM | discussion | - | - | - | - | .. | Rel-15 | - | | | WI is aiming at increasing resource utilization at the network and at the same time reducing the interference from CRS signals and hereby increasing UE performance. The approach has been already tested in life networks and demonstrated up to 80% increased throughput at low and medium traffic load levels. Special attention is paid to supporting legacy UEs. | | | - | - | | | 2/22/2017 15:10 | 3/5/2017 21:53 | | Iana Siomina | 42857 | 1450 | Yes | No | Discussion |
| 148 | RAN1 | No | withdrawn | 9.1 | RP-170147 | New SI: Study on Integrated Access and Backhaul for NR | AT&T | SID new | - | - | - | - | .. | Rel-15 | - | | | new SI for NR; leading WG: RAN1 | moved from AI 9.3 to AI 9.1 | | - | - | | | 2/22/2017 17:54 | | | Arun Ghosh | 57084 | 2260 | Yes | Yes | Approval |


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| | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z | AA | AB | AC | AD | AE | AF | AG |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 149 | RAN2 | Yes | revised | 9.1 | RP-170148 | New SI: Study on Integrated Access and Backhaul for NR | AT&T | SID new | - | - | - | - | .. | Rel-15 | - | RP-170688 | | new SI for NR; leading WG: RAN2; compare RP-170175 | | | - | - | | | 2/22/2017 18:00 | 3/5/2017 21:53 | | Arun Ghosh | 57084 | 2230 | Yes | No | Approval |
| 150 | RAN1 | No | withdrawn | 10.1.1 | RP-170149 | New WI proposal: Even further enhanced MTC for LTE | Sierra Wireless, S.A. | WID new | - | - | - | - | .. | Rel-15 | - | | | new WI for LTE; leading WG: RAN1; WI code to be used: LTE_eMTC4; compare RP-170465 | | | - | - | | | 2/22/2017 19:07 | | | Gustav Vos | 31476 | 1220 | Yes | Yes | Approval |
| 151 | motiv | No | withdrawn | 10.1.1 | RP-170150 | Motivation for new WI: Even Further Enhanced MTC for LTE | Sierra Wireless, S.A. | discussion | - | - | - | - | .. | Rel-15 | - | | | | | | - | - | | | 2/22/2017 19:13 | | | Gustav Vos | 31476 | 1500 | Yes | Yes | Discussion |
| 152 | RAN4 | Yes | revised | 10.1.5 | RP-170151 | New Work Item on V2X new band combinations for LTE | LG Electronics Inc. | WID new | - | - | - | - | .. | Rel-15 | - | RP-170727 | | new WI for LTE; leading WG: RAN4; specifying the V2X band combinations and evaluating the sidelink V2X operation coexistence with legacy LTE system at licensed bands | | | - | - | | | 2/23/2017 1:19 | 3/5/2017 21:53 | | Suhwan Lim | 46654 | 1510 | Yes | No | Approval |
| 153 | RAN4 | Yes | approved | 10.5.7 | RP-170152 | WI exception request for Core part: LTE Advanced inter-band Carrier Aggregation Rel-14 for xDL/2UL with x=3,4,5 | LG Electronics Inc. | WI exception request | - | - | - | - | .. | Rel-14 | LTE_CA_R14_xDL2UL-Core | | | based on operator request, xDL/2UL inter-band CA in rel-14 will be extened until June 2017 | | | - | - | | | 2/23/2017 1:33 | 3/5/2017 21:53 | | Suhwan Lim | 46654 | 5710 | Yes | No | Approval |
| 154 | | Yes | noted | 10.1.1 | RP-170153 | Proposal for NB-IoT TDD support | KDDI Corporation | discussion | - | - | - | - | .. | - | - | | | | | | - | - | | | 2/23/2017 5:16 | 3/5/2017 21:53 | | Hiroki Takeda | 58815 | 1121 | Yes | No | Discussion |
| 155 | | Yes | noted | 9.1 | RP-170154 | K-ICT Spectrum Plan for 5G services in the Republic of Korea | TTA | discussion | - | - | - | - | .. | Rel-15 | - | | | Information on the spectrum plan for 5G services in Korea to take into consideration the regulatory aspect in Rel.15 NR WI | moved from AI 9.4 to AI 9.1 | | - | - | | | 2/23/2017 5:19 | 3/5/2017 21:53 | | Hyeyoung Esthel Lee | 56649 | 2480 | Yes | No | Discussion |
| 156 | | Yes | noted | 9.1 | RP-170155 | IMS voice and public warning system support for NR | NTT DOCOMO, INC. | discussion | - | - | - | - | .. | Rel-15 | FS_NR_new RAT | | | | | | - | - | | | 2/23/2017 5:52 | 3/5/2017 21:53 | | Hideaki Takahashi | 60906 | 2360 | Yes | No | Decision |
| 157 | RAN2 | Yes | revised | 10.1.2 | RP-170156 | New SID on Study on enhanced LTE Support for Aerial Vehicles | NTT DOCOMO, INC., Ericsson | SID new | - | - | - | - | .. | Rel-15 | - | RP-170742 | | new SI for LTE only; leading WG: RAN2 | | | - | - | | | 2/23/2017 6:07 | 3/5/2017 21:53 | | Hideaki Takahashi | 60906 | 4341 | Yes | No | Approval |
| 158 | motiv | Yes | noted | 10.1.2 | RP-170157 | Motivation for Study on Enhanced LTE Support for Aerial Vehicles | Ericsson, NTT DOCOMO, INC. | discussion | - | - | - | - | .. | Rel-15 | - | | | related to SID in R2-170156 | | | - | - | | | 2/23/2017 6:13 | 3/5/2017 21:53 | | Hideaki Takahashi | 60906 | 4340 | Yes | No | Discussion |
| 159 | | Yes | noted | 10.14.3 | RP-170158 | Status report for SI: Study on interference cancellation receiver for LTE BS, rapporteur: China Telecom | RAN4 | WI status report | - | - | - | - | .. | Rel-15 | FS_LTE_IC_BS | | | | conclusion: noted; approved: 65%, June 17 | | - | - | | | 2/23/2017 6:35 | 3/5/2017 21:53 | | Xiaoming She | 46899 | 1580 | Yes | No | |
| 160 | RAN4 | Yes | approved | 10.1.5 | RP-170159 | New WID on 450 MHz Band for LTE in Region 3 | China Unicom | WID new | - | - | - | - | .. | - | - | | | new WI for LTE; leading WG: RAN4; to standardize a new E-UTRA operating band on 450MHz band | | | - | - | | | 2/23/2017 6:57 | 3/5/2017 21:53 | | Xiao Han | 46713 | 1590 | Yes | No | Approval |
| 161 | RAN4 | Yes | noted | 10.14.3 | RP-170160 | TR 36.766 V1.0.0 for Study on interference cancellation receiver for LTE BS | China Telecom | draft TR | 36.766 | - | - | - | 1.0.0 | Rel-14 | FS_LTE_IC_BS | | | RAN4 TR 36.766 is provided for information | | | - | - | | | 2/23/2017 7:03 | 3/5/2017 21:53 | | Shan Yang | 48340 | 1600 | Yes | No | Information |
| 162 | RAN1 | Yes | rejected | 9.1 | RP-170161 | New SID Proposal: Study on NR-based V2X services | Samsung | SID new | - | - | - | - | .. | Rel-15 | - | | | new SI for NR; leading WG: RAN1 | see RP-170837 instead | | - | - | | | 2/23/2017 8:16 | 3/5/2017 21:53 | | Younsun Kim | 43499 | 1720 | Yes | No | Approval |
| 163 | motiv | Yes | noted | 9.1 | RP-170162 | Motivation for new SI: NR-based V2X services | Samsung | discussion | - | - | - | - | .. | - | - | | | | | | - | - | | | 2/23/2017 8:16 | 3/5/2017 21:53 | | Younsun Kim | 43499 | 1716 | Yes | No | Discussion |
| 164 | RAN1 | Yes | postponed | 9.1 | RP-170163 | New SID Proposal: Study on MBMS for NR | Samsung | SID new | - | - | - | - | .. | Rel-15 | - | | | new SI for NR; leading WG: RAN1 | | | - | - | | | 2/23/2017 8:16 | 3/5/2017 21:53 | | Younsun Kim | 43499 | 1590 | Yes | No | Approval |
| 165 | motiv | Yes | noted | 9.1 | RP-170164 | Motivation for new SI: MBMS for NR | Samsung | discussion | - | - | - | - | .. | - | - | | | | | | - | - | | | 2/23/2017 8:16 | 3/5/2017 21:53 | | Younsun Kim | 43499 | 1580 | Yes | No | Discussion |
| 166 | RAN1 | Yes | postponed | 9.1 | RP-170165 | New SID Proposal: Study on Shared Spectrum Access (SSA) for NR | Samsung | SID new | - | - | - | - | .. | Rel-15 | - | | | new SI for NR; leading WG: RAN1 | only one supporting company | | - | - | | | 2/23/2017 8:16 | 3/5/2017 21:53 | | Younsun Kim | 43499 | 1530 | Yes | No | Approval |
| 167 | motiv | Yes | noted | 9.1 | RP-170166 | Motivation for new SI: Shared Spectrum Access (SSA) for NR | Samsung | discussion | - | - | - | - | .. | - | - | | | | | | - | - | | | 2/23/2017 8:16 | 3/5/2017 21:53 | | Younsun Kim | 43499 | 1520 | Yes | No | Discussion |
| 168 | RAN1 | Yes | not treated | 9.1 | RP-170167 | New SID proposal: Study on NR Integrated Backhaul and Access | Samsung | SID new | - | - | - | - | .. | Rel-15 | - | | | new SI for NR; leading WG: RAN1 | | | - | - | | | 2/23/2017 8:16 | 3/5/2017 21:53 | | Younsun Kim | 43499 | 2270 | Yes | No | Approval |
| 169 | motiv | Yes | not treated | 9.1 | RP-170168 | Motivation for new SI: NR Integrated Backhaul and Access | Samsung | discussion | - | - | - | - | .. | - | - | | | | | | - | - | | | 2/23/2017 8:16 | 3/5/2017 21:53 | | Younsun Kim | 43499 | 2280 | Yes | No | Discussion |
| 170 | RAN1 | Yes | revised | 10.1.1 | RP-170169 | New WID Proposal: Further Enhancements on Full-Dimension (FD) MIMO for LTE | Samsung | WID new | - | - | - | - | .. | Rel-15 | - | RP-170773 | | new WI for LTE only; leading WI: RAN1; WI code to be used: LTE_eFDMIMO2 | | | - | - | | | 2/23/2017 8:16 | 3/5/2017 21:53 | | Younsun Kim | 43499 | 1840 | Yes | No | Approval |
| 171 | motiv | Yes | revised | 10.1.1 | RP-170170 | Motivation for new WI: Further Enhancements on Full-Dimension (FD) MIMO for LTE | Samsung | discussion | - | - | - | - | .. | Rel-15 | - | RP-170674 | | | | | - | - | | | 2/23/2017 8:16 | 3/5/2017 21:53 | | Younsun Kim | 43499 | 1900 | Yes | No | Discussion |


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| | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z | AA | AB | AC | AD | AE | AF | AG |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 172 | RAN1 | Yes | withdrawn | 10.1.1 | RP-170171 | New WID Proposal: Further enhancements on NB-IoT and eMTC | Samsung | WID new | - | - | - | - | .. | Rel-15 | - | | | new WI for LTE only; leading WI: RAN1; finally split into 2 WIs: see RP-170676 for NB-IoT and RP-170678 for eMTC | | | - | - | | | 2/23/2017 8:16 | 3/5/2017 21:53 | | Younsun Kim | 43499 | 1090 | Yes | Yes | Approval |
| 173 | motiv | Yes | withdrawn | 10.1.1 | RP-170172 | Motivation for new WI: Further enhancements on NB-IoT and eMTC | Samsung | discussion | - | - | - | - | .. | Rel-15 | - | | | see RP-170677 and RP-170679 instead | | | - | - | | | 2/23/2017 8:16 | 3/5/2017 21:53 | | Younsun Kim | 43499 | 1080 | Yes | Yes | Discussion |
| 174 | RAN1 | Yes | noted | 10.3.7 | RP-170173 | Summary for WI on Enhancement on Full-Dimension (FD) MIMO for LTE | Samsung | WI summary | - | - | - | - | .. | Rel-14 | LTE_eFDMIMO-Core | | | | | | - | - | | | 2/23/2017 8:16 | 3/5/2017 21:53 | | Younsun Kim | 43499 | 6290 | Yes | No | |
| 175 | | Yes | noted | 10.3.7 | RP-170174 | Status report for WI: Enhancement on Full-Dimension (FD) MIMO for LTE | Samsung | WI status report | - | - | - | - | .. | Rel-14 | LTE_eFDMIMO | | | | conclusion: noted; approved: Core: 100%, March17; Perf.: 0%, Sep.17 | | - | - | | | 2/23/2017 8:16 | 3/5/2017 21:53 | | Younsun Kim | 43499 | 1730 | Yes | No | |
| 176 | RAN2 | No | withdrawn | 9.1 | RP-170175 | New SI: Study on mmWave backhaul and relay for NR | Qualcomm Incorporated | SID new | - | - | - | - | .. | Rel-15 | - | | | new SI for NR; leading WG: RAN2; compare RP-170148 | | | - | - | | | 2/23/2017 8:42 | | | Peter Gaal | 57198 | 2300 | No | Yes | Approval |
| 177 | motiv | Yes | withdrawn | 9.1 | RP-170176 | Motivation for new Study Item on mmWave backhaul and relay for NR | Qualcomm Incorporated | discussion | - | - | - | - | .. | Rel-15 | - | | | | | | - | - | | | 2/23/2017 8:42 | 3/5/2017 21:53 | | Peter Gaal | 57198 | 2290 | Yes | Yes | Discussion |
| 178 | RAN1 | Yes | postponed | 9.1 | RP-170177 | New SI: Study on Positioning support for NR | Qualcomm Incorporated | SID new | - | - | - | - | .. | Rel-15 | - | | | new SID for NR; leading WG: RAN1 | | | - | - | | | 2/23/2017 8:42 | 3/5/2017 21:53 | | Peter Gaal | 57198 | 2005 | Yes | No | Approval |
| 179 | motiv | Yes | noted | 9.1 | RP-170178 | Motivation for Study Item on Positioning support for NR | Qualcomm Incorporated | discussion | - | - | - | - | .. | Rel-15 | - | | | | | | - | - | | | 2/23/2017 8:42 | 3/5/2017 21:53 | | Peter Gaal | 57198 | 2000 | Yes | No | Discussion |
| 180 | - | No | withdrawn | 9.1 | RP-170179 | New Study Item on NR eMBB UE Power Saving | Qualcomm Incorporated | SID new | - | - | - | - | .. | Rel-15 | - | | | | | | - | - | | | 2/23/2017 8:42 | | | Peter Gaal | 57198 | 2530 | Yes | Yes | Approval |
| 181 | motiv | No | withdrawn | 9.1 | RP-170180 | Motivation for Study Item on NR eMBB UE Power Saving | Qualcomm Incorporated | discussion | - | - | - | - | .. | Rel-15 | - | | | | | | - | - | | | 2/23/2017 8:42 | | | Peter Gaal | 57198 | 2520 | Yes | Yes | Discussion |
| 182 | | Yes | noted | 9.1 | RP-170181 | On evolution of V2X | Qualcomm Incorporated | discussion | - | - | - | - | .. | Rel-15 | - | | | | | | - | - | | | 2/23/2017 8:42 | 3/5/2017 21:53 | | Peter Gaal | 57198 | 1730 | Yes | No | Information |
| 183 | RAN1 | No | withdrawn | 10.1.1 | RP-170182 | New Work Item for DL 1024QAM in LTE | Qualcomm Incorporated | WID new | - | - | - | - | .. | Rel-15 | - | | | new WI for LTE only; leading WI: RAN1; WI code to be used: LTE_DL1024QAM | was merged with Huawei proposal | | - | - | | | 2/23/2017 8:42 | | | Peter Gaal | 57198 | 1630 | Yes | Yes | Approval |
| 184 | motiv | Yes | withdrawn | 10.1.1 | RP-170183 | Motivation for Work Item for DL 1024QAM in LTE | Qualcomm Incorporated | discussion | - | - | - | - | .. | Rel-15 | - | | | | | | - | - | | | 2/23/2017 8:42 | 3/5/2017 21:53 | | Peter Gaal | 57198 | 1620 | Yes | Yes | Discussion |
| 185 | | Yes | noted | 10.15 | RP-170184 | Introduction of new TBS for DL 256QAM | Qualcomm Incorporated | discussion | - | - | - | - | .. | Rel-14 | - | | | | | | - | - | | | 2/23/2017 8:42 | 3/5/2017 21:53 | | Peter Gaal | 57198 | 1840 | Yes | No | Approval |
| 186 | | Yes | revised | 10.15 | RP-170185 | Way Forward on new TBS for DL 256QAM | Qualcomm Incorporated | discussion | - | - | - | - | .. | Rel-14 | - | RP-170759 | | | | | - | - | | | 2/23/2017 8:42 | 3/5/2017 21:53 | | Peter Gaal | 57198 | 1841 | Yes | No | Approval |
| 187 | | Yes | noted | 10.5.1 | RP-170186 | Status report of WI LTE_CA_R14_intra; rapporteur: Ericsson | RAN4 | WI status report | - | - | - | - | .. | Rel-14 | LTE_CA_R14_intra | | | Status Report: LTE Advanced Intra-band CA including contiguous and non-contiguous spectrum Rel-14; Previous SR: RP-162021. | conclusion: noted; approved: Core: 82%, June 17; Perf.: 82%, June 17 | | - | - | | | 2/23/2017 9:19 | 3/5/2017 21:53 | | Per Lindell | 56972 | 1860 | Yes | No | |
| 188 | | Yes | noted | 10.5.4 | RP-170187 | Status report of WI LTE_CA_R14_4DL1UL; rapporteur: Ericsson | RAN4 | WI status report | - | - | - | - | .. | Rel-14 | LTE_CA_R14_4DL1UL | | | Previous SR: RP-162020. | conclusion: noted; approved: Core: 95%, June 17; Perf.: 95%, June 17 | | - | - | | | 2/23/2017 9:19 | 3/5/2017 21:53 | | Per Lindell | 56972 | 1870 | Yes | No | |
| 189 | RAN4 | Yes | approved | 10.5.1 | RP-170188 | Revised WID: Basket WI for LTE Advanced Intra-band CA including contiguous and non-contiguous spectrum | Ericsson | WID revised | - | - | - | - | .. | Rel-14 | LTE_CA_R14_intra | | | last approved WID: RP-162023 | | | - | - | | | 2/23/2017 9:19 | 3/5/2017 21:53 | | Per Lindell | 56972 | 1900 | Yes | No | Approval |
| 190 | RAN4 | Yes | approved | 10.5.4 | RP-170189 | Revised WID: Basket WI for LTE Advanced Inter-band CA Rel-14 for 4DL/1UL | Ericsson | WID revised | - | - | - | - | .. | Rel-14 | LTE_CA_R14_4DL1UL | | | last approved WID: RP-162022 | | | - | - | | | 2/23/2017 9:19 | 3/5/2017 21:53 | | Per Lindell | 56972 | 1910 | Yes | No | Approval |
| 191 | RAN4 | Yes | approved | 10.5.1 | RP-170190 | WI exception request for Core part: LTE Advanced intra-band Carrier Aggregation for xDL/yUL including contiguous and non-contiguous spectrum | Ericsson | WI exception request | - | - | - | - | .. | Rel-14 | LTE_CA_R14_intra-Core | | | | | | - | - | | | 2/23/2017 9:19 | 3/5/2017 21:53 | | Per Lindell | 56972 | 5650 | Yes | No | Approval |
| 192 | RAN4 | Yes | approved | 10.5.4 | RP-170191 | WI exception request for Core part: LTE Advanced inter-band CA Rel-14 for 4DL/1UL | Ericsson | WI exception request | - | - | - | - | .. | Rel-14 | LTE_CA_R14_4DL1UL-Core | | | | | | - | - | | | 2/23/2017 9:19 | 3/5/2017 21:53 | | Per Lindell | 56972 | 5680 | Yes | No | Approval |
| 193 | | Yes | noted | 12.2.1 | RP-170192 | Status report WI Positioning Enhancements for GERAN; rapporteur: Ericsson | RAN6 | WI status report | - | - | - | - | .. | Rel-14 | ePOS_GERAN | | | | conclusion: noted; approved: Core: 80%, June 17; Perf.: 80%, June 17 | | - | - | | | 2/23/2017 10:16 | 3/5/2017 21:53 | | Nicklas Johansson | 47575 | 570 | Yes | No | |
| 194 | RAN5 | Yes | approved | 13.1 | RP-170193 | New WI: UE Conformance Test Aspects - LTE 2.6 GHz FDD SDL band (2570-2620 MHz) and LTE Carrier Aggregation (2DL/1UL) with Band 3 for Region 1 (Band 69) | ORANGE | WID new | - | - | - | - | .. | Rel-14 | - | | | new WI for LTE only; leading WG: RAN5; tested: REL-14 LTE_FDD_2600_CA_B3-Core; WI code to be used: LTE_FDD_2600_CA_B3-UEConTest | | | - | - | | | 2/23/2017 10:28 | 3/5/2017 21:53 | | Benoit Graves | 43674 | 1930 | Yes | No | Approval |


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| | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z | AA | AB | AC | AD | AE | AF | AG |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 195 | RAN6 | Yes | noted | 12.4.1 | RP-170194 | Summary for WI Dedicated Core Networks for GERAN | Ericsson LM | WI summary | - | - | - | - | .. | Rel-14 | DECOR_GERAN-Core | | | Note: The WI DECOR_GERAN-Core was already completed at RAN #73 in Sep.2016. | | | - | - | | | 2/23/2017 10:39 | 3/5/2017 21:53 | | Nicklas Johansson | 47575 | 1940 | Yes | No | |
| 196 | | Yes | noted | 10.3.21 | RP-170195 | Status report of WI Enhanced LTE WLAN Radio Level Integration with IPsec Tunnel (eLWIP); rapporteur: Nokia | RAN3 | WI status report | - | - | - | - | .. | - | LTE_WLAN_eLWIP-Core | | | Completion: 100% | conclusion: noted; approved: Core: 100%, March 17; Core part is completed | | - | - | | | 2/23/2017 10:44 | 3/5/2017 21:53 | | Krzysztof Kordybach | 68359 | 1950 | Yes | No | |
| 197 | | Yes | revised | 9 | RP-170196 | On the overall 5G-NR workplan | Qualcomm | discussion | - | - | - | - | .. | Rel-15 | - | RP-170531 | | | moved from AI 9.1 to AI 9 | | - | - | | | 2/23/2017 10:44 | 3/5/2017 21:53 | | Casaccia Lorenzo | 53206 | 3600 | Yes | No | |
| 198 | | Yes | noted | 9.1 | RP-170197 | Considerations on Sidelink | Qualcomm | discussion | - | - | - | - | .. | - | - | | | | | | - | - | | | 2/23/2017 10:45 | 3/5/2017 21:53 | | Casaccia Lorenzo | 53206 | 2340 | Yes | No | |
| 199 | | Yes | noted | 9.1 | RP-170198 | V2X Evolution: Timeline and Scope | Qualcomm | discussion | - | - | - | - | .. | - | - | | | | | | - | - | | | 2/23/2017 10:46 | 3/5/2017 21:53 | | Casaccia Lorenzo | 53206 | 1740 | Yes | No | |
| 200 | RAN1 | Yes | approved | 10.3.10 | RP-170199 | Updated WID "eMBMS enhancements for LTE" | Ericsson | WID revised | - | - | - | - | .. | Rel-14 | MBMS_LTE_enh2 | | | last approved WID: RP-162231; proposing extension of the WI by one quarter | RRM to RAN4 part added | | - | - | | | 2/23/2017 11:12 | 3/5/2017 21:53 | | Ali Behravan | 45979 | 6080 | Yes | No | Approval |
| 201 | | Yes | noted | 10.3.10 | RP-170200 | Status report for eMBMS enhancements for LTE; rapporteur: Ericsson | RAN1 | WI status report | - | - | - | - | .. | Rel-14 | MBMS_LTE_enh2 | | | | conclusion: noted; approved: Core: 90%, June 17; Perf.: 0%, Sep.17 | | - | - | | | 2/23/2017 11:12 | 3/5/2017 21:53 | | Ali Behravan | 45979 | 1990 | Yes | No | |
| 202 | RAN1 | Yes | approved | 10.3.10 | RP-170201 | WI exception request for Core part: eMBMS enhancement for LTE | Ericsson | WI exception request | - | - | - | - | .. | Rel-14 | MBMS_LTE_enh2-Core | | | | | | - | - | | | 2/23/2017 11:12 | 3/5/2017 21:53 | | Ali Behravan | 45979 | 6330 | Yes | No | Approval |
| 203 | | Yes | noted | 10.5.8 | RP-170202 | Status report of WI LTE Advanced Inter-band CA Rel-14 for 3DL/3UL; rapporteur: Nokia; source: RAN4 | Nokia | WI status report | - | - | - | - | .. | Rel-14 | LTE_CA_R14_3DL3UL | | | | conclusion: noted; approved: Core: 100%, March 17; Perf.: 100%, March 17; Core and Perf. part WI completed | | - | - | | | 2/23/2017 12:47 | 3/5/2017 21:53 | | Petri Vasenkari | 69954 | 2020 | Yes | No | |
| 204 | | Yes | noted | 10.7.4 | RP-170203 | Status report of SI Study on SON for eCoMP for LTE; rapporteur: Nokia | RAN3 | WI status report | - | - | - | - | .. | Rel-14 | FS_LTE_SON_eCOMP | | | | conclusion: noted; approved: 60%, June 17; SI is moved to REL-15 | | - | - | | | 2/23/2017 13:02 | 3/5/2017 21:53 | | Hakon Helmers | 69127 | 2030 | Yes | No | |
| 205 | RAN3 | Yes | noted | 10.7.4 | RP-170204 | TR 36.742 v1.0.0 on Study on SON for eCoMP for LTE; for information | Nokia, Alcatel-Lucent Shanghai Bell | draft TR | 36.742 | - | - | - | 1.0.0 | Rel-14 | FS_LTE_SON_eCOMP | | | RAN3 TR 36.742 is provided for information | | | - | - | | | 2/23/2017 13:47 | 3/5/2017 21:53 | | Hakon Helmers | 69127 | 2040 | Yes | No | Information |
| 206 | RAN1 | Yes | revised | 9.1 | RP-170205 | New SI: Study on NR-based Access to Unlicensed Spectrum | QUALCOMM CDMA Technologies | SID new | - | - | - | - | .. | Rel-15 | - | RP-170820 | | new SI for NR; leading WG: RAN1 | | | - | - | | | 2/23/2017 13:58 | 3/5/2017 21:53 | | Juan Montojo | 34439 | 1500 | Yes | No | Approval |
| 207 | RAN1 | Yes | not treated | 9.1 | RP-170206 | New SI: Study on NR eMBB enhancements | QUALCOMM CDMA Technologies | SID new | - | - | - | - | .. | Rel-15 | - | | | new SI for NR; leading WG: RAN1 | | | - | - | | | 2/23/2017 14:01 | 3/5/2017 21:53 | | Juan Montojo | 34439 | 2550 | Yes | No | Approval |
| 208 | | Yes | noted | 9.2.1 | RP-170207 | Proposal for new TR for unlicensed spectrum | QUALCOMM CDMA Technologies | discussion | - | - | - | - | .. | Rel-15 | - | | | | moved from AI 9.4 to AI 9.2.1<br>BT: no example for Europe<br>Telecom Italia: TR 38.805 was specifically for 60GHz<br>Huawei, Orange: new SI should be brought<br><br>conclusion: title of TR 38.805 will not be changed, new TR would be needed and new SI | | - | - | | | 2/23/2017 14:04 | 3/5/2017 21:53 | | Juan Montojo | 34439 | 4900 | Yes | No | |
| 209 | | Yes | noted | 9 | RP-170208 | On NR forward compatibility | QUALCOMM CDMA Technologies | discussion | - | - | - | - | .. | Rel-15 | - | | | | moved from AI 9.4 to AI 9<br>RAN chair: system aspect we will discuss in joint session with SA on Wed (architecutre/migration options) | | - | - | | | 2/23/2017 14:06 | 3/5/2017 21:53 | | Juan Montojo | 34439 | 6750 | Yes | No | |
| 210 | - | Yes | withdrawn | 9.1 | RP-170209 | Study on high accuracy positioning of NR | ESA | SID new | - | - | - | - | .. | Rel-15 | - | RP-170213 | | see RP-170530 instead | | | - | - | | | 2/23/2017 14:06 | 3/5/2017 21:53 | | Florin Grec | 67349 | 1940 | Yes | Yes | Approval |
| 211 | motiv | Yes | noted | 9.1 | RP-170210 | Motivation to study high accuracy positioning of NR | ESA | discussion | - | - | - | - | .. | Rel-15 | - | | | related to RP-170513; preliminary discussion on the capabilities of various positioning technologies and their hybridisation | | | - | - | | | 2/23/2017 14:06 | 3/5/2017 21:53 | | Florin Grec | 67349 | 1920 | Yes | No | Discussion |
| 212 | motiv | Yes | noted | 9.1 | RP-170211 | High accuracy positioning of NR - presentation of the motivation | ESA | discussion | - | - | - | - | .. | Rel-15 | - | | | related to RP-170513; presentation (ppt) associated to SI proposal | | | - | - | | | 2/23/2017 14:06 | 3/5/2017 21:53 | | Florin Grec | 67349 | 1930 | Yes | No | Discussion |
| 213 | RAN4 | Yes | approved | 10.13.2 | RP-170212 | Revision of WI E-UTRA 700MHz in Europe for Broadband-PPDR: Adapting LTE band 68 for usage in Europe | Minstere de l'Interieur (French MoI), Airbus DS SLC | WID revised | - | - | - | - | .. | Rel-15 | LTE700_Europe_PPDR | | | last approved WID: RP-162534 | MCC: general reminder for all REL-15 WIs: REL-15 specs will not introduced before Sep.17<br>ATT: question: if there is no Perf. part, would this not create a problem in RAN5<br>RAN5 chair: Core part can be used<br>RAN4 chair: not all RAN4 WIs have a Perf. part | | - | - | | | 2/23/2017 14:50 | 3/5/2017 21:53 | | Eric Georgeaux | 38175 | 2120 | Yes | No | Approval |
| 214 | - | No | withdrawn | 9.1 | RP-170213 | Study on high accuracy positioning of NR | ESA, Deutsche Telekom, Fraunhofer IIS | SID new | - | - | - | - | .. | Rel-15 | - | | RP-170209 | see RP-170530 instead | | | - | - | | | 2/23/2017 15:05 | | | Lionel RIES | 67046 | 1950 | Yes | Yes | Approval |

| | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z | AA | AB | AC | AD | AE | AF | AG |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 215 | RAN1 | Yes | not treated | 9.1 | RP-170214 | New SI: Study on non-linear precoding for MIMO and Centralized RAN/COMP Coherent Joint Transmission for NR | IITH | SID new | - | - | - | - | .. | Rel-15 | - | | | new SI for NR; leading WG: RAN1 | | | - | - | | | 2/23/2017 15:09 | 2/24/2017 14:02 | | Kuchi Kiran | 61192 | 2590 | Yes | No | Approval |
| 216 | | Yes | noted | 10.5.12 | RP-170215 | Status Report for Addition of band 25 and 26 to LTE MTC cat.0; rapporteur: Sprint | RAN4 | WI status report | - | - | - | - | .. | Rel-14 | LC_MTC_LTE_cat0_B25_B26-Core | | | | conclusion: noted; approved: Core: 100%, March 17; Core part WI completed | | - | - | | | 2/23/2017 15:29 | 3/5/2017 21:53 | | George Cummings | 45981 | 2150 | Yes | No | |
| 217 | | Yes | noted | 10.5.13 | RP-170216 | Status Report for Addition of bands 25 and 40 to LTE MTC cat.1; rapporteur: Sprint | RAN4 | WI status report | - | - | - | - | .. | Rel-14 | LTE_MTCe2_L1_cat1_B25_B40-Core | | | | conclusion: noted; approved: Core: 100%, March 17; Core part WI completed | | - | - | | | 2/23/2017 15:34 | 3/5/2017 21:53 | | George Cummings | 45981 | 2160 | Yes | No | |
| 218 | motiv | Yes | not treated | 9.1 | RP-170217 | Motivation for SI on integrated access and backhaul (IAB) for NR | AT&T | discussion | - | - | - | - | .. | - | - | | | wrong Tdoc type SIDnew in Tdoc request | | | - | - | | | 2/23/2017 15:38 | 3/5/2017 21:53 | | Arun Ghosh | 57084 | 2240 | Yes | No | Discussion |
| 219 | | No | withdrawn | 9.1 | RP-170218 | Time Budget Request for SI on IAB | AT&T | discussion | - | - | - | - | .. | - | - | | | Provide proposed TU allocation in RAN1, RAN2, and RAN3 | | | - | - | | | 2/23/2017 15:41 | | | Arun Ghosh | 57084 | 2250 | Yes | Yes | Decision |
| 220 | motiv | Yes | noted | 10.1.2 | RP-170219 | Motivation paper for Support for high accuracy positioning in LTE | Deutsche Telekom, Huawei, HiSilicon, Neul | discussion | - | - | - | - | .. | - | - | | | wrong Tdoc type WIDnew in Tdoc request | | | - | - | | | 2/23/2017 15:42 | 3/5/2017 21:53 | | Axel Klatt | 20567 | 3740 | Yes | No | Discussion |
| 221 | RAN2 | Yes | postponed | 10.1.2 | RP-170220 | New WI: Support for high accuracy positioning in LTE | Deutsche Telekom, Huawei, HiSilicon, Neul | WID new | - | - | - | - | .. | Rel-15 | - | | | new WI for LTE; leading WG: RAN2 | | | - | - | | | 2/23/2017 15:43 | 3/5/2017 21:53 | | Axel Klatt | 20567 | 3750 | Yes | No | Approval |
| 222 | | Yes | noted | 10.4.3 | RP-170221 | Status Report of WI: Core part: LTE UE TRP and TRS and UTRA Hand Phantom related UE TRP and TRS Requirements; rapporteur: Telecom Italia | RAN4 | WI status report | - | - | - | - | .. | Rel-14 | LTE_UTRA_TRP_TRS-Core | | | | conclusion: noted; approved: Core: 75%, June 17 | | - | - | | | 2/23/2017 16:31 | 3/5/2017 21:53 | | Paolo Goria | 23040 | 2220 | Yes | No | |
| 223 | RAN4 | Yes | approved | 10.4.3 | RP-170222 | WI exception request for Core part: LTE UE TRP and TRS and UTRA Hand Phantom related UE TRP and TRS Requirements | TELECOM ITALIA S.p.A. | WI exception request | - | - | - | - | .. | Rel-14 | LTE_UTRA_TRP_TRS-Core | | | | | | - | - | | | 2/23/2017 16:33 | 3/5/2017 21:53 | | Paolo Goria | 23040 | 69800 | Yes | No | Approval |
| 224 | RAN4 | Yes | approved | 10.4.3 | RP-170223 | Revised WID: LTE UE TRP and TRS and UTRA Hand Phantom related UE TRP and TRS Requirements | TELECOM ITALIA S.p.A. | WID revised | - | - | - | - | .. | Rel-14 | LTE_UTRA_TRP_TRS-Core | | | last approved WID: RP-162061 | | | - | - | | | 2/23/2017 17:03 | 3/5/2017 21:53 | | Paolo Goria | 23040 | 2230 | Yes | No | Approval |
| 225 | | Yes | noted | 13.6.6 | RP-170224 | Status Report: UE Conformance Test Aspects – Band 41 power class 2 operation; rapporteur: Sprint | RAN5 | WI status report | - | - | - | - | .. | Rel-14 | LTE_B41_UE_PC2-Core | | | | conclusion: noted; approved: 100%, March 17; WI is completed | | - | - | | | 2/23/2017 18:46 | 3/5/2017 21:53 | | Scott Probasco | 17698 | 920 | Yes | No | |
| 226 | | Yes | noted | 13.6.1 | RP-170225 | Status Report of WI UE Conformance Test Aspects - LTE UE TRP and TRS and UTRA Hand Phantom; rapporteur: ZTE | RAN5 | WI status report | - | - | - | - | .. | - | LTE_UTRA_TRP_TRS-UEConTest | | | | conclusion: noted; approved: 77%, Sep.17 | | - | - | | | 2/23/2017 18:53 | 3/5/2017 21:53 | | Carolyn Taylor | 19440 | 880 | Yes | No | |
| 227 | | Yes | noted | 9 | RP-170226 | NR planning | Nokia | discussion | - | - | - | - | .. | Rel-15 | - | | | The document presents fundamental aspects of planning NR work for Release 15. | moved from AI 9.1 to AI 9<br>proposals for RAN#75:<br>1.Define the clear initial priorities within the normative Release-15 WID. Limit lower layer options and architecture options in line with planned initial deployments and forward compatibility requirements.<br>2.Identify available time left for phase-2 study work (on top of phase-1 normative work), approve study items accordingly.<br>3.WGs should strongly prioritize NR normative work over NR study work in the upcoming cycle.<br><br>4.RAN WG chairs and rapporteurs to outline a detailed plan how 1. and 2. will be delivered given the timeline commitments. This plan should be endorsed and maintained by TSG-RAN.<br>5.The plan shall ensure paralell progress of both non-standalone and standalone NR components (especially in RAN2) as much as possible.<br>6.The detailed plan should also be coordinated and followed up regularly with TSG-SA. Officials and rapporteurs should take an active role here. | | - | - | | | 2/23/2017 19:40 | 3/5/2017 21:53 | | Balazs Bertenyi | 68269 | 340 | Yes | No | Decision |
| 228 | | Yes | noted | 9.2.1 | RP-170227 | NR terminology - summary of email discussion | Nokia (Convenor) | discussion | - | - | - | - | .. | Rel-15 | - | | | Summary and proposal on NR terminology based on email discussion conducted on the RAN exploder | moved from AI 9.1 to AI 9.2.1<br>NTT DOCOMO: wants to have NG-RAN<br>China Unicom, Qualcomm: support this<br><br>conclusion: We will use NG-RAN and communicate this to SA in the joint RAN-SA session | | - | - | | | 2/23/2017 19:52 | 3/5/2017 21:53 | | Balazs Bertenyi | 68269 | 85400 | Yes | No | Decision |


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| | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z | AA | AB | AC | AD | AE | AF | AG |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 229 | RAN1 | Yes | postponed | 9.1 | RP-170228 | New SI: Study on Ultra Reliable Low Latency Communication Enhancements for NR | Nokia, Alcatel-Lucent Shanghai Bell | SID new | - | - | - | - | .. | Rel-15 | - | | | new SI for NR; leading WG: RAN1; studying enhancements of URLLC compared to REL-15 NR WI | | | - | - | | | | 2/23/2017 19:56 | 3/5/2017 21:53 | | Sigen Ye | 45768 | 1335 | Yes | No | Approval |
| 230 | motiv | Yes | noted | 9.1 | RP-170229 | Motivation for new Study Item on Ultra Reliable Low Latency Communication Enhancements for NR | Nokia, Alcatel-Lucent Shanghai Bell | discussion | - | - | - | - | .. | - | - | | | | | | - | - | | | | 2/23/2017 19:57 | 3/5/2017 21:53 | | Sigen Ye | 45768 | 1330 | Yes | No | Discussion |
| 231 | | Yes | noted | 9 | RP-170230 | Confirming the Date for Milestone Box 4 | AT&T | discussion | - | - | - | - | .. | Rel-15 | FS_NR_new RAT | | | Rationale in Support of Milestone 4 Date | moved from AI 9.4 to AI 9 | | - | - | | | | 2/23/2017 21:55 | 3/5/2017 21:53 | | Vince Spatafora | 42588 | 4120 | Yes | No | Decision |
| 232 | | Yes | noted | 10.4.1 | RP-170231 | Status report of WI Further Indoor Positioning enhancements for UTRA and LTE; rapporteur: Huawei, NextNav | RAN4 | WI status report | - | - | - | - | .. | Rel-14 | UTRA_LTE_iPos_enh2-Perf | | | Core part was completed in Dec.16 | conclusion: noted; approved: Perf.: 50%, June 17 | | - | - | | | | 2/23/2017 21:56 | 3/5/2017 21:53 | | Bill Shvodian | 61097 | 2310 | Yes | No | |
| 233 | | Yes | noted | 13.5.7 | RP-170232 | Status report of WI UE Conformance Test Aspects – Indoor Positioning Enhancements Support for LTE and UMTS; rapporteur: NextNav | RAN5 | WI status report | - | - | - | - | .. | Rel-13 | UTRA_LTE_iPos_enh-UEConTest | | | | conclusion: noted; approved: 100%, March 17; WI completed | | - | - | | | | 2/23/2017 22:02 | 3/5/2017 21:53 | | Bill Shvodian | 61097 | 2320 | Yes | No | |
| 234 | RAN5 | Yes | approved | 13.5.7 | RP-170233 | Revision of WI UE Conformance Test Aspects – Indoor Positioning Enhancement Support for LTE and UMTS | NextNav, AT&T, Broadcom | WID revised | - | - | - | - | .. | Rel-13 | UTRA_LTE_iPos_enh-UEConTest | | | last approved WID: RP-161478 | ATT: is an example where someone did the good example to take something out where there is no operator interest | | - | - | | | | 2/23/2017 22:09 | 3/5/2017 21:53 | | Bill Shvodian | 61097 | 2330 | Yes | No | Approval |
| 235 | RAN5 | Yes | approved | 13.1 | RP-170234 | New WID on UE Conformance Test Aspects – RAT Independent Further Indoor Positioning Enhancements for LTE | NextNav, AT&T, Broadcom | WID new | - | - | - | - | .. | Rel-14 | - | | | new WI for LTE only; leading WG: RAN5; tested: REL-14 UTRA_LTE_iPos_enh2-Core (but only RAT independent aspects for LTE); WI code to be used: LTE_iPos_enh2_RI-UEConTest; endorsed by RAN5 in R5-161389 | | | - | - | | | | 2/23/2017 22:13 | 3/5/2017 21:53 | | Bill Shvodian | 61097 | 2340 | Yes | No | Approval |
| 236 | RAN4 | Yes | approved | 10.5.10 | RP-170235 | Revised WID: Core part: Addition of 1.4 and 3 MHz Channel Bandwidth to E-UTRA operating band 65 for CGC (Complementary Ground Component) operations in Region 1 | HUGHES Network Systems Ltd | WID revised | - | - | - | - | .. | Rel-14 | LTE_1980_2170_REG1_addBWs-Core | | RP-162515 | last approved WID: RP-162515; revision of RP-170052; reference to one specification was removed and reference to two others was added; wrong WI code in Tdoc request | | | - | - | | | | 2/23/2017 22:39 | 2/23/2017 22:43 | | Seth Parkoff | 49571 | 5730 | Yes | No | Approval |
| 237 | | Yes | noted | 10.3.14 | RP-170236 | Status report of WI: LTE-based V2X Services; rapporteur: LG Electronics | RAN1 | WI status report | - | - | - | - | .. | Rel-14 | LTE_V2X-Core | | | | conclusion: noted; approved: Core: 100%, March 17; Perf.: 0%, Sep.17; Core part completed | | - | - | | | | 2/23/2017 23:18 | 3/5/2017 21:53 | | Youngwoo Yun | 45048 | 1270 | Yes | No | |
| 238 | RAN1 | Yes | noted | 10.3.14 | RP-170237 | Summary for WI LTE-based V2X Services | LG Electronics | WI summary | - | - | - | - | .. | Rel-14 | LTE_V2X-Core | | | | | | - | - | | | | 2/23/2017 23:18 | 3/5/2017 21:53 | | Youngwoo Yun | 45048 | 6350 | Yes | No | |
| 239 | RAN1 | Yes | revised | 9.1 | RP-170238 | New SI proposal: Study on 3GPP V2X phase 3 for LTE & NR | LG Electronics | SID new | - | - | - | - | .. | Rel-15 | - | RP-170680 | | new SI for LTE and NR; leading WG: RAN1; | | | - | - | | | | 2/23/2017 23:18 | 3/5/2017 21:53 | | Youngwoo Yun | 45048 | 1700 | Yes | No | Approval |
| 240 | motiv | Yes | noted | 9.1 | RP-170239 | Motivation for new SI : Study on 3GPP V2X phase 3 | LG Electronics | discussion | - | - | - | - | .. | Rel-15 | - | | | | | | - | - | | | | 2/23/2017 23:18 | 3/5/2017 21:53 | | Youngwoo Yun | 45048 | 1630 | Yes | No | Discussion |
| 241 | RAN1 | Yes | revised | 9.1 | RP-170240 | New SI proposal: Study on flexible and full duplex for NR | LG Electronics | SID new | - | - | - | - | .. | Rel-15 | - | RP-170707 | | new SI for NR; leading WG: RAN1; | | | - | - | | | | 2/23/2017 23:18 | 3/5/2017 21:53 | | Youngwoo Yun | 45048 | 2191 | Yes | No | Approval |
| 242 | motiv | Yes | noted | 9.1 | RP-170241 | Motivation for new SI : Study on flexible and full duplex for NR | LG Electronics | discussion | - | - | - | - | .. | Rel-15 | - | | | | | | - | - | | | | 2/23/2017 23:18 | 3/5/2017 21:53 | | Youngwoo Yun | 45048 | 2190 | Yes | No | Discussion |
| 243 | RAN1 | Yes | postponed | 10.1.1 | RP-170242 | New WI proposal: Ultra reliable low latency communication (URLLC) support in LTE | LG Electronics | WID new | - | - | - | - | .. | Rel-15 | - | | | new WI for LTE only; leading WI: RAN1; WI code to be used: LTE_URLLC; compare RP-170119 | | | - | - | | | | 2/23/2017 23:18 | 3/5/2017 21:53 | | Youngwoo Yun | 45048 | 1830 | Yes | No | Approval |
| 244 | motiv | Yes | noted | 10.1.1 | RP-170243 | Motivation for new WI: URLLC support in LTE | LG Electronics | discussion | - | - | - | - | .. | Rel-15 | - | | | | | | - | - | | | | 2/23/2017 23:18 | 3/5/2017 21:53 | | Youngwoo Yun | 45048 | 1820 | Yes | No | Discussion |
| 245 | RAN1 | Yes | revised | 10.1.1 | RP-170244 | New WID: UE Positioning Accuracy Enhancements for LTE | Nokia, Alcatel-Lucent Shanghai Bell | WID new | - | - | - | - | .. | Rel-15 | - | RP-170722 | | new WI for LTE only; leading WI: RAN1 | | | - | - | | | | 2/23/2017 23:30 | 3/5/2017 21:53 | | Matthew Baker | 68789 | 1941 | Yes | No | Approval |
| 246 | motiv | Yes | noted | 10.1.1 | RP-170245 | Motivation for New WID: UE Positioning Accuracy Enhancements for LTE | Nokia, Alcatel-Lucent Shanghai Bell | discussion | - | - | - | - | .. | Rel-15 | - | | | | | | - | - | | | | 2/23/2017 23:33 | 3/5/2017 21:53 | | Matthew Baker | 68789 | 1940 | Yes | No | Discussion |
| 247 | RAN1 | Yes | revised | 10.1.1 | RP-170246 | New WID: Enhancements to LTE operation in unlicensed spectrum | Nokia, Ericsson, Qualcomm, Intel | WID new | - | - | - | - | .. | Rel-15 | - | RP-170723 | | new WI for LTE only; leading WI: RAN1 | | | - | - | | | | 2/23/2017 23:36 | 3/5/2017 21:53 | | Matthew Baker | 68789 | 1730 | Yes | No | Approval |
| 248 | motiv | Yes | noted | 10.1.1 | RP-170247 | Motivation for New WID: Enhancements to LTE operation in unlicensed spectrum | Nokia, Ericsson | discussion | - | - | - | - | .. | Rel-15 | - | | | | | | - | - | | | | 2/23/2017 23:38 | 3/5/2017 21:53 | | Matthew Baker | 68789 | 1720 | Yes | No | Discussion |


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| | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z | AA | AB | AC | AD | AE | AF | AG |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 249 | | Yes | noted | 10.13.3 | RP-170248 | Status Report of WI: FDD operating band in the L-band for LTE; rapporteur: NTT DOCOMO, INC. | RAN4 | WI status report | - | - | - | - | .. | Rel-15 | LTE_FDD_L_Band | | | | conclusion: noted; approved: Core: 50%, June 17; Perf.: 0%, June 17 | | - | - | | | 2/24/2017 0:56 | 3/5/2017 21:53 | | Kei Ando | 57164 | 2480 | Yes | No | |
| 250 | | Yes | approved | 9.2.1 | RP-170249 | TP for TR38.805: Regulations for 60GHz in Korea | KT Corp. | pCR | 38.805 | - | - | - | 0.0.1 | Rel-14 | FS_NR_new RAT | | | Skeleton TR 38.805 v0.0.1 is submitted in RP-170137; this contribution is a text proposal to TR 38.805 on Regulations for 60GHz in Korea. | | | - | - | | | 2/24/2017 1:29 | 3/5/2017 21:53 | | Chungwoo Hwang | 55545 | 4890 | Yes | No | Approval |
| 251 | | Yes | noted | 10.1 | RP-170250 | KT's perspective on 3GPP Release-15 for LTE-Advanced Pro. | KT Corp. | discussion | - | - | - | - | .. | Rel-15 | - | | | This contribution presents KT's perspective on 3GPP Release-15 for LTE-Advanced Pro. | moved from AI 10 to AI 10.1 | | - | - | | | 2/24/2017 1:32 | 3/5/2017 21:53 | | Chungwoo Hwang | 55545 | 2500 | Yes | No | Discussion |
| 252 | RAN3 | Yes | revised | 9.1 | RP-170251 | New WID on CU-DU lower layer split for New Radio | NTT DOCOMO, INC. | WID new | - | - | - | - | .. | Rel-15 | - | RP-170818 | | new WI for NR only; leading WG: RAN3 | | | - | - | | | 2/24/2017 1:57 | 3/5/2017 21:53 | | Hideaki Takahashi | 60906 | 1350 | Yes | No | Approval |
| 253 | motiv | Yes | noted | 9.1 | RP-170252 | Motivation for WI on CU-DU lower layer split for New Radio | NTT DOCOMO, INC. | discussion | - | - | - | - | .. | Rel-15 | FS_NR_new RAT | | | related to WID in RP-170251 | | | - | - | | | 2/24/2017 2:02 | 3/5/2017 21:53 | | Hideaki Takahashi | 60906 | 1360 | Yes | No | Discussion |
| 254 | flag M | Yes | noted | 10.3.3 | RP-170253 | Status report for WI: Perf. part: Performance enhancements for high speed scenario in LTE; rapporteur: NTT DOCOMO and Huawei | RAN4 | WI status report | - | - | - | - | .. | - | LTE_high_speed-Perf | | | Core part was completed in Dec.16 | conclusion: noted; approved: Perf.: 70%, June 17; | | - | - | | | 2/24/2017 2:21 | 3/5/2017 21:53 | | Kunihiko Teshima | 57760 | 2530 | Yes | No | |
| 255 | | Yes | noted | 13.4.1 | RP-170254 | Status Report of WI: UE Conformance Test aspects - LTE Device–to-Device Proximity Services | RAN5 | WI status report | - | - | - | - | .. | Rel-12 | LTE_D2D_Prox-UEConTest | | | | conclusion: noted; approved: 92%, June 17 | | - | - | | | 2/24/2017 3:31 | 3/5/2017 21:53 | | Francesco Pica | 57089 | 670 | Yes | No | |
| 256 | | Yes | noted | 13.5.3 | RP-170255 | Status report for WI: UE Conformance Test Aspects - Licensed-Assisted Access using LTE | RAN5 | WI status report | - | - | - | - | .. | Rel-13 | LTE_LAA-UEConTest | | | | conclusion: noted; approved: 45%, June 17 | | - | - | | | 2/24/2017 3:33 | 3/5/2017 21:53 | | Francesco Pica | 57089 | 760 | Yes | No | |
| 257 | RAN2 | Yes | revised | 11.1 | RP-170256 | New WID on Network assisted DL interference mitigation for UMTS | Qualcomm Incorporated | WID new | - | - | - | - | .. | Rel-15 | - | RP-170703 | | new WI for UMTS only; leading WG: RAN2 | | | - | - | | | 2/24/2017 3:38 | 3/5/2017 21:53 | | Francesco Pica | 57089 | 2570 | Yes | No | Approval |
| 258 | motiv | Yes | noted | 11.1 | RP-170257 | On NW assisted DL interference mitigation - Motivation | Qualcomm Incorporated | discussion | - | - | - | - | .. | Rel-15 | - | | | | | | - | - | | | 2/24/2017 3:40 | 3/5/2017 21:53 | | Francesco Pica | 57089 | 2560 | Yes | No | Discussion |
| 259 | | Yes | noted | 11.2.1 | RP-170258 | Status Report for WI Core part: Quality of Experience (QoE) Measurement Collection for streaming services in UTRAN; rapporteur: China Unicom | RAN2 | WI status report | - | - | - | - | .. | Rel-14 | UMTS_QMC_Streaming-Core | | | | conclusion: noted; approved: Core: 100%, March 17; Core part WI completed | | - | - | | | 2/24/2017 5:02 | 3/5/2017 21:53 | | Yue Ma | 60300 | 2580 | Yes | No | |
| 260 | RAN2 | Yes | noted | 11.2.1 | RP-170259 | Summary for WI Quality of Experience (QoE) Measurement Collection for streaming services in UTRAN | China Unicom | WI summary | - | - | - | - | .. | Rel-14 | UMTS_QMC_Streaming-Core | | | | | | - | - | | | 2/24/2017 5:16 | 3/5/2017 21:53 | | Yue Ma | 60300 | 6480 | Yes | No | |
| 261 | motiv | Yes | noted | 9.1 | RP-170260 | Motivation for New SI on NR support for high speed scenario | ETRI | discussion | - | - | - | - | .. | Rel-15 | - | | | | | | - | - | | | 2/24/2017 5:47 | 3/5/2017 21:53 | | Jihyung Kim | 65152 | 2210 | Yes | No | Discussion |
| 262 | RAN1 | Yes | revised | 9.1 | RP-170261 | New SID: Study on NR support for high speed scenario | ETRI | SID new | - | - | - | - | .. | Rel-15 | - | RP-170815 | | new SI for NR; leading WG: RAN1 | | | - | - | | | 2/24/2017 5:51 | 3/5/2017 21:53 | | Jihyung Kim | 65152 | 2220 | Yes | No | Approval |
| 263 | RAN3 | Yes | revised | 10.1.3 | RP-170262 | New WID: Architecture Evolution for E-UTRAN | China Unicom, Orange, Huawei,HiSilicon | WID new | - | - | - | - | .. | Rel-15 | - | RP-170728 | | new WI for LTE only; leading WG: RAN3; | | | - | - | | | 2/24/2017 6:19 | 3/5/2017 21:53 | | Gen Cao | 58500 | 2620 | Yes | No | Approval |
| 264 | RAN2 | Yes | postponed | 10.1.2 | RP-170263 | New WI: Further mobility enhancement for E-UTRAN | China Telecommunications, Huawei, HiSilicon | WID new | - | - | - | - | .. | Rel-15 | - | | | new WI for LTE only; leading WG: RAN2; | | | - | - | | | 2/24/2017 6:19 | 3/5/2017 21:53 | | Xiaoming She | 46899 | 1780 | Yes | No | Approval |
| 265 | motiv | Yes | noted | 10.1.2 | RP-170264 | Motivation for new WI on further mobility enhancement for EUTRAN | China Telecommunications, Huawei, HiSilicon | discussion | - | - | - | - | .. | Rel-15 | - | | | | | | - | - | | | 2/24/2017 6:22 | 3/5/2017 21:53 | | Xiaoming She | 46899 | 1770 | Yes | No | Discussion |
| 266 | motiv | Yes | revised | 10.1.3 | RP-170265 | Motivation for WI on Architecture Evolution for E-UTRAN | China Unicom, Orange, Huawei, HiSilicon | discussion | - | - | - | - | .. | Rel-15 | - | RP-170729 | | | | | - | - | | | 2/24/2017 6:24 | 3/5/2017 21:53 | | Gen Cao | 58500 | 2650 | Yes | No | Discussion |
| 267 | RAN4 | Yes | not treated | 10.1.4 | RP-170266 | New SI Proposal: Study on enhanced Carrier Aggregation Mobility for LTE | Intel | SID new | - | - | - | - | .. | Rel-15 | - | | | new SI for LTE only; leading WG: RAN4 | only 1 supporting company | | - | - | | | 2/24/2017 6:24 | 3/5/2017 21:53 | | Yang Tang | 56725 | 3540 | Yes | No | Approval |
| 268 | motiv | Yes | not treated | 10.1.4 | RP-170267 | Motivation for SI: Enhanced Carrier Aggregation Mobility | Intel | discussion | - | - | - | - | .. | Rel-15 | - | | | | | | - | - | | | 2/24/2017 6:25 | 3/5/2017 21:53 | | Yang Tang | 56725 | 3530 | Yes | No | Discussion |
| 269 | | Yes | noted | 10.3.1 | RP-170268 | Status report for WI Enhanced LAA for LTE; rapporteur: Ericsson | RAN1 | WI status report | - | - | - | - | .. | - | LTE_eLAA | | | | conclusion: noted; approved: Core: 100%, March 17; Perf.: 33%, June 17; Core part is completed | | - | - | | | 2/24/2017 6:27 | 3/5/2017 21:53 | | Havish Koorapaty | 46308 | 2680 | Yes | No | |

| | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z | AA | AB | AC | AD | AE | AF | AG |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 270 | RAN1 | Yes | noted | 10.3.1 | RP-170269 | Summary for WI Enhanced LAA for LTE | Ericsson Inc., Huawei | WI summary | - | - | - | - | .. | Rel-14 | LTE_eLAA-Core | | | | | | - | - | | | 2/24/2017 6:27 | 3/5/2017 21:53 | | Havish Koorapaty | 46308 | 2690 | Yes | No | |
| 271 | | Yes | noted | 10.3.22 | RP-170270 | Status report of WI: Enhanced CRS and SU-MIMO Interference Mitigation Performance Requirements for LTE; rapporteurs: Intel Corporation, Huawei, LGE | RAN4 | WI status report | - | - | - | - | .. | Rel-14 | LTE_eCRSIM_eSUMIMO-Perf | | | | conclusion: noted, approved:50%, Sep.17 | | - | - | | | 2/24/2017 6:31 | 3/5/2017 21:53 | | Yang Tang | 56725 | 2700 | Yes | No | |
| 272 | RAN4 | Yes | revised | 10.1.4 | RP-170271 | New WI Proposal: Enhanced CRS and SU-MIMO Interference Mitigation Performance Requirements for LTE | Intel | WID new | - | - | - | - | .. | Rel-15 | - | RP-170747 | | new WI for LTE only; leading WG: RAN4 | only 1 supporting company<br>RAN chair: it seems this one is also not yet ready for approval | | - | - | | | 2/24/2017 6:32 | 3/5/2017 21:53 | | Yang Tang | 56725 | 2661 | Yes | No | Approval |
| 273 | RAN4 | Yes | not treated | 10.1.4 | RP-170272 | New SI proposal: Study on Advanced Receivers for LTE V2X | Intel | SID new | - | - | - | - | .. | Rel-15 | - | | | new SI for LTE only; leading WG: RAN4 | only 1 supporting company | | - | - | | | 2/24/2017 6:33 | 3/5/2017 21:53 | | Yang Tang | 56725 | 2810 | Yes | No | Approval |
| 274 | | Yes | noted | 10.3.13 | RP-170273 | Status report of WI: Measurement gap enhancement; rapporteur: Intel Corporation | RAN4 | WI status report | - | - | - | - | .. | Rel-14 | LTE_meas_gap_enh | | | | conclusion: noted; approved: Core: 95, June 17; Perf: 20%, June 17 | | - | - | | | 2/24/2017 6:35 | 3/5/2017 21:53 | | Yang Tang | 56725 | 2730 | Yes | No | |
| 275 | | Yes | noted | 9.1 | RP-170274 | Coverage extension for NR Rel-15 | China Telecommunications | discussion | - | - | - | - | .. | Rel-15 | - | | | discussion on NR WI scope | | | - | - | | | 2/24/2017 6:36 | 3/5/2017 21:53 | | Xiaoming She | 46899 | 2600 | Yes | No | Discussion |
| 276 | RAN4 | Yes | approved | 10.3.13 | RP-170275 | WI exception request for Core part: Measurement gap enhancement | Intel | WI exception request | - | - | - | - | .. | Rel-14 | LTE_meas_gap_enh-Core | | | | | | - | - | | | 2/24/2017 6:36 | 3/5/2017 21:53 | | Yang Tang | 56725 | 6340 | Yes | No | Approval |
| 277 | | Yes | noted | 10.3.6 | RP-170276 | Status report of WI Core part: Radiated performance requirements for the verification of multi-antenna reception of UEs in LTE | RAN4 | WI status report | - | - | - | - | .. | Rel-14 | LTE_MIMO_OTA-Core | | | | MCC: do not use % steps less than 1% please<br>conclusion: noted; approved: Core part: 33%, June 17 | | - | - | | | 2/24/2017 6:37 | 3/5/2017 21:53 | | Yang Tang | 56725 | 2760 | Yes | No | |
| 278 | RAN4 | Yes | approved | 10.3.6 | RP-170277 | WI exception request for Core part: Radiated performance requirements for the verification of multi-antenna reception of UEs in LTE | Intel Corporation | WI exception request | - | - | - | - | .. | Rel-14 | LTE_MIMO_OTA-Core | | | | | | - | - | | | 2/24/2017 6:37 | 3/5/2017 21:53 | | Yang Tang | 56725 | 2790 | Yes | No | Approval |
| 279 | RAN4 | Yes | approved | 10.3.6 | RP-170278 | Revision of WI Core part: Radiated performance requirements for the verification of multi-antenna reception of UEs in LTE | Intel Corporation | WID revised | - | - | - | - | .. | Rel-14 | LTE_MIMO_OTA-Core | | | last approved WID: RP-162306 | Intel: is updating completion dates only | | - | - | | | 2/24/2017 6:37 | 3/5/2017 21:53 | | Yang Tang | 56725 | 2780 | Yes | No | Approval |
| 280 | | Yes | revised | 10.3.6 | RP-170279 | Draft LS on MIMO OTA (to: GCF; cc: -; contact: Intel) | Intel Corporation | LS out | - | - | - | - | .. | Rel-14 | LTE_MIMO_OTA-Core | RP-170766 | | | | | GCF | - | | | 2/24/2017 6:37 | 3/5/2017 21:53 | | Yang Tang | 56725 | 5560 | Yes | No | Approval |
| 281 | RAN4 | Yes | not treated | 10.1.4 | RP-170280 | New WID: UE requirements for transmit antenna selection for LTE | Intel Corporation | WID new | - | - | - | - | .. | - | - | | | new WI for LTE only; leading WG: RAN4; MCC: no supporting companies? | no supporting companies | | - | - | | | 2/24/2017 6:37 | 3/5/2017 21:53 | | Yang Tang | 56725 | 2720 | Yes | No | Approval |
| 282 | motiv | Yes | not treated | 10.1.4 | RP-170281 | Motivation for the new WID on UE requirements for transmit antenna selection | Intel Corporation | discussion | - | - | - | - | .. | - | - | | | | | | - | - | | | 2/24/2017 6:37 | 3/5/2017 21:53 | | Yang Tang | 56725 | 2710 | Yes | No | Discussion |
| 283 | RAN4 | Yes | revised | 9.1 | RP-170282 | New SID: Study of test methods for New Radio | Intel Corporation | SID new | - | - | - | - | .. | Rel-15 | - | RP-170714 | | new SID for NR; leading WG: RAN4 | | | - | - | | | 2/24/2017 6:37 | 3/5/2017 21:53 | | Yang Tang | 56725 | 2621 | Yes | No | Approval |
| 284 | motiv | Yes | noted | 9.1 | RP-170283 | Motivation for Study of test methods for New Radio | Intel Corporation | discussion | - | - | - | - | .. | - | - | | | | | | - | - | | | 2/24/2017 6:37 | 3/5/2017 21:53 | | Yang Tang | 56725 | 2620 | Yes | No | Discussion |
| 285 | motiv | Yes | not treated | 10.1.4 | RP-170284 | Motivation for WI: CRS-IM Performance Requirements for Single RX Chain UEs | Intel Corporation | discussion | - | - | - | - | .. | Rel-15 | - | | | | | | - | - | | | 2/24/2017 6:37 | 3/5/2017 21:53 | | Yang Tang | 56725 | 2660 | Yes | No | Discussion |
| 286 | motiv | Yes | not treated | 10.1.4 | RP-170285 | Motivation for SI: Study on Advanced Receivers LTE V2X | Intel Corporation | discussion | - | - | - | - | .. | Rel-15 | - | | | | | | - | - | | | 2/24/2017 6:37 | 3/5/2017 21:53 | | Yang Tang | 56725 | 2800 | Yes | No | Discussion |
| 287 | | Yes | noted | 10.1.2 | RP-170286 | Discussion on the support of NGC functions for eLTE | China Telecommunications | discussion | - | - | - | - | .. | Rel-15 | - | | | Discussion on eLTE-NGC | | | - | - | | | 2/24/2017 6:44 | 3/5/2017 21:53 | | Xiaoming She | 46899 | 4470 | Yes | No | Discussion |
| 288 | RAN | Yes | approved | 9.3.2 | RP-170287 | Appending some missed abbreviations for 38.913 | China Mobile Com. Corporation | CR | 38.913 | 8 | - | F | 14.1.0 | Rel-14 | FS_NG_SReq | | | CR to RAN TR; some missed abbreviations are appended for 38.913 | MCC: wrong rev 1 on CR cover; Telecom Italia: there will be some alignments needed with ITU-R requirements | | - | - | | | 2/24/2017 6:50 | 3/9/2017 19:01 | | Xiaodong Xu | 39125 | 5050 | Yes | No | Approval |
| 289 | | Yes | noted | 10.3.16 | RP-170288 | Status report for WI: Enhancements of NB-IoT; rapporteur: Huawei | RAN1 | WI status report | - | - | - | - | .. | Rel-14 | NB_IOTenh-Core | | | | conclusion: noted; approved: Core: 95%, June 17; Perf.: 0%, Dec.17; | | - | - | | | 2/24/2017 6:51 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 2880 | Yes | No | |
| 290 | RAN1 | Yes | postponed | 10.3.16 | RP-170289 | Summary for WI for enhancements of NB-IoT | Huawei | WI summary | - | - | - | - | .. | Rel-14 | NB_IOTenh-Core | | | | MCC: WI is not yet completed | | - | - | | | 2/24/2017 6:51 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 6580 | Yes | No | |
| 291 | RAN1 | Yes | revised | 10.3.16 | RP-170290 | WI exception request for Core part: Enhancements of NB-IoT | RAN1 | WI exception request | - | - | - | - | .. | Rel-14 | NB_IOTenh-Core | RP-170712 | | | | | - | - | | | 2/24/2017 6:51 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 6370 | Yes | No | Approval |

| | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z | AA | AB | AC | AD | AE | AF | AG |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 292 | flag D, flag M | Yes | revised | 10.3.4 | RP-170291 | Status report for WI: Signalling reduction to enable light connection for LTE, rapporteur: Huawei | RAN2 | WI status report | - | - | - | - | .. | Rel-14 | LTE_LIGHT_CON-Core | RP-170787 | | | Vodafone: While it is not entirely obvious from the CRs for this WI, Vodafone's understanding is that the CRs will result in a UE in "light connected" state not performing the background PLMN search. This is not acceptable to Vodafone as the UE could remain in the LC state for a long period, and therefore the HPLMN could incur substantial inter-operator roaming charges.<br><br>MCC: target March 17 so is it intended to stop this work and to not approve CRs for it? | | - | - | | | 2/24/2017 6:51 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 2910 | Yes | No | |
| 293 | RAN2 | Yes | revised | 10.3.4 | RP-170292 | Revision of WI: Signalling reduction to enable light connection for LTE | Huawei | WID revised | - | - | - | - | .. | Rel-14 | LTE_LIGHT_CON-Core | RP-170788 | | last approved WID: RP-160937; change of rapporteur | | | - | - | | | 2/24/2017 6:51 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 2930 | Yes | No | Approval |
| 294 | RAN2 | Yes | withdrawn | 10.3.4 | RP-170293 | WI exception request for Core part: Signalling reduction to enable light connection for LTE | Huawei, Intel, China Telecom | WI exception request | - | - | - | - | .. | Rel-14 | LTE_LIGHT_CON-Core | | | | | | - | - | | | 2/24/2017 6:51 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 4360 | Yes | Yes | Approval |
| 295 | | Yes | revised | 10.14.1 | RP-170294 | Status report for SI: Further Enhancements LTE Device to Device, UE to Network Relays for IoT and Wearables; rapporteur: Huawei | RAN2 | WI status report | - | - | - | - | .. | Rel-15 | FS_feD2D_IoT_relay_wearable | RP-170708 | | Add RAN3 TU | | | - | - | | | 2/24/2017 6:51 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 2940 | Yes | No | |
| 296 | RAN2 | Yes | approved | 10.14.1 | RP-170295 | Revision of SI: Further Enhancements LTE Device to Device, UE to Network Relays for IoT and Wearables | Huawei, Huawei Device | SID revised | - | - | - | - | .. | Rel-15 | FS_feD2D_IoT_relay_wearable | | | last approved SID: RP-161839; adding RAN3 as secondary responsible WG | | | - | - | | | 2/24/2017 6:51 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 3270 | Yes | No | Approval |
| 297 | | Yes | noted | 10.3.11 | RP-170296 | Status report for WI Perf Part: SRS (sounding reference signal) switching between LTE component carriers, rapporteur: Huawei | RAN4 | WI status report | - | - | - | - | .. | Rel-14 | LTE_SRS_switch-Perf | | | Core part was completed in Dec.16 | conclusion: noted; approved: Perf.: 25%, June 17 | | - | - | | | 2/24/2017 6:51 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 2960 | Yes | No | |
| 298 | | Yes | noted | 10.4.2 | RP-170297 | Status report for WI: Enhancements of Base Station (BS) RF and EMC requirements for Active Antenna System (AAS), rapporteur: Huawei | RAN4 | WI status report | - | - | - | - | .. | Rel-14 | AASenh_BS_LTE_UTRA | | | | conclusion: noted, approved: Core: 40%, Dec.17; Perf.: 10%, June 18; both are shifted from REL-14 to REL-15 | | - | - | | | 2/24/2017 6:51 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 2970 | Yes | No | |
| 299 | RAN4 | Yes | revised | 10.4.2 | RP-170298 | Revision of WI: Enhancements of Base Station (BS) RF and EMC requirements for Active Antenna System (AAS) | Huawei | WID revised | - | - | - | - | .. | Rel-14 | AASenh_BS_LTE_UTRA | RP-170769 | | last approved WID: RP-161668; to update affected specifications and to align target date with proposed shift to Rel-15 | | | - | - | | | 2/24/2017 6:51 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 2990 | Yes | No | Approval |
| 300 | motiv | Yes | noted | 10.4.2 | RP-170299 | Motivations for revision of WI on enhancements of Base Station (BS) RF and EMC requirements for Active Antenna System (AAS) | RAN4 | discussion | - | - | - | - | .. | Rel-14 | AASenh_BS_LTE_UTRA | | | | | | - | - | | | 2/24/2017 6:51 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 2980 | Yes | No | Discussion |
| 301 | flag D | Yes | noted | 10.14.2 | RP-170300 | Status report for SI: LTE bandwidth flexibility enhancements; rapporteur: Huawei | RAN4 | WI status report | - | - | - | - | .. | Rel-15 | FS_LTE_BW_flex | | | | Ericsson: Time budget should be discussed together with all other proposed WI/SIs.<br>Huawei: Ericsson is proposing to stop the SI, we would be ok if it would be addressed in the NR WI<br>RAN chair: seems to be a possible way forward so try to capture this in the NR WID and we can then stop this SI<br><br>Huawei: we can stop the SI as objective is transferred into NR WI as shown in the document on handling RAN4 NR workload from NTT Docomo (RP-170443)<br>Nokia: so planned TUs can be reused<br>Huawei: yes<br>MCC: was there a TR already, if yes please let me know<br>Huawei: TR 36.740<br>conclusion: noted; approved: 50%, March 17; SI is stopped, TR 36.740 will be withdrawn | | - | - | | | 2/24/2017 6:51 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 3000 | Yes | No | |
| 302 | | Yes | noted | 10.2.1 | RP-170301 | Status report for SI: Study on Multi-node testing for LAA; rapporteur: Huawei | RAN4 | WI status report | - | - | - | - | .. | Rel-13 | FS_LTE_LAA_multinode_test | | | | conclusion: noted; approved: 30%, June 17; note: As this SI is related to testing, it will stay in REL-13. | | - | - | | | 2/24/2017 6:51 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 3010 | Yes | No | |
| 303 | | Yes | noted | 10.12.3 | RP-170302 | Status report for WI: Core part: Addition of power class 1 UE to B3/B20/B28 for LTE; rapporteur: Huawei | RAN4 | WI status report | - | - | - | - | .. | Rel-15 | LTE_HPUE_B3_B20_B28 | | | | conclusion: noted; approved: Core: 70%, June 17 | | - | - | | | 2/24/2017 6:51 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 3020 | Yes | No | |
| 304 | | Yes | noted | 10.13.4 | RP-170303 | Status report for WI: TDD operating band in the L-band for LTE; rapporteur: Huawei | RAN4 | WI status report | - | - | - | - | .. | Rel-15 | LTE_TDD_L_Band | | | | conclusion: noted; approved: Core: 15%, June 17; Perf.: 0%, June 17 | | - | - | | | 2/24/2017 6:51 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 3030 | Yes | No | |

| | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z | AA | AB | AC | AD | AE | AF | AG |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 305 | RAN4 | Yes | approved | 10.13.4 | RP-170304 | Revision of WI: TDD operating band in the L-band for LTE | Huawei, HiSilicon | WID revised | - | - | - | - | .. | Rel-15 | LTE_TDD_L_Band | | | last approved WID: RP-162557; title update. | | | - | - | | | 2/24/2017 6:51 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 3040 | Yes | No | Approval |
| 306 | | Yes | noted | 10.5.11 | RP-170305 | Status report for WI: Introduction of new band support for 4Rx antenna ports; rapporteur: Huawei | RAN4 | WI status report | - | - | - | - | .. | Rel-14 | LTE_4Rx_AP_DL_bands-Core | | | | conclusion: noted; approved: Core: 80%, June 17 | | - | - | | | 2/24/2017 6:51 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 3050 | Yes | No | |
| 307 | RAN4 | Yes | approved | 10.5.11 | RP-170306 | WI exception request for Core part: Introduction of new band support for 4Rx antenna ports for LTE | Huawei, HiSilicon | WI exception request | - | - | - | - | .. | Rel-14 | LTE_4Rx_AP_DL_bands-Core | | | | | | - | - | | | 2/24/2017 6:51 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 5740 | Yes | No | Approval |
| 308 | RAN4 | Yes | approved | 10.5.11 | RP-170307 | Revision of WI: Core part: Introduction of new band support for 4Rx antenna ports for LTE | Huawei, HiSilicon | WID revised | - | - | - | - | .. | Rel-14 | LTE_4Rx_AP_DL_bands-Core | | | last approved WID: RP-162496; title change, addition of WI code, other editorial revisions | | | - | - | | | 2/24/2017 6:51 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 3070 | Yes | No | Approval |
| 309 | | Yes | noted | 10.5.3 | RP-170308 | Status report for WI: LTE Advanced inter-band CA Rel-14 for 3DL/1UL; rapporteur: Huawei | RAN4 | WI status report | - | - | - | - | .. | Rel-14 | LTE_CA_R14_3DL1UL | | | | conclusion: noted; approved: Core: 90%, June 17; Perf.: 90%, June 17 | | - | - | | | 2/24/2017 6:51 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 3080 | Yes | No | |
| 310 | RAN4 | Yes | approved | 10.5.3 | RP-170309 | Revised WID: LTE Advanced inter-band CA Rel-14 for 3DL/1UL | Huawei, HiSilicon | WID revised | - | - | - | - | .. | Rel-14 | LTE_CA_R14_3DL1UL | | | last approved WID: RP-162146 | | | - | - | | | 2/24/2017 6:51 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 3100 | Yes | No | Approval |
| 311 | RAN4 | Yes | approved | 10.5.3 | RP-170310 | WI exception request for LTE Advanced inter-band CA Rel-14 for 3DL/1UL | Huawei, HiSilicon | WI exception request | - | - | - | - | .. | Rel-14 | LTE_CA_R14_3DL1UL-Core | | | | | | - | - | | | 2/24/2017 6:51 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 5670 | Yes | No | Approval |
| 312 | | Yes | noted | 10.5.6 | RP-170311 | Status report for WI: LTE Advanced inter-band CA Rel-14 for 2DL/2UL; rapporteur: Huawei | RAN4 | WI status report | - | - | - | - | .. | Rel-14 | LTE_CA_R14_2DL2UL | | | | conclusion: noted; approved: Core: 90%, June 17; Perf.: 90%, June 17 | | - | - | | | 2/24/2017 6:51 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 3110 | Yes | No | |
| 313 | RAN4 | Yes | approved | 10.5.6 | RP-170312 | Revised WID: LTE Advanced inter-band CA Rel-14 for 2DL/2UL | Huawei, HiSilicon | WID revised | - | - | - | - | .. | Rel-14 | LTE_CA_R14_2DL2UL | | | last approved WID: RP-162148 | | | - | - | | | 2/24/2017 6:51 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 3130 | Yes | No | Approval |
| 314 | RAN4 | Yes | approved | 10.5.6 | RP-170313 | WI exception request for Core part: LTE Advanced inter-band CA Rel-14 for 2DL/2UL | Huawei, HiSilicon | WI exception request | - | - | - | - | .. | Rel-14 | LTE_CA_R14_2DL2UL | | | | | | - | - | | | 2/24/2017 6:51 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 5700 | Yes | No | Approval |
| 315 | | Yes | noted | 13.4.2 | RP-170314 | Status report for WI: UE Conformance Test Aspects - E-UTRA small cell enhancements - Physical layer aspects; rapporteur: Huawei | RAN5 | WI status report | - | - | - | - | .. | Rel-12 | LTE_SC_enh_L1-UEConTest | | | | conclusion: noted; approved: 96%, June 17 | | - | - | | | 2/24/2017 6:51 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 680 | Yes | No | |
| 316 | | Yes | noted | 13.6.4 | RP-170315 | Status report for WI: Support for V2V services based on LTE sidelink; rapporteur: Huawei | RAN5 | WI status report | - | - | - | - | .. | Rel-14 | LTE_SL_V2V-UEConTest | | | | conclusion: noted; approved: 15%, Sep.17 | | - | - | | | 2/24/2017 6:51 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 910 | Yes | No | |
| 317 | | Yes | noted | 13.5.9 | RP-170316 | Status report for WI: LTE CA Enhancement Beyond 5 Carriers - PUCCH on Scell; rapporteur: Huawei | RAN5 | WI status report | - | - | - | - | .. | Rel-13 | LTE_CA_enh_b5C_PUCCH-UEConTest | | | | conclusion: noted; approved: 5%, Sep.17 | | - | - | | | 2/24/2017 6:51 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 3160 | Yes | No | |
| 318 | RAN1 | Yes | revised | 9.1 | RP-170317 | New SI: Enhanced duplexing for NR | China Telecom, Huawei, HiSilicon | SID new | - | - | - | - | .. | Rel-15 | - | RP-170663 | | new SI for NR; leading WG: RAN1; | | | - | - | | | 2/24/2017 6:56 | 3/5/2017 21:53 | | Xiaoming She | 46899 | 2120 | Yes | No | Approval |
| 319 | motiv | Yes | revised | 9.1 | RP-170318 | Motivation for new SI on enhanced duplexing for NR | China Telecom, Huawei, HiSilicon | discussion | - | - | - | - | .. | Rel-15 | - | RP-170664 | | | | | - | - | | | 2/24/2017 6:57 | 3/5/2017 21:53 | | Xiaoming She | 46899 | 2100 | Yes | No | Discussion |
| 320 | RAN3 | Yes | approved | 10.3.16 | RP-170319 | Introduction of S1 UE information retrieve procedure | Huawei | CR | 36.413 | 1507 | 1 | B | 14.1.0 | Rel-14 | NB_IOTenh-Core | | | company CR; RAN3 agreed CR R3-170912 of RP-170539 needs to be revised to fix some mistakes (procedure code/IE-ID missing, typos); | | | - | - | | | 2/24/2017 7:02 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 5400 | Yes | No | Approval |
| 321 | | Yes | noted | 9 | RP-170320 | Principles for harmonizing specification of NSA and SA | China Mobile Com. Corporation | discussion | - | - | - | - | .. | Rel-14 | FS_NR_new RAT | | | this contribution presents some basic principles for heath development of NSA and SA if NSA is accelerated. | moved from AI 9.2.1 to AI 9 | | - | - | | | 2/24/2017 7:06 | 3/5/2017 21:53 | | Xiaodong Xu | 39125 | 4730 | Yes | No | Agreement |


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| | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z | AA | AB | AC | AD | AE | AF | AG |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 322 | RAN2 | Yes | approved | 10.8.3 | RP-170321 | Correction to PRACH resource configuration for high speed scenario | Huawei, HiSilicon | CR | 36.331 | 2698 | - | F | 14.1.0 | Rel-14 | LTE_high_speed-Core | | | company CR; RAN1 agreed 36.211 CR R1-1704132 (by email) where two additional RRC parameters are introduced for PRACH resource configuration for the Rel-14 high speed scenario; RAN1 has also sent LSout R1-1704133 = RP-170534 (agreed by email after Athens) to ask RAN2 to capture the 2 parameters in 36.331 but RAN2 did not have time for this and had no RAN2 Tdoc on this; Note: The REL-14 WI LTE_high_speed-Core was declared 100% complete at RAN #74 in Dec.16. | Nokia: a lot of REL-14 work that gets exceptions, so concerned that this was not reviewed by RAN2 | | - | - | | | 2/24/2017 7:12 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 5790 | Yes | No | Approval |
| 323 | | Yes | revised | 10.3.17 | RP-170322 | Status Report for WI Core part: Voice and Video Enhancement for LTE; rapporteur: CMCC | RAN2 | WI status report | - | - | - | - | .. | Rel-14 | LTE_VoLTE_ViLTE_enh-Core | RP-170803 | | | conclusion: noted; approved: Core: 100%, March 17; Core part is completed | | - | - | | | 2/24/2017 7:24 | 3/5/2017 21:53 | | Xiaodong Xu | 39125 | 3220 | Yes | No | |
| 324 | RAN2 | Yes | noted | 10.3.17 | RP-170323 | Summary for WI Core part: Voice and Video Enhancement for LTE | China Mobile Com. Corporation | WI summary | - | - | - | - | .. | Rel-14 | LTE_VoLTE_ViLTE_enh-Core | | | | | | - | - | | | 2/24/2017 7:32 | 3/5/2017 21:53 | | Xiaodong Xu | 39125 | 6380 | Yes | No | |
| 325 | RAN2 | Yes | revised | 10.1.2 | RP-170324 | New Work Item proposal: Further enhancements on Video for LTE | China Mobile Com. Corporation | WID new | - | - | - | - | .. | Rel-15 | - | RP-170781 | | new WI for LTE only; leading WG: RAN2; | | | - | - | | | 2/24/2017 7:37 | 3/5/2017 21:53 | | Xiaodong Xu | 39125 | 3251 | Yes | No | Approval |
| 326 | motiv | Yes | noted | 10.1.2 | RP-170325 | Motivation of LTE enhancements for video | China Mobile Com. Corporation | discussion | - | - | - | - | .. | Rel-15 | - | | | | | | - | - | | | 2/24/2017 7:42 | 3/5/2017 21:53 | | Xiaodong Xu | 39125 | 3250 | Yes | No | Discussion |
| 327 | RAN2 | Yes | postponed | 10.1.2 | RP-170326 | New Work Item proposal: UE velocity oriented mobility management for LTE | China Mobile Com. Corporation | WID new | - | - | - | - | .. | - | - | | | new WI for LTE only; leading WG: RAN2; | | | - | - | | | 2/24/2017 7:48 | 3/5/2017 21:53 | | Xiaodong Xu | 39125 | 2200 | Yes | No | Approval |
| 328 | | Yes | noted | 10.14.1 | RP-170327 | Plan for FeD2D work | LG Electronics France | discussion | - | - | - | - | .. | Rel-15 | FS_feD2D_IoT_relay_wearable | | | | LG: also Sequans is supporting this Tdoc proposals:<br>RAN2 should make SI conclusion on layer 2 relay until June 2017.<br>RAN1 will start WI phase for sidelink enhancement from September 2017 | | - | - | | | 2/24/2017 7:50 | 3/5/2017 21:53 | | Youngdae Lee | 33638 | 2950 | Yes | No | |
| 329 | motiv | Yes | noted | 10.1.2 | RP-170328 | Motivation of LTE enhancements for UE velocity oriented mobility management | China Mobile Com. Corporation | discussion | - | - | - | - | .. | Rel-15 | - | | | | | | - | - | | | 2/24/2017 7:52 | 3/5/2017 21:53 | | Xiaodong Xu | 39125 | 2190 | Yes | No | Discussion |
| 330 | | Yes | noted | 10.3.5 | RP-170329 | Status report of WI Core part: Enhanced LTE-WLAN Aggregation (LWA); rapporteur: Intel Corporation | RAN2 | WI status report | - | - | - | - | .. | Rel-14 | LTE_WLAN_aggr-Core | | | | conclusion: noted; approved: Core: 100%, March17; Core part completed | | - | - | | | 2/24/2017 7:56 | 3/5/2017 21:53 | | Sasha Sirotkin | 41562 | 3290 | Yes | No | |
| 331 | RAN2 | Yes | noted | 10.3.5 | RP-170330 | Summary for WI Core part: Enhanced LTE-WLAN Aggregation (LWA) | Intel Corporation | WI summary | - | - | - | - | .. | Rel-14 | LTE_WLAN_aggr-Core | | | | | | - | - | | | 2/24/2017 7:56 | 3/5/2017 21:53 | | Sasha Sirotkin | 41562 | 6280 | Yes | No | |
| 332 | RAN3 | Yes | approved | 10.3.5 | RP-170331 | Xw support for WT MAC address signalling | Intel Corporation | CR | 36.463 | 37 | - | B | 14.0.0 | Rel-14 | LTE_WLAN_aggr-Core | | | company CR to address one RAN3 issue related to late RAN2 agreements (taken on Fri of Athens meeting), which could not be addressed in the last RAN3 meeting; | | | - | - | | | 2/24/2017 7:56 | 3/5/2017 21:53 | | Sasha Sirotkin | 41562 | 5500 | Yes | No | Approval |
| 333 | RAN2 | Yes | revised | 9.1 | RP-170332 | New SID on Study on NR/non-3GPP integration, interworking and aggregation | Intel Corporation | SID new | - | - | - | - | .. | Rel-15 | - | RP-170692 | | new SI for NR only; leading WG: RAN2 | | | - | - | | | 2/24/2017 7:56 | 3/5/2017 21:53 | | Sasha Sirotkin | 41562 | 1901 | Yes | No | Approval |
| 334 | motiv | Yes | noted | 9.1 | RP-170333 | Motivation paper for the new SID on NR/non-3GPP integration, interworking and aggregation | Intel Corporation | discussion | - | - | - | - | .. | Rel-15 | - | | | | | | - | - | | | 2/24/2017 7:56 | 3/5/2017 21:53 | | Sasha Sirotkin | 41562 | 1900 | Yes | No | Discussion |
| 335 | | No | withdrawn | 9 | RP-170334 | Principle for_x00B_NR Phase-1 Work Plan | Samsung | discussion | - | - | - | - | .. | Rel-15 | - | | | | moved from AI 9.1 to AI 9 | | - | - | | | 2/24/2017 7:59 | | | Juho Lee | 31056 | 4910 | Yes | Yes | Decision |
| 336 | RAN3 | Yes | revised | 9.1 | RP-170335 | New Study Item Proposal: Study on Self-Organising Networks in New Radio | China Mobile Com. Corporation | SID new | - | - | - | - | .. | Rel-15 | - | RP-170696 | | new SI for NR only; leading WG: RAN3 | | | - | - | | | 2/24/2017 8:04 | 3/5/2017 21:53 | | Xiaodong Xu | 39125 | 2610 | Yes | No | Approval |
| 337 | RAN1 | Yes | revised | 10.1.1 | RP-170336 | New WI proposal: Further NB-IoT enhancements | Huawei, HiSilicon | WID new | - | - | - | - | .. | Rel-15 | - | RP-170744 | | new WI for LTE only; leading WG: RAN1; WI code to be used: NB_IOTenh2; compare RP-170507 | | | - | - | | | 2/24/2017 8:04 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 1031 | Yes | No | Information |


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| | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z | AA | AB | AC | AD | AE | AF | AG |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 338 | motiv | Yes | noted | 10.1.1 | RP-170337 | Motivation for new WI proposal on further NB-IoT enhancements | Huawei, HiSilicon | discussion | - | - | - | - | .. | Rel-15 | - | | | | | | - | - | | | 2/24/2017 8:04 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 1030 | Yes | No | Discussion |
| 339 | RAN1 | Yes | not treated | 10.1.1 | RP-170338 | New SI proposal: Study on licensed-downlink-assisted IoT | Huawei, HiSilicon | SID new | - | - | - | - | .. | Rel-15 | - | | | new SI for LTE only; leading WG: RAN1; | 3 supporting companies<br>RAN chair: does not have 4 supporters | | - | - | | | 2/24/2017 8:04 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 1580 | Yes | No | Information |
| 340 | motiv | Yes | noted | 10.1.1 | RP-170339 | Motivation for new SI on licensed-downlink-assisted IoT | Huawei, HiSilicon | discussion | - | - | - | - | .. | Rel-15 | - | | | | | | - | - | | | 2/24/2017 8:04 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 1570 | Yes | No | Discussion |
| 341 | RAN1 | Yes | postponed | 10.1.1 | RP-170340 | New WI proposal: Further Enhancements to Licensed-Assisted Access with LTE PCell | Huawei, HiSilicon | WID new | - | - | - | - | .. | Rel-15 | - | | | new WI for LTE only; leading WG: RAN1; | | | - | - | | | 2/24/2017 8:04 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 1760 | Yes | No | Approval |
| 342 | motiv | Yes | noted | 10.1.1 | RP-170341 | Motivation for new WI on Further Enhancements to Licensed-Assisted Access with LTE Pcell | Huawei, HiSilicon | discussion | - | - | - | - | .. | Rel-15 | - | | | | | | - | - | | | 2/24/2017 8:04 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 1750 | Yes | No | Discussion |
| 343 | | Yes | noted | 9.1 | RP-170342 | Specification handling of 3GPP-based access to unlicensed spectrum from Rel-15 onwards | Huawei, HiSilicon | discussion | - | - | - | - | .. | Rel-15 | - | | | | | | - | - | | | 2/24/2017 8:04 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 1540 | Yes | No | Discussion |
| 344 | RAN1 | Yes | not treated | 10.1.1 | RP-170343 | New WI proposal: Fast Accessible SCells for LTE | Huawei, HiSilicon | WID new | - | - | - | - | .. | Rel-15 | - | | | new WI for LTE only; leading WG: RAN1; | only 3 supporting companies | | - | - | | | 2/24/2017 8:04 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 1970 | Yes | No | Approval |
| 345 | motiv | Yes | not treated | 10.1.1 | RP-170344 | Motivation for new WI proposal on Fast Accessible SCells for LTE | Huawei, HiSilicon | discussion | - | - | - | - | .. | Rel-15 | - | | | | | | - | - | | | 2/24/2017 8:04 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 1960 | Yes | No | Discussion |
| 346 | RAN1 | Yes | not treated | 10.1.1 | RP-170345 | New WI proposal on SRS capacity enhancements for LTE | Huawei, HiSilicon | WID new | - | - | - | - | .. | Rel-15 | - | | | new WI for LTE only; leading WG: RAN1; not related to CA | only 2 supporting companies | | - | - | | | 2/24/2017 8:04 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 1990 | Yes | No | Approval |
| 347 | motiv | Yes | not treated | 10.1.1 | RP-170346 | Motivation for new WI proposal on SRS capacity enhancements for LTE | Huawei, HiSilicon | discussion | - | - | - | - | .. | Rel-15 | - | | | | | | - | - | | | 2/24/2017 8:04 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 1980 | Yes | No | Discussion |
| 348 | | Yes | noted | 10.1.1 | RP-170347 | Discussion on Further MIMO enhancements for LTE in Rel-15 | Huawei, HiSilicon | discussion | - | - | - | - | .. | Rel-15 | - | | | | | | - | - | | | 2/24/2017 8:04 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 1920 | Yes | No | Discussion |
| 349 | RAN1 | Yes | revised | 10.1.1 | RP-170348 | New WI proposal: Further MIMO enhancements for LTE | Huawei, HiSilicon | WID new | - | - | - | - | .. | Rel-15 | - | RP-170739 | | new WI for LTE only; leading WG: RAN1; additional enhancements for FD-MIMO (some leftovers), but also enhancements applicable for low numbers of transmit antennas (such as 4 at the BS not necessarily using AAS) | | | - | - | | | 2/24/2017 8:04 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 1930 | Yes | No | Approval |
| 350 | RAN3 | Yes | postponed | 10.1.3 | RP-170349 | New WI proposal: Network Assistance for Network Synchronization in LTE | Huawei, HiSilicon | WID new | - | - | - | - | .. | Rel-15 | - | | | new WI for LTE only; leading WG: RAN3; | | | - | - | | | 2/24/2017 8:04 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 3490 | Yes | No | Approval |
| 351 | motiv | Yes | noted | 10.1.3 | RP-170350 | Motivation for new WI on Network Assistance for Network Synchronization in LTE | Huawei, HiSilicon | discussion | - | - | - | - | .. | Rel-15 | - | | | | | | - | - | | | 2/24/2017 8:04 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 3500 | Yes | No | Discussion |
| 352 | RAN4 | Yes | not treated | 10.1.4 | RP-170351 | New WI proposal: High power UE for LTE band 42 (power class 2) | Huawei, HiSilicon | WID new | - | - | - | - | .. | Rel-15 | - | | | new WI for LTE only; leading WG: RAN4; WI code to be used: LTE_B42_UE_PC2 | | | - | - | | | 2/24/2017 8:04 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 3950 | Yes | No | Approval |
| 353 | motiv | Yes | not treated | 10.1.4 | RP-170352 | Motivation for new work item on high power UE for LTE band 42 (power class 2) | Huawei, HiSilicon | discussion | - | - | - | - | .. | Rel-15 | - | | | | | | - | - | | | 2/24/2017 8:04 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 3930 | Yes | No | Discussion |
| 354 | RAN4 | Yes | not treated | 10.1.4 | RP-170353 | New WI proposal: LTE DL 8Rx antenna ports | Huawei, HiSilicon | WID new | - | - | - | - | .. | Rel-15 | - | | | new WI for LTE only; leading WG: RAN4; WI code to be used: LTE_8Rx_AP_DL | | | - | - | | | 2/24/2017 8:04 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 2850 | Yes | No | Approval |
| 355 | motiv | Yes | not treated | 10.1.4 | RP-170354 | Motivation for new work item on LTE DL 8Rx antenna ports | Huawei, HiSilicon | discussion | - | - | - | - | .. | Rel-15 | - | | | | | | - | - | | | 2/24/2017 8:04 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 2840 | Yes | No | Discussion |
| 356 | RAN5 | Yes | approved | 13.1 | RP-170355 | New WI proposal: UE Conformance Test Aspects - SRS (sounding reference signal) switching between LTE component carriers | Huawei, CMCC | WID new | - | - | - | - | .. | Rel-14 | - | | | new WI for LTE only; leading WG: RAN5; tested: REL-14 LTE_SRS_switch-Core; WI code to be used: LTE_SRS_switch-UEConTest; endorsed by RAN5 in R5-171397 | | | - | - | | | 2/24/2017 8:04 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 3550 | Yes | No | Approval |

| | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z | AA | AB | AC | AD | AE | AF | AG |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 357 | RAN5 | Yes | approved | 13.1 | RP-170356 | New WI proposal: UE Conformance Test Aspects - Quality of Experience (QoE) Measurement Collection for streaming services in UTRAN | Huawei, China Unicom | WID new | - | - | - | - | .. | Rel-14 | - | | | new WI for UMTS only; leading WG: RAN5; tested: REL-14 UMTS_QMC_Streaming-Core; WI code to be used: UMTS_QMC_Streaming-UEConTest; endorsed by RAN5 in R5-171593 | | | - | - | | | 2/24/2017 8:04 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 3560 | Yes | No | Approval |
| 358 | | Yes | noted | 9.1 | RP-170357 | Discussion on NR sidelink | Huawei, Huawei Device | discussion | - | - | - | - | .. | - | - | | | | | | - | - | | | 2/24/2017 8:04 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 2345 | Yes | No | Discussion |
| 359 | | Yes | noted | 9.1 | RP-170358 | Support of URLLC in NR Rel-15 | Huawei, HiSilicon | discussion | - | - | - | - | .. | Rel-15 | - | | | | | | - | - | | | 2/24/2017 8:04 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 1340 | Yes | No | Discussion |
| 360 | motiv | Yes | not treated | 9.1 | RP-170359 | Motivation for study on non-orthogonal multiple access for NR | Huawei, HiSilicon | discussion | - | - | - | - | .. | Rel-15 | - | | | | | | - | - | | | 2/24/2017 8:04 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 1460 | Yes | No | Discussion |
| 361 | | Yes | noted | 9 | RP-170360 | Scope of Rel-15 work on NR | Huawei, HiSilicon | discussion | - | - | - | - | .. | Rel-15 | - | | | | moved from AI 9.1 to AI 9<br>proposal:<br>This document highlighted the goals in Rel-15 for NR to support eMBB services up to 52.6 GHz as well as URLLC services meeting the URLLC requirements, and the goal to continue the study on non-orthogonal multiple access schemes in Rel-15 targeting specification in Rel-16. This document also highlighted more detailed aspects on specific features that we believe are important for the success of the first release of NR, including LTE/NR coexistence with sharing of uplink spectrum, and native support for flexible duplex. Views on the specification work plan were also provided.<br><br>Samsung: COMP can be supported from the start of NSA<br>Huawei: some more work will be needed after Dec.17<br>ZTE: bandwidth package related to what we discussed in Athens?<br>RAN chair: we will see some more documents for bands for NR | | - | - | | | 2/24/2017 8:04 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 1960 | Yes | No | Discussion |
| 362 | | No | withdrawn | 9.1 | RP-170361 | Views on 3GPP-based V2X evolution | Huawei, HiSilicon | discussion | - | - | - | - | .. | Rel-15 | - | | | | | | - | - | | | 2/24/2017 8:04 | | | David Mazzarese | 44044 | 1750 | Yes | Yes | Discussion |
| 363 | RAN3 | Yes | approved | 10.7.2 | RP-170362 | TR 36.933 v2.0.0 on Study on Context Aware Service Delivery in RAN for LTE | China Mobile Com. Corporation | draft TR | 36.933 | - | - | - | 2.0.0 | Rel-14 | FS_LTE_context | | | wrong Tdoc type "report" in Tdoc request; moved from AI 5.3 to AI 10.7.2; RAN3 TR 36.933 is provided for approval | conclusion: approved as REL-14 TR | | - | - | | | 2/24/2017 8:10 | 3/5/2017 21:53 | | Xiaodong Xu | 39125 | 3630 | Yes | No | Approval |
| 364 | | Yes | noted | 10.7.2 | RP-170363 | Status Report for SI Study on Context Aware Service Delivery in RAN for LTE; rapporteur: CMCC | RAN3 | WI status report | - | - | - | - | .. | Rel-14 | FS_LTE_context | | | | conclusion: noted; approved: 100%, March 17; SI completed | | - | - | | | 2/24/2017 8:14 | 3/5/2017 21:53 | | Xiaodong Xu | 39125 | 3620 | Yes | No | |
| 365 | RAN1 | Yes | not treated | 9.1 | RP-170364 | New SID: Study on Multi Antenna Enhancements for NR | Nokia, Alcatel-Lucent Shanghai Bell | SID new | - | - | - | - | .. | Rel-15 | - | | | new SID for NR; leading WG: RAN1 | | | - | - | | | 2/24/2017 8:14 | 3/5/2017 21:53 | | Mihai Enescu | 68296 | 2505 | Yes | No | Approval |
| 366 | motiv | Yes | not treated | 9.1 | RP-170365 | Motivation for new Study Item on Multi Antenna Enhancements for NR | Nokia, Alcatel-Lucent Shanghai Bell | discussion | - | - | - | - | .. | Rel-15 | - | | | | | | - | - | | | 2/24/2017 8:18 | 3/5/2017 21:53 | | Mihai Enescu | 68296 | 2500 | Yes | No | Discussion |
| 367 | | Yes | noted | 13.5.6 | RP-170366 | Status report for WI UE Conformance Test Aspects - Narrowband Internet of Things (NB-IOT); rapporteur: CMCC | RAN5 | WI status report | - | - | - | - | .. | Rel-14 | NB_IOT-UEConTest | | | | conclusion: noted; approved: 85%, June 17 | | - | - | | | 2/24/2017 8:19 | 2/24/2017 8:38 | | Xiaodong Xu | 39125 | 820 | Yes | No | |
| 368 | RAN5 | Yes | approved | 13.1 | RP-170367 | New WI: UE Conformance Test Aspects - Performance enhancements for high speed scenario in LTE | China Mobile Com. Corporation | WID new | - | - | - | - | .. | Rel-14 | - | | | new WI for LTE only; leading WG: RAN5; tested: REL-14 LTE_high_speed-Core; WI code to be used: LTE_high_speed-UEConTest | | | - | - | | | 2/24/2017 8:29 | 2/24/2017 8:38 | | Xiaodong Xu | 39125 | 3670 | Yes | No | Approval |
| 369 | | Yes | noted | 10.3.8 | RP-170368 | Status Report of WI further mobility enhancements in LTE; rapporteur:ZTE | ZTE Corporation | WI status report | - | - | - | - | .. | Rel-14 | LTE_eMob-Core | | | the core part of this WI is completed! | MCC: please avoid < ><br>conclusion: noted; approved: Core: 100%, March 17; Perf.: 30%, June 17 | | - | - | | | 2/24/2017 8:41 | 3/5/2017 21:53 | | Zhongda Du | 38890 | 3680 | Yes | No | |
| 370 | RAN2 | Yes | noted | 10.3.8 | RP-170369 | Summary for WI Further mobility enhancements in LTE | ZTE Corporation | WI summary | - | - | - | - | .. | Rel-14 | LTE_eMob-Core | | | | | | - | - | | | 2/24/2017 8:42 | 3/5/2017 21:53 | | Zhongda Du | 38890 | 6300 | Yes | No | |


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| | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z | AA | AB | AC | AD | AE | AF | AG |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 371 | | Yes | noted | 10.7.1 | RP-170370 | Status Report of SI Feasibility Study on LTE Advanced Carrier Aggregation of Band 3 and Band 39; rapporteur: ZTE | ZTE Corporation | WI status report | - | - | - | - | .. | - | FS_LTE_CA_B3_B39 | | | | MCC: no TR provided so SI completed via pCRs to 36.714-02-01 ?<br>SI for 2DL/1UL or 3DL/1UL?<br>ZTE: The SI was revised in RP-161704 at RAN #73 to extend the studies on 3DL/1UL CA for Band 3 + Band 39 + Band 8/Band 41 according to the outcome of 2DL/1UL studies that it's difficult to aggregate 2DL CC only; results of this SI are captured into TR 36.714-02-01 and TR 36.714-03-01;<br>MCC: as WI code and title have to remain, it is not a good idea to extend the scope of the SI like this; next time better consider to open a new SI;<br>conclusion: noted; approved: 100%, March 17; SI completed | | - | - | | | 2/24/2017 8:44 | 3/5/2017 21:53 | | Zhongda Du | 38890 | 3700 | Yes | No | |
| 372 | | Yes | revised | 9.1 | RP-170371 | Draft reply LS to ITU-R WP4B/TEMP/17 = RP-161971 on the integration of satellite in IMT2020 (to: ITU-R WP4B; cc: ETSI TC SES, ITU-R WP5D, ITU-T SG13; contact: Thales) | THALES | LS out | - | - | - | - | .. | Rel-15 | - | RP-170548 | | LSin RP-161971 was received at RAN #74 | moved from AI 7 to AI 9.1 | | ITU-R WP4B | ETSI TC SES, ITU-R WP5D, ITU-T SG13 | ITU-R WP4B/TEMP/17 = RP-161971 | | 2/24/2017 8:46 | 3/5/2017 21:53 | | Nicolas Chuberre | 21633 | 1400 | Yes | No | Approval |
| 373 | motiv | Yes | withdrawn | 10.1.1 | RP-170372 | Motivation for new WI: Further enhancements on NB-IoT and eMTC for LTE | ZTE Corporation | discussion | - | - | - | - | .. | Rel-15 | - | | | wrong Tdoc type WIDnew in Tdoc request; see RP-170684 and RP-170686 instead | | | - | - | | | 2/24/2017 8:47 | 3/5/2017 21:53 | | Zhongda Du | 38890 | 1103 | Yes | Yes | Discussion |
| 374 | RAN1 | Yes | withdrawn | 10.1.1 | RP-170373 | New WI: Further enhancements on NB-IoT and eMTC for LTE | ZTE Corporation | WID new | - | - | - | - | .. | Rel-15 | - | | | new WI for LTE; leading WG: RAN1; finally split into 2 WIs: see RP-170676 for NB-IoT and RP-170678 for eMTC; | | | - | - | | | 2/24/2017 8:48 | 3/5/2017 21:53 | | Zhongda Du | 38890 | 1110 | Yes | Yes | Approval |
| 375 | RAN2 | Yes | postponed | 10.1.2 | RP-170374 | New Work item on LTE interworking with NR and connectivity to NG | ZTE Corporation | WID new | - | - | - | - | .. | - | - | | | new WI for LTE only?; leading WG: RAN2; | | | - | - | | | 2/24/2017 8:49 | 3/5/2017 21:53 | | Zhongda Du | 38890 | 4820 | Yes | No | Approval |
| 376 | motiv | Yes | noted | 10.1.2 | RP-170375 | Motivation for new Work item on LTE interworking with NR and connectivity to NG | ZTE Corporation | discussion | - | - | - | - | .. | Rel-15 | - | | | | | | - | - | | | 2/24/2017 8:52 | 3/5/2017 21:53 | | Zhongda Du | 38890 | 4810 | Yes | No | Discussion |
| 377 | | Yes | noted | 9.2.1 | RP-170376 | Status Report of Study on New Radio Access Technology | NTT DOCOMO, INC. | WI status report | - | - | - | - | .. | Rel-14 | FS_NR_new RAT | | | wrong Tdoc type "report" in Tdoc request | approved: 100%, March 17, SI is completed | | - | - | | | 2/24/2017 8:52 | 3/5/2017 21:53 | | Kazuaki Takeda | 59634 | 1000 | Yes | No | |
| 378 | RAN1 | Yes | approved | 9.2.1 | RP-170377 | TR 38.802 v2.0.0 on Study on New Radio (NR) Access Technology Physical Layer Aspects; for approval | NTT DOCOMO, INC. | draft TR | 38.802 | - | - | - | 2.0.0 | Rel-14 | FS_NR_new RAT | | | RAN1 TR 38.802 is provided for approval | conclusion: approved as REL-14 TR | | - | - | | | 2/24/2017 8:52 | 3/5/2017 21:53 | | Kazuaki Takeda | 59634 | 1370 | Yes | No | Approval |
| 379 | | Yes | revised | 9.2.1 | RP-170378 | pCR for TR38.912 | NTT DOCOMO, INC. | pCR | 38.912 | - | - | - | 0.0.2 | Rel-14 | FS_NR_new RAT | RP-170735 | | TR 38.912 v0.0.2 was agreed by RAN #73 | RAN4 part needs to be revised | | - | - | | | 2/24/2017 8:52 | 3/7/2017 23:55 | | Kazuaki Takeda | 59634 | 1010 | Yes | No | Approval |
| 380 | | Yes | approved | 9.2.1 | RP-170379 | Revision of SI: Study on New Radio Access Technology | NTT DOCOMO, INC. | SID revised | - | - | - | - | .. | Rel-14 | FS_NR_new RAT | | RP-162469 | last approved SID: RP-162469 | | | - | - | | | 2/24/2017 8:52 | 3/5/2017 21:53 | | Kazuaki Takeda | 59634 | 3790 | Yes | No | Approval |
| 381 | RAN1 | Yes | revised | 9.1 | RP-170380 | New WID on New Radio Access Technology | NTT DOCOMO, INC. | WID new | - | - | - | - | .. | Rel-15 | - | RP-170745 | | new WI for NR only; leading WG: RAN1 | RAN chair: we do not have a final WID but it would be good if we have a draft for joint session with SA; try to converge offline<br>MCC: duplicated versions of RP-170380 exist | | - | - | | | 2/24/2017 8:52 | 3/6/2017 12:28 | | Kazuaki Takeda | 59634 | 20 | Yes | No | Approval |
| 382 | | Yes | revised | 9.1 | RP-170381 | Work plan for Rel-15 New Radio access technology WI | NTT DOCOMO, INC. | discussion | - | - | - | - | .. | Rel-15 | - | RP-170667 | | | | | - | - | | | 2/24/2017 8:52 | 3/5/2017 21:53 | | Kazuaki Takeda | 59634 | 1160 | Yes | No | Decision |
| 383 | motiv | Yes | noted | 9.1 | RP-170382 | Motivation for the Study on 5G Non-Orthogonal Multiple Access | ZTE Corporation | discussion | - | - | - | - | .. | - | - | | | | | | - | - | | | 2/24/2017 8:52 | 3/5/2017 21:53 | | Zhongda Du | 38890 | 1430 | Yes | No | Discussion |
| 384 | RAN1 | Yes | revised | 9.1 | RP-170383 | New SI: Study on 5G Non-Orthogonal Multiple Access | ZTE Corporation | SID new | - | - | - | - | .. | Rel-15 | - | RP-170681 | | new SID for NR; leading WG: RAN1 | | | - | - | | | 2/24/2017 8:53 | 3/5/2017 21:53 | | Zhongda Du | 38890 | 1440 | Yes | No | Approval |
| 385 | | Yes | revised | 9 | RP-170384 | Discussion on NR WI and time line | ZTE Corporation | discussion | - | - | - | - | .. | Rel-15 | - | RP-170670 | | | moved from AI 9.1 to AI 9 | | - | - | | | 2/24/2017 8:54 | 3/5/2017 21:53 | | Zhongda Du | 38890 | 3850 | Yes | No | |
| 386 | | Yes | revised | 9 | RP-170385 | Discussion on overall WI and SI of R15 | ZTE Corporation | discussion | - | - | - | - | .. | Rel-15 | - | RP-170669 | | | moved from AI 9.1 to AI 9 | | - | - | | | 2/24/2017 8:57 | 3/5/2017 21:53 | | Zhongda Du | 38890 | 2080 | Yes | No | |
| 387 | | Yes | noted | 9.1 | RP-170386 | Discussion on further study of CU-DU lower layer split | ZTE Corporation | discussion | - | - | - | - | .. | - | - | | | | | | - | - | | | 2/24/2017 8:58 | 3/5/2017 21:53 | | Zhongda Du | 38890 | 1380 | Yes | No | |
| 388 | | Yes | noted | 9.1 | RP-170387 | Considerations on the future eV2X study | ZTE Corporation | discussion | - | - | - | - | .. | - | - | | | | | | - | - | | | 2/24/2017 8:59 | 3/5/2017 21:53 | | Zhongda Du | 38890 | 1760 | Yes | No | |
| 389 | | Yes | not treated | 9.1 | RP-170388 | Considerations on LTE-NR uplink sharing | ZTE Corporation | discussion | - | - | - | - | .. | - | - | | | | | | - | - | | | 2/24/2017 8:59 | 3/5/2017 21:53 | | Zhongda Du | 38890 | 2580 | Yes | No | |
| 390 | flag D | Yes | revised | 10.3.20 | RP-170389 | Status report of WI: Requirements for a new UE category with single receiver based on Category 1 for LTE; rapporteur Qualcomm Incorporated | RAN4 | WI status report | - | - | - | - | .. | Rel-14 | LTE_UE_cat_1RX | RP-170713 | | | Ericsson: Positioning test cases are missing in the list of open issues of the performance part | | - | - | | | 2/24/2017 9:02 | 3/5/2017 21:53 | | Valentin Gheorghiu | 43117 | 3890 | Yes | No | |

| | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z | AA | AB | AC | AD | AE | AF | AG |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 391 | RAN4 | Yes | revised | 10.3.20 | RP-170390 | WI exception request for Core part: Requirements for a new UE category with single receiver based on Category 1 for LTE | Qualcomm Japan Inc | WI exception request | - | - | - | - | .. | Rel-14 | LTE_UE_cat_1RX-Core | RP-170768 | | some positioning core requirements are not yet finalized | | | - | - | | | 2/24/2017 9:05 | 3/5/2017 21:53 | | Valentin Gheorghiu | 43117 | 79100 | Yes | No | Approval |
| 392 | | Yes | noted | 9 | RP-170391 | Principle for Planning NR SIs | Samsung | discussion | - | - | - | - | .. | - | - | | | | moved from AI 9.1 to AI 9<br>Panasonic: agrees with Samsung and Intel first we need to define the channels and then we can look at higher reliabiliy | | | - | - | | | 2/24/2017 9:06 | 3/5/2017 21:53 | | Juho Lee | 31056 | 2300 | Yes | No | Decision |
| 393 | | Yes | noted | 9.1 | RP-170392 | NR Spectrum Related Work | Qualcomm Japan Inc | discussion | - | - | - | - | .. | Rel-15 | - | | | This paper discusses how to organize the work on new bands for NR | | | - | - | | | 2/24/2017 9:07 | 3/5/2017 21:53 | | Valentin Gheorghiu | 43117 | 2420 | Yes | No | Approval |
| 394 | motiv | Yes | not treated | 10.1.4 | RP-170393 | Motivation for WI on Low Complexity Higher Order MIMO for LTE | Qualcomm Japan Inc | discussion | - | - | - | - | .. | Rel-15 | - | | | This paper presents the motivation to start a new work item on lower complexity higher order MIMO for LTE | | | - | - | | | 2/24/2017 9:08 | 3/5/2017 21:53 | | Valentin Gheorghiu | 43117 | 3510 | Yes | No | Discussio n |
| 395 | | Yes | revised | 9.2.1 | RP-170394 | TR 38.9xx v1.0.0 Study on channel model for frequencies from 0.5 to 100 GHz | Samsung | other | 38.901 | - | - | - | 1.0.0 | Rel-14 | FS_NR_new RAT | RP-170737 | | RAN1 TR 38.9XX is provided for 1-step approval; note: Based on TR 38.900 (including aspects below 6GHz, and also some aspects from TR 36.873) this new TR is created under SI FS_NR_newRAT and a corresponding SID revision in RP-170379 has to be approved first in order to allocate a TR number | | | - | - | | | 2/24/2017 9:10 | 3/5/2017 21:53 | | Juho Lee | 31056 | 3791 | Yes | No | Approval |
| 396 | RAN4 | Yes | not treated | 10.1.4 | RP-170395 | New Work Item Proposal: Lower Complexity Higher Order MIMO for LTE | Qualcomm Japan Inc | WID new | - | - | - | - | .. | Rel-15 | - | | | new WI for LTE only; leading WG: RAN4; | | | - | - | | | 2/24/2017 9:10 | 3/5/2017 21:53 | | Valentin Gheorghiu | 43117 | 3520 | Yes | No | Approval |
| 397 | RAN2 | Yes | postponed | 10.1.2 | RP-170396 | New WI proposal: Enhancements of Light connection for LTE | Intel Corporation, Huawei, China Telecom | WID new | - | - | - | - | .. | Rel-15 | - | | | new WI for LTE only; leading WG: RAN2; | | | - | - | | | 2/24/2017 9:13 | 3/5/2017 21:53 | | Youn hyoung Heo | 47007 | 2640 | Yes | No | Approval |
| 398 | motiv | Yes | noted | 10.1.2 | RP-170397 | Motivation for New WI proposal on enhancements of Light connection for LTE | Intel Corporation, Huawei, China Telecom | discussion | - | - | - | - | .. | Rel-15 | - | | | | | | - | - | | | 2/24/2017 9:13 | 3/5/2017 21:53 | | Youn hyoung Heo | 47007 | 2630 | Yes | No | Discussio n |
| 399 | RAN2 | No | withdrawn | 10.1.2 | RP-170398 | New WI proposal: Multimedia Enhancements for LTE | Intel Corporation | WID new | - | - | - | - | .. | Rel-15 | - | | | new WI for LTE only; leading WG: RAN2; | | | - | - | | | 2/24/2017 9:13 | | | Youn hyoung Heo | 47007 | 3280 | No | Yes | Approval |
| 400 | RAN2 | Yes | postponed | 10.15 | RP-170399 | Introduction of a new UL UE category for 300Mbps with 64QAM | Intel Corporation | CR | 36.331 | 2699 | - | B | 14.1.0 | Rel-14 | TEI14 | | | company CR; compare RP-161776 postponed by RAN #73 | | | - | - | | | 2/24/2017 9:13 | 3/5/2017 21:53 | | Youn hyoung Heo | 47007 | 3990 | Yes | No | Approval |
| 401 | RAN2 | Yes | postponed | 10.15 | RP-170400 | Introduction of a new UL UE category for 300Mbps with 64QAM | Intel Corporation | CR | 36.306 | 1432 | - | B | 14.1.0 | Rel-14 | TEI14 | | | company CR; compare RP-161776 postponed by RAN #73 and RP-161513 withdrawn at RAN #73 | | | - | - | | | 2/24/2017 9:13 | 3/5/2017 21:53 | | Youn hyoung Heo | 47007 | 4000 | Yes | No | Approval |
| 402 | | Yes | noted | 10.13.5 | RP-170401 | Status Report of WI: LTE Extended 1.5 GHz SDL band (1427 – 1518 MHz) and LTE Carrier Aggregation (2DL/1UL) with Band 20; rapporteur: Qualcomm Incorporated | RAN4 | WI status report | - | - | - | - | .. | Rel-14 | LTE_SDL_1500ext | | | | conclusion: noted; approved: Core: 20%, June 17; Perf.: 0%, June 17 | | | - | - | | | 2/24/2017 9:16 | 3/5/2017 21:53 | | Valentin Gheorghiu | 43117 | 4010 | Yes | No | |
| 403 | | Yes | noted | 13.4.5 | RP-170402 | Status Report for WI: UE Conformance Test Aspects - Further Enhancements to LTE TDD for DL-UL Interference Management and Traffic Adaptation | RAN5 | WI status report | - | - | - | - | .. | Rel-12 | LTE_TDD_eIMTA-UEConTest | | | | conclusion: noted; approved: 60%, Dec.17 | | | - | - | | | 2/24/2017 9:22 | 3/5/2017 21:53 | | Haiyang Quan | 35212 | 4020 | Yes | No | |
| 404 | | Yes | approved | 10.14.4 | RP-170403 | Revised SID on Study on UL data compression in LTE | CATT | SID revised | - | - | - | - | .. | Rel-15 | FS_LTE_UDC | | | last approved SID: RP-162541 | | | - | - | | | 2/24/2017 9:22 | 3/5/2017 21:53 | | Haiyang Quan | 35212 | 4040 | Yes | No | Approval |
| 405 | | Yes | noted | 10.14.4 | RP-170404 | Status Report for SI: Study on UL data compression in LTE | CATT | WI status report | - | - | - | - | .. | Rel-15 | FS_LTE_UDC | | | | conclusion: noted; approved: 0%, June 17 | | | - | - | | | 2/24/2017 9:22 | 3/5/2017 21:53 | | Haiyang Quan | 35212 | 4030 | Yes | No | |
| 406 | motiv | Yes | noted | 9.1 | RP-170405 | Motivation for new Study Item on NR UE Positioning | CATT | discussion | - | - | - | - | .. | Rel-15 | - | | | motivation contribution on new SI proposal on NR UE positioning | | | - | - | | | 2/24/2017 9:22 | 3/5/2017 21:53 | | Haiyang Quan | 35212 | 2010 | Yes | No | Discussio n |
| 407 | RAN1 | Yes | revised | 9.1 | RP-170406 | New SID: Study on NR UE Positioning | CATT | SID new | - | - | - | - | .. | Rel-15 | - | RP-170671 | | new SID for NR; leading WG: RAN1 | | | - | - | | | 2/24/2017 9:22 | 3/5/2017 21:53 | | Haiyang Quan | 35212 | 2020 | Yes | No | Approval |
| 408 | motiv | Yes | not treated | 9.1 | RP-170407 | Motivation for Study Item on Non-orthogonal Multiple Access for NR | CATT | discussion | - | - | - | - | .. | Rel-15 | - | | | motivation contribution on new SI proposal on Non-orthogonal Multiple Access for NR | | | - | - | | | 2/24/2017 9:22 | 3/5/2017 21:53 | | Haiyang Quan | 35212 | 1480 | Yes | No | Discussio n |

| | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z | AA | AB | AC | AD | AE | AF | AG |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 409 | motiv | Yes | noted | 9.1 | RP-170408 | Motivation for Study on NR Sidelink Framework | CATT | discussion | - | - | - | - | .. | Rel-15 | - | | | motivation contribution on new SI proposal on NR sidelink framework | | | - | - | | | 2/24/2017 9:22 | 3/5/2017 21:53 | | Haiyang Quan | 35212 | 2310 | Yes | No | Discussion |
| 410 | RAN1 | Yes | revised | 9.1 | RP-170409 | New SID: Study on NR Sidelink Framework | CATT | SID new | - | - | - | - | .. | Rel-15 | - | RP-170672 | | new SID for NR; leading WG: RAN1 | | | - | - | | | 2/24/2017 9:22 | 3/5/2017 21:53 | | Haiyang Quan | 35212 | 2320 | Yes | No | Approval |
| 411 | motiv | Yes | not treated | 9.1 | RP-170410 | Motivation for Study on UE Wakeup Mechanism in NR | CATT | discussion | - | - | - | - | .. | Rel-15 | - | | | motivation contribution on new SI proposal on UE wakeup mechanism in NR | | | - | - | | | 2/24/2017 9:22 | 3/5/2017 21:53 | | Haiyang Quan | 35212 | 2540 | Yes | No | Discussion |
| 412 | RAN1 | Yes | revised | 9.1 | RP-170411 | New SID: Study on UE Wakeup Mechanism in NR | CATT | SID new | - | - | - | - | .. | Rel-15 | - | RP-170673 | | new SID for NR; leading WG: RAN1 | | | - | - | | | 2/24/2017 9:22 | 3/5/2017 21:53 | | Haiyang Quan | 35212 | 2560 | Yes | No | Approval |
| 413 | | Yes | noted | 9 | RP-170412 | SK Telecom's view on 5G NR acceleration | SK Telecom | discussion | - | - | - | - | .. | Rel-15 | FS_NR_new RAT | | | This contribution describes SK Telecom's view on 5G NR schedule | moved from AI 9.4 to AI 9 | | - | - | | | 2/24/2017 9:23 | 3/5/2017 21:53 | | Minsoo Na | 57735 | 4530 | Yes | No | Decision |
| 414 | | Yes | noted | 14.2.6 | RP-170413 | Alignment of RAN2 specification with CT1/SA2 on control plane, user plane and user plane optimization | Qualcomm Incorporated | discussion | - | - | - | - | .. | Rel-13 | NB_IOT-Core | | | | | | - | - | | | 2/24/2017 9:24 | 3/5/2017 21:53 | | Masato Kitazoe | 29801 | 4130 | Yes | No | Decision |
| 415 | | Yes | revised | 14.2.6 | RP-170414 | Draft reply LS to S2-170518 on Multiple bearer capability handling independent of CIoT user plane optimization (to: SA2, CT1; cc: -; contact: Qualcomm) | Qualcomm Incorporated | LS out | - | - | - | - | .. | Rel-13 | NB_IOT-Core | RP-170775 | | note: S2-170518 was sent to: RAN2 (see R2-1700719), cc: CT1 but not to/cc RAN; | Qualcomm: typo: we should say RAN and not RAN2 | | SA2, CT1 | - | S2-170518 | | 2/24/2017 9:24 | 3/5/2017 21:53 | | Masato Kitazoe | 29801 | 4140 | Yes | No | Approval |
| 416 | RAN2 | No | withdrawn | 14.2.6 | RP-170415 | IOT status indication for NB-IoT 3.75 kHz single tone | Qualcomm Incorporated | CR | 36.331 | 2700 | - | F | 13.4.0 | Rel-13 | NB_IOT-Core | | | company CR; CR had no RAN2 Tdoc allocated so far; IOT issue identified. | | | - | - | | | 2/24/2017 9:24 | | | Masato Kitazoe | 29801 | 4150 | Yes | Yes | Approval |
| 417 | RAN2 | No | withdrawn | 14.2.6 | RP-170416 | IOT status indication for NB-IoT 3.75 kHz single tone | Qualcomm Incorporated | CR | 36.306 | 1433 | - | F | 13.4.0 | Rel-13 | NB_IOT-Core | | | company CR; CR had no RAN2 Tdoc allocated so far; IOT issue identified. | | | - | - | | | 2/24/2017 9:24 | | | Masato Kitazoe | 29801 | 4160 | Yes | Yes | Approval |
| 418 | RAN2 | Yes | revised | 10.3.20 | RP-170417 | Feature optionality for Cat.1bis UE | Qualcomm Incorporated | CR | 36.331 | 2701 | - | B | 14.1.0 | Rel-14 | LTE_UE_cat_1RX-Core | RP-170807 | | company CR; related LSin RP-170040 from RAN2; this CR had no previous CR in RAN2; features made optional for Category 1bis UE in this CR: crs-InterfHandl-r11, ss-CCH-InterfHandl-r11, FGI101 | conclusion: IncMon will be added in a revision of the CR<br>Qualcomm: needs also REL-13 CR | | - | - | | | 2/24/2017 9:24 | 3/5/2017 21:53 | | Masato Kitazoe | 29801 | 5630 | Yes | No | Approval |
| 419 | RAN2 | Yes | revised | 10.3.20 | RP-170418 | Feature optionality for Cat.1bis UE | Qualcomm Incorporated | CR | 36.306 | 1434 | - | B | 14.1.0 | Rel-14 | LTE_UE_cat_1RX-Core | RP-170806 | | company CR; related LSin RP-170040 from RAN2; this CR had no previous CR in RAN2; features made optional for Category 1bis UE in this CR: crs-InterfHandl-r11, ss-CCH-InterfHandl-r11, FGI101 | conclusion: IncMon will be added in a revision of the CR<br>Qualcomm: needs also REL-13 CR | | - | - | | | 2/24/2017 9:24 | 3/5/2017 21:53 | | Masato Kitazoe | 29801 | 4180 | Yes | No | Approval |
| 420 | | Yes | noted | 10.3.9 | RP-170419 | Introduction of UL 300Mbps class UE category | Qualcomm Incorporated | discussion | - | - | - | - | .. | Rel-14 | LTE_UL_CAP_enh-Core | | | | proposal to approve RP-170632 with 5 categories<br>Nokia: would also support the CRset with 5 categories | | - | - | | | 2/24/2017 9:24 | 3/5/2017 21:53 | | Masato Kitazoe | 29801 | 6050 | Yes | No | Decision |
| 421 | RAN1 | Yes | revised | 9.1 | RP-170420 | New SID: Study on NR vehicular services | Intel Corporation | SID new | - | - | - | - | .. | Rel-15 | - | RP-170701 | | new SID for NR; leading WG: RAN1 | | | - | - | | | 2/24/2017 9:26 | 3/5/2017 21:53 | | Seunghee Han | 47329 | 1800 | Yes | No | Approval |
| 422 | motiv | Yes | noted | 9.1 | RP-170421 | Motivation for New SI: Study on NR vehicular services | Intel Corporation | discussion | - | - | - | - | .. | Rel-15 | - | | | | | | - | - | | | 2/24/2017 9:26 | 3/5/2017 21:53 | | Seunghee Han | 47329 | 1811 | Yes | No | Discussion |
| 423 | RAN1 | Yes | revised | 9.1 | RP-170422 | New SID: Study on NR positioning technologies | Intel Corporation | SID new | - | - | - | - | .. | Rel-15 | - | RP-170702 | | new SID for NR; leading WG: RAN1 | | | - | - | | | 2/24/2017 9:26 | 3/5/2017 21:53 | | Seunghee Han | 47329 | 2081 | Yes | No | Approval |
| 424 | motiv | Yes | noted | 9.1 | RP-170423 | Motivation for New SI: Study on NR positioning technologies | Intel Corporation | discussion | - | - | - | - | .. | Rel-15 | - | | | | | | - | - | | | 2/24/2017 9:26 | 3/5/2017 21:53 | | Seunghee Han | 47329 | 2080 | Yes | No | Discussion |
| 425 | | Yes | not treated | 9.1 | RP-170424 | Studies on UL NOMA for NR in Rel-15 | Intel Corporation | discussion | - | - | - | - | .. | Rel-15 | - | | | | | | - | - | | | 2/24/2017 9:26 | 3/5/2017 21:53 | | Seunghee Han | 47329 | 1490 | Yes | No | Discussion |
| 426 | RAN1 | Yes | revised | 10.1.1 | RP-170425 | New WID: Further enhancements to Coordinated Multi-Point (CoMP) Operation for LTE | Intel Corporation, ZTE | WID new | - | - | - | - | .. | Rel-15 | - | RP-170682 | | new WI for LTE only; leading WG: RAN1; follow-up WI of SI FS_feCOMP_LTE | | | - | - | | | 2/24/2017 9:26 | 3/5/2017 21:53 | | Seunghee Han | 47329 | 1595 | Yes | No | Approval |
| 427 | motiv | Yes | noted | 10.1.1 | RP-170426 | Motivation for New WI: Further enhancements to Coordinated Multi-Point (CoMP) Operation for LTE | Intel Corporation, ZTE | discussion | - | - | - | - | .. | Rel-15 | - | | | | | | - | - | | | 2/24/2017 9:26 | 3/5/2017 21:53 | | Seunghee Han | 47329 | 1590 | Yes | No | Discussion |
| 428 | RAN1 | Yes | revised | 10.1.1 | RP-170427 | New SID: Study on LTE vehicular positioning technologies | Intel Corporation | SID new | - | - | - | - | .. | Rel-15 | - | RP-170683 | RP-162521 | new SI for LTE only; leading WG: RAN1; | | | - | - | | | 2/24/2017 9:26 | 3/5/2017 21:53 | | Seunghee Han | 47329 | 1650 | Yes | No | Approval |

| | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z | AA | AB | AC | AD | AE | AF | AG |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 429 | motiv | Yes | noted | 10.1.1 | RP-170428 | Motivation for New SI: Study on LTE vehicular positioning technologies | Intel Corporation | discussion | - | - | - | - | .. | Rel-15 | - | | RP-162522 | | | | - | - | | | 2/24/2017 9:26 | 3/5/2017 21:53 | | Seunghee Han | 47329 | 1640 | Yes | No | Discussion |
| 430 | | Yes | noted | 10.1.1 | RP-170429 | On further evolution of eMTC and NB-IoT in Rel-15 LTE | Intel Corporation | discussion | - | - | - | - | .. | Rel-15 | - | | | | | | - | - | | | 2/24/2017 9:26 | 3/5/2017 21:53 | | Seunghee Han | 47329 | 1130 | Yes | No | Discussion |
| 431 | motiv | Yes | noted | 10.1.1 | RP-170430 | Motivation for New Work Item on Further Enhanced LAA for LTE | Intel Corporation | discussion | - | - | - | - | .. | Rel-15 | - | | RP-162250 | | | | - | - | | | 2/24/2017 9:26 | 3/5/2017 21:53 | | Seunghee Han | 47329 | 1721 | Yes | No | Discussion |
| 432 | | Yes | noted | 10.7.3 | RP-170431 | Status report of SI: Further enhancements to Coordinated Multi-Point (CoMP) Operation for LTE; rapporteur: Intel Corporation | RAN1 | WI status report | - | - | - | - | .. | Rel-14 | FS_feCOMP_LTE | | | | conclusion: noted; approved: 100%, March 17; SI completed | | - | - | | | 2/24/2017 9:26 | 3/5/2017 21:53 | | Seunghee Han | 47329 | 4310 | Yes | No | |
| 433 | RAN2 | Yes | revised | 10.1.2 | RP-170432 | New WI Proposal on Quality of Experience (QoE) Measurement Collection for streaming services in E-UTRAN | China Unicom,Huawei, China Telecom | WID new | - | - | - | - | .. | Rel-15 | - | RP-170786 | | new WI for LTE; leading WG: RAN2; | | | - | - | | | 2/24/2017 9:40 | 3/5/2017 21:53 | | Yue Ma | 60300 | 2861 | Yes | No | Approval |
| 434 | | Yes | revised | 9.2.1 | RP-170433 | TP for TR 38.912: Radio transmission/reception | NTT DOCOMO INC. | pCR | 38.912 | - | - | - | 0.0.2 | Rel-14 | FS_NR_new RAT | RP-170736 | | TR 38.912 v0.0.2 was agreed by RAN #73; text proposal on UE/BS RF feasibility | | | - | - | | | 2/24/2017 9:40 | 3/5/2017 21:53 | | Hiromasa Umeda | 40918 | 1030 | Yes | No | Approval |
| 435 | motiv | Yes | noted | 10.1.2 | RP-170434 | Motivation for WI Proposal on Quality of Experience (QoE) Measurement Collection for streaming services in E-UTRAN | China Unicom | discussion | - | - | - | - | .. | Rel-15 | - | | | motivation paper for new WID | | | - | - | | | 2/24/2017 9:42 | 3/5/2017 21:53 | | Yue Ma | 60300 | 2860 | Yes | No | Discussion |
| 436 | | Yes | noted | 9.1 | RP-170435 | Justification & vision of NR low layer split | TELEFONICA S.A. | discussion | - | - | - | - | .. | Rel-15 | - | | | Requirements and needs for taking advantage of NR low layer split towards a C-RAN approach | | | - | - | | | 2/24/2017 9:46 | 3/5/2017 21:53 | | Luis Miguel Campoy | 47175 | 1390 | Yes | No | Discussion |
| 437 | RAN2 | Yes | postponed | 10.3.4 | RP-170436 | Introduction of Light Connected state | Huawei, Intel, China Telecom | CR | 36.300 | 980 | - | B | 14.1.0 | Rel-14 | LTE_LIGHT_CON-Core | | | company CR; CR is presented for information to show the impact of the proposed Rel-14 exception; there was no previous RAN2 CR for this | | | - | - | | | 2/24/2017 9:47 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 4370 | Yes | No | Information |
| 438 | RAN3 | Yes | postponed | 10.3.4 | RP-170437 | Introduction of light connection in S1AP | Huawei, Intel, China Telecom | CR | 36.413 | 1467 | 5 | B | 14.1.0 | Rel-14 | LTE_LIGHT_CON-Core | | | company CR; resubmission of R3-170812 not agreed by RAN3, presented for information to show the impact of the proposed Rel-14 exception | | | - | - | | | 2/24/2017 9:50 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 4380 | Yes | No | Information |
| 439 | RAN3 | Yes | postponed | 10.3.4 | RP-170438 | Introduction of light connection in X2AP | Huawei, Intel, China Telecom | CR | 36.423 | 1003 | 6 | B | 14.1.0 | Rel-14 | LTE_LIGHT_CON-Core | | | company CR; resubmission of R3-170811 not agreed by RAN3; is presented for information to show the impact of the proposed Rel-14 exception | | | - | - | | | 2/24/2017 9:52 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 4700 | Yes | No | Information |
| 440 | RAN4 | Yes | approved | 9.2.1 | RP-170439 | TR 38.803 v2.0.0 on Study on New Radio Access Technology: RF and co-existence aspects | NTT DOCOMO INC. | draft TR | 38.803 | - | - | - | 2.0.0 | Rel-14 | FS_NR_new RAT | | | RAN4 TR 38.803 is provided for approval | conclusion: approved as REL-14 TR | | - | - | | | 2/24/2017 9:53 | 3/5/2017 21:53 | | Hiromasa Umeda | 40918 | 3000 | Yes | No | Approval |
| 441 | | Yes | noted | 9.1 | RP-170440 | Necessity of additional RAN4 NR AH meetings | NTT DOCOMO INC. | discussion | - | - | - | - | .. | Rel-15 | - | | | Necessity of RAN4 NR AH is proposed. | Qualcomm: supports NTT DOCOMO paper<br><br>Proposal: At least the following RAN4 NR AH meetings shall be held.<br>-18-20th September in 2017<br>-7-9th November in 2017 | | - | - | | | 2/24/2017 9:58 | 3/5/2017 21:53 | | Hiromasa Umeda | 40918 | 2490 | Yes | No | Approval |
| 442 | | Yes | not treated | 9.1 | RP-170441 | Phase 2 study on nonlinear spatial multiplexing for NR | Mitsubishi Electric Co. | discussion | - | - | - | - | .. | Rel-15 | - | | | | | | - | - | | | 2/24/2017 9:59 | 3/5/2017 21:53 | | Fumihiro Hasegawa | 61720 | 2570 | Yes | No | |
| 443 | | Yes | noted | 9.1 | RP-170442 | Specctum handling procedure for New Radio WI | NTT DOCOMO INC. | discussion | - | - | - | - | .. | Rel-15 | - | | | How to handle spectrum in New Radio WI is proposed. | | | - | - | | | 2/24/2017 10:01 | 3/5/2017 21:53 | | Hiromasa Umeda | 40918 | 2370 | Yes | No | Approval |
| 444 | | Yes | noted | 9.1 | RP-170443 | Way forward on how to handle RAN4 NR workload | NTT DOCOMO INC. | discussion | - | - | - | - | .. | Rel-15 | - | | | How to handle potentially large amount of workload due to large number of options such as SCS and significant number of potential NR bands/DC combinations. | multiple versions of RP-170443 exist | | - | - | | | 2/24/2017 10:05 | 3/5/2017 21:53 | | Hiromasa Umeda | 40918 | 2380 | Yes | No | Approval |
| 445 | | No | withdrawn | 9.1 | RP-170444 | Deprioritization of eAAS WI compared to BS RF in NR WI | NTT DOCOMO INC. | discussion | - | - | - | - | .. | Rel-15 | AASenh_BS_LTE_UTRA-Core | | | | | | - | - | | | 2/24/2017 10:14 | | | Hiromasa Umeda | 40918 | 1000 | No | Yes | Approval |


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| | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z | AA | AB | AC | AD | AE | AF | AG |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 446 | motiv | Yes | noted | 10.1.2 | RP-170445 | Motivation for New Work Item for Enhancing Utilization of CA for LTE | Nokia, Alcatel-Lucent Shanghai Bell | discussion | - | - | - | - | .. | Rel-15 | - | | RP-162259 | Motivation for New Work Item for Enhancing Utilization of CA for LTE | | | - | - | | | 2/24/2017 10:17 | 3/5/2017 21:53 | | Tero Henttonen | 69943 | 3960 | Yes | No | Discussion |
| 447 | RAN1 | Yes | approved | 10.7.3 | RP-170446 | TR 36.741 v2.0.1 on Study on Further enhancements to Coordinated Multi-Point (CoMP) Operation for LTE | Intel Corporation, ZTE | draft TR | 36.741 | - | - | - | 2.0.1 | Rel-14 | FS_feCOMP_LTE | | | RAN1 TR 36.741 is provided for approval | conclusion: approved as REL-14 TR | | - | - | | | 2/24/2017 10:18 | 3/5/2017 21:53 | | Davydov Alexei | 45738 | 4460 | Yes | No | Approval |
| 448 | RAN2 | Yes | revised | 10.1.2 | RP-170447 | New WID: Enhancing LTE CA Utilization | Nokia, Alcatel-Lucent Shanghai Bell | WID new | - | - | - | - | .. | Rel-15 | - | RP-170715 | RP-162258 | new WI for LTE; leading WG: RAN2 | | | - | - | | | 2/24/2017 10:18 | 3/5/2017 21:53 | | Tero Henttonen | 69943 | 3970 | Yes | No | Approval |
| 449 | RAN1 | Yes | postponed | 9.1 | RP-170448 | New SID: Study on MBMS in NR | Qualcomm Incorporated | SID new | - | - | - | - | .. | Rel-15 | - | | | new SID for NR; leading WG: RAN1 | | | - | - | | | 2/24/2017 10:44 | 3/5/2017 21:53 | | Peter Gaal | 57198 | 1610 | Yes | No | Approval |
| 450 | motiv | Yes | noted | 9.1 | RP-170449 | Motivation for new Study Item on MBMS in NR | Qualcomm Incorporated | discussion | - | - | - | - | .. | Rel-15 | - | | | | | | - | - | | | 2/24/2017 10:44 | 3/5/2017 21:53 | | Peter Gaal | 57198 | 1600 | Yes | No | Discussion |
| 451 | | Yes | noted | 9.1 | RP-170450 | Way Forward for 3GPP V2X evolution | VODAFONE Group Plc | discussion | - | - | - | - | .. | Rel-15 | - | | | Way forward for V2X evolution towards full 5G requirements fulfillment in 3GPP | moved from AI 10.1.1 to AI 9.1 | | - | - | | | 2/24/2017 11:13 | 3/5/2017 21:53 | | Tim Frost | 28235 | 1820 | Yes | No | Approval |
| 452 | | No | withdrawn | 9.1 | RP-170451 | Highest priority frequency bands and band combinations for NR | VODAFONE Group Plc | discussion | - | - | - | - | .. | Rel-15 | - | | | | | | - | - | | | 2/24/2017 11:15 | | | Tim Frost | 28235 | 2400 | Yes | Yes | Approval |
| 453 | | Yes | noted | 9.1 | RP-170452 | View on structure of band-specific work for NR | VODAFONE Group Plc | discussion | - | - | - | - | .. | Rel-15 | - | | | | DT: we support the 2nd proposal | | - | - | | | 2/24/2017 11:16 | 3/5/2017 21:53 | | Tim Frost | 28235 | 2410 | Yes | No | Discussion |
| 454 | | No | withdrawn | 9 | RP-170453 | Additional rationale for NR acceleration | VODAFONE Group Plc | discussion | - | - | - | - | .. | Rel-15 | - | | | | moved from AI 9.1 to AI 9 | | - | - | | | 2/24/2017 11:19 | | | Tim Frost | 28235 | 5310 | Yes | Yes | Information |
| 455 | | Yes | noted | 9.1 | RP-170454 | Intra-RAN network interface scope for Rel-15 NR WI | VODAFONE Group Plc | discussion | - | - | - | - | .. | Rel-15 | - | | | | | | - | - | | | 2/24/2017 11:22 | 3/5/2017 21:53 | | Tim Frost | 28235 | 1370 | Yes | No | Approval |
| 456 | | Yes | noted | 10.1 | RP-170455 | Rel-15 LTE work/studies on 5G-related verticals | VODAFONE Group Plc | discussion | - | - | - | - | .. | Rel-15 | - | | | | | | - | - | | | 2/24/2017 11:26 | 3/5/2017 21:53 | | Tim Frost | 28235 | 4550 | Yes | No | Discussion |
| 457 | | Yes | noted | 10.5.4 | RP-170456 | LTE CA 4DL/1UL late band combination | VODAFONE Group Plc | discussion | - | - | - | - | .. | Rel-14 | - | | | | RAN chair: same approach as for previous AI | | - | - | | | 2/24/2017 11:30 | 3/5/2017 21:53 | | Tim Frost | 28235 | 4560 | Yes | No | Decision |
| 458 | | Yes | noted | 10.5.3 | RP-170457 | LTE 3DL/1UL CA late band combination | VODAFONE Group Plc | discussion | - | - | - | - | .. | Rel-14 | - | | | | RAN4 chair: these combinations were proposed but they missed the deadline; would recommend to respect the deadline | | - | - | | | 2/24/2017 11:32 | 3/5/2017 21:53 | | Tim Frost | 28235 | 4570 | Yes | No | Decision |
| 459 | motiv | No | withdrawn | 10.1.1 | RP-170458 | Motivation for proposed WI on NB-IoT further evolution | VODAFONE Group Plc | discussion | - | - | - | - | .. | Rel-15 | - | | | | | | - | - | | | 2/24/2017 11:34 | | | Tim Frost | 28235 | 1200 | Yes | Yes | Discussion |
| 460 | RAN1 | No | withdrawn | 10.1.1 | RP-170459 | Proposed WI on NB-IoT further evolution | VODAFONE Group Plc | WID new | - | - | - | - | .. | - | - | | | new WI for LTE only; leading WG: RAN1 | | | - | - | | | 2/24/2017 11:35 | | | Tim Frost | 28235 | 1210 | Yes | Yes | Approval |
| 461 | motiv | No | withdrawn | 10.1.1 | RP-170460 | Motivation for SI on fulfilling mMTC requirements with NB-IoT | VODAFONE Group Plc | discussion | - | - | - | - | .. | Rel-15 | - | | | note: mMTC requirements are taken from NR TR 38.913 | | | - | - | | | 2/24/2017 11:37 | | | Tim Frost | 28235 | 1530 | Yes | Yes | Discussion |
| 462 | RAN1 | No | withdrawn | 10.1.1 | RP-170461 | SI on fulfilling mMTC requirements with NB-IoT | VODAFONE Group Plc | SID new | - | - | - | - | .. | Rel-15 | - | | | new SI for LTE only; leading WG: RAN1; note: mMTC requirements are taken from NR TR 38.913 | | | - | - | | | 2/24/2017 11:38 | | | Tim Frost | 28235 | 1540 | Yes | Yes | Approval |
| 463 | | Yes | noted | 10.3.15 | RP-170462 | Status report of WI Further enhanced MTC for LTE; rapporteur: Ericsson | RAN1 | WI status report | - | - | - | - | .. | Rel-14 | LTE_feMTC | | | | conclusion: noted; approved: Core: 95%, June 17; Perf.: 0%, Dec.17; | | - | - | | | 2/24/2017 11:52 | 3/5/2017 21:53 | | Johan Bergman | 51222 | 4620 | Yes | No | |
| 464 | RAN1 | Yes | approved | 10.3.15 | RP-170463 | WI exception request for Core part: Further enhanced MTC for LTE | Ericsson | WI exception request | - | - | - | - | .. | Rel-14 | LTE_feMTC-Core | | | | RAN4 RF and demodulation part concerned | | - | - | | | 2/24/2017 11:52 | 3/5/2017 21:53 | | Johan Bergman | 51222 | 6230 | Yes | No | Approval |
| 465 | RAN1 | Yes | postponed | 10.3.15 | RP-170464 | Summary for WI Further enhanced MTC for LTE | Ericsson | WI summary | - | - | - | - | .. | Rel-14 | LTE_feMTC-Core | | | | MCC: WI is not yet completed | | - | - | | | 2/24/2017 11:52 | 3/5/2017 21:53 | | Johan Bergman | 51222 | 6360 | Yes | No | |
| 466 | RAN1 | Yes | revised | 10.1.1 | RP-170465 | New WI: Even further enhanced MTC for LTE | Ericsson | WID new | - | - | - | - | .. | Rel-15 | - | RP-170732 | | new WI for LTE; leading WG: RAN1; WI code to be used: LTE_eMTC4; compare RP-170149 and RP-170678 | | | - | - | | | 2/24/2017 11:52 | 3/5/2017 21:53 | | Johan Bergman | 51222 | 1000 | Yes | No | Approval |
| 467 | motiv | Yes | revised | 10.1.1 | RP-170466 | Motivation for New WI on Even further enhanced MTC for LTE | Ericsson | discussion | - | - | - | - | .. | Rel-15 | - | RP-170733 | | Motivation paper for New WI on Even further enhanced MTC for LTE | | | - | - | | | 2/24/2017 11:52 | 3/5/2017 21:53 | | Johan Bergman | 51222 | 1010 | Yes | No | Discussion |
| 468 | | Yes | noted | 13.4.4 | RP-170467 | Status report for UE Conformance Test Aspects - Network-Assisted Interference Cancellation and Suppression for LTE; rapporteur: MediaTek Inc. | RAN5 | WI status report | - | - | - | - | .. | - | LTE_NAICS-UEConTest | | | | conclusion: noted; approved: 100%, March 17; WI completed | | - | - | | | 2/24/2017 12:11 | 3/5/2017 21:53 | | I-Kang Fu | 54527 | 700 | Yes | No | |

| | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z | AA | AB | AC | AD | AE | AF | AG |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 469 | | Yes | noted | 18 | RP-170468 | Handling of WIDs across TSG RAN | MediaTek Inc. | discussion | - | - | - | - | .. | - | - | | | | •Proposal 1a: 4WTUs daily shall remain the reference budget for a Work Session. Exceptionally, and subject to TSG approval only, a maximum of 5WTUs daily may be scheduled for a Work Session. 5WTUs shall never be allocated on Fridays.<br>•Proposal 1b: For technical discussions, the WG leadership may exceed the TSG-approved WTUs by a maximum of [.5WTU i.e. 1 hour] per Work Session throughout the meeting week. When exceeding this [.5WTU] margin, a penalty shall be imposed on WIDs that made use of this extra time in this Work Session. In this case, any decision taken during that extra time shall be considered non-binding and shall be subject to being reopened and discussed. This shall be notified to plenary as part of the WG Chairman's report.<br>•Proposal 1c: For work planning discussions, [0.5~1WTU] is always reserved by the WG Chairman on Thursday during WTU5 (or the earliest free WTU on that day).<br>•Proposal 1d: The WG/TSG leadership shall ensure 'offline' discussions are well coordinated and not conflicting with each other. In particular, 'offline' discussions in a WG shall not be more constraining on delegations than parallel Work Sessions in that WG.<br>•Proposal 2: WID Rapporteur and WG Chairman shall flag at the following TSG any WID that exceeded its planned WTU budget beyond | | - | - | | | 2/24/2017 12:12 | 3/5/2017 21:53 | | I-Kang Fu | 54527 | 4680 | Yes | No | |
| 470 | | Yes | noted | 10.1.1 | RP-170469 | On Rel-15 NB-IoT Scope | MediaTek Inc. | discussion | - | - | - | - | .. | - | - | | | | | | - | - | | | 2/24/2017 12:14 | 3/5/2017 21:53 | | I-Kang Fu | 54527 | 1140 | Yes | No | |
| 471 | | Yes | revised | 10.3.4 | RP-170470 | On the Completion of Light Connection | Nokia, Alcatel-Lucent Shanghai Bell | discussion | - | - | - | - | .. | Rel-14 | - | RP-170716 | | In this contribution we discuss Light Connection status of RAN WGs and its dependencies to SA and CT groups. | | | - | - | | | 2/24/2017 12:15 | 3/5/2017 21:53 | | Sari Nielsen | 69936 | 2920 | Yes | No | Decision |
| 472 | | Yes | noted | 10.3.12 | RP-170471 | Status Report for WI: Perf. part: Downlink Multiuser Superposition Transmission for LTE; rapporteur: Mediatek | RAN4 | WI status report | - | - | - | - | .. | - | LTE_MUST-Perf | | | Core part was completed in Dec.16 | conclusion: noted; approved: Perf.: 25%, June 17 | | - | - | | | 2/24/2017 12:16 | 3/5/2017 21:53 | | I-Kang Fu | 54527 | 4710 | Yes | No | |
| 473 | | Yes | noted | 9 | RP-170472 | 5G NR Phase 1 Scope | MediaTek Inc. | discussion | - | - | - | - | .. | - | - | | | | moved from AI 9.1 to AI 9 | | - | - | | | 2/24/2017 12:17 | 3/5/2017 21:53 | | I-Kang Fu | 54527 | 3200 | Yes | No | |
| 474 | | Yes | noted | 9 | RP-170473 | TU Allocation for Rel-15 NR Works | MediaTek Inc. | discussion | - | - | - | - | .. | - | - | | | | proposal: in both RAN1 and RAN2 more time be dedicated to NR work as follows:<br>•RAN1: an additional parallel session should be introduced for NR i.e. totaling at least 36TUs per week for NR without increasing the overall number of parallel sessions in RAN1.<br>•RAN2: 2 full joint CP/UP sessions and 2x full parallel CP/UP sessions should be scheduled i.e. totaling at least 24TUs per week for NR.<br>•A joint session shall always be scheduled after all parallel sessions are concluded, in order to provide visibility to the entire WG on the progress made in these sessions, to review this progress and eventually reach, when applicable, WG enforcement of the decisions made.<br><br>Sprint: has a problem with this proposal as you take time from LTE<br>Qualcomm: we are not supporting Mediatek's proposal to take massive time budget from LTE<br>Mediatek: we have to review the | | - | - | | | 2/24/2017 12:18 | 3/5/2017 21:53 | | I-Kang Fu | 54527 | 3340 | Yes | No | |
| 475 | | Yes | noted | 12.2.2 | RP-170474 | Status Report of WI Radio Interface Enhancements for EC-GSM-IoT; rapporteur: Nokia | RAN6 | WI status report | - | - | - | - | .. | Rel-14 | CIoT_EC_GSM_radio_enh | | | | conclusion: noted; approved: Core: 80%, June 17; Perf.: 80%, June 17 | | - | - | | | 2/24/2017 12:27 | 3/5/2017 21:53 | | Juergen Hofmann | 68332 | 580 | Yes | No | |
| 476 | | Yes | noted | 10.3.18 | RP-170475 | Status report of WI Core part: Flexible eNB-ID and Cell-ID in E-UTRAN; rapporteur: China Telecom | RAN3 | WI status report | - | - | - | - | .. | Rel-14 | LTE_FNBID-Core | | | | conclusion: noted; approved: Core: 100%, March 17; WI is completed | | - | - | | | 2/24/2017 12:28 | 3/5/2017 21:53 | | Sen Xu | 56667 | 4750 | Yes | No | |
| 477 | | Yes | noted | 9 | RP-170476 | Essential aspects on NR acceleration | KT Corporation | discussion | - | - | - | - | .. | - | - | | | In this contribution, KT presents our view for NR acceleration | moved from AI 9.4 to AI 9 | | - | - | | | 2/24/2017 12:35 | 3/5/2017 21:53 | | ILWHAN KIM | 48721 | 4720 | Yes | No | Decision |
| 478 | RAN2 | Yes | approved | 9.2.1 | RP-170477 | TR 38.804 v1.0.0 on Study on New Radio Access Technology; Radio Interface Protocol Aspects | NTT DOCOMO, INC. (Rapporteur) | draft TR | 38.804 | - | - | - | 1.0.0 | Rel-14 | FS_NR_new RAT | | | RAN2 TR 38.804 is provided for 1-step approval | conclusion: approved as REL-14 TR | | - | - | | | 2/24/2017 12:37 | 3/5/2017 21:53 | | Hideaki Takahashi | 60906 | 1380 | Yes | No | Approval |
| 479 | RAN3 | Yes | noted | 10.3.18 | RP-170478 | Summary for WI Flexible eNB-ID and Cell-ID in E-UTRAN | China Telecommunications | WI summary | - | - | - | - | .. | Rel-14 | LTE_FNBID-Core | | | | Ericsson: cooperation with GERAN and CT groups, but there was no GERAN work done, should this be reflected in the summary?<br>RAN3 chair: we sent an LS and there was no answer so we assume no impact<br>Huawei: we checked that there is no impact | | - | - | | | 2/24/2017 12:38 | 3/5/2017 21:53 | | Sen Xu | 56667 | 5420 | Yes | No | |


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| | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z | AA | AB | AC | AD | AE | AF | AG |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 480 | | Yes | revised | 7 | RP-170479 | Draft reply LS to ITU-T SG15/COM 15-LS405-E = RP-161984 on Requirements for mobile backhaul/fronthaul in a G.fast Deployment Environment (to: ITU-T SG15; cc: -; contact: Nokia) | Nokia Germany | LS out | - | - | - | - | .. | Rel-14 | FS_NR_new RAT | RP-170700 | | LSin RP-161984 was received at RAN #74 | Nokia: this is feedback from WGs which we can hopefully send as reply to LSin ITU-T SG15/COM 15-LS405-E = RP-161984<br>Ericsson: was this text approved?<br>Nokia: yes, was in an LS from RAN1 to RAN | | ITU-T SG15 | - | ITU-T SG15/COM 15-LS405-E = RP-161984 | | 2/24/2017 12:38 | 3/5/2017 21:53 | | Colin Willcock | 68505 | 5480 | Yes | No | Approval |
| 481 | | Yes | noted | 9.1 | RP-170480 | Consideration for NR band specification in Rel 15 | KT Corporation | discussion | - | - | - | - | .. | - | - | | | In this contribution, KT presents our view for NR band specification in Rel 15. | moved from AI 9.4 to AI 9.1 | | - | - | | | 2/24/2017 12:38 | 3/5/2017 21:53 | | ILWHAN KIM | 48721 | 2430 | Yes | No | Approval |
| 482 | RAN2 | Yes | revised | 10.1.2 | RP-170481 | New WI proposal: carrier aggregation in unsynchronized networks for LTE | Huawei, HiSilicon | WID new | - | - | - | - | .. | Rel-15 | - | RP-170731 | | new WI for LTE only; leading WG: RAN2; | only 3 supporting companies | | - | - | | | 2/24/2017 12:52 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 3981 | Yes | No | Approval |
| 483 | motiv | Yes | noted | 10.1.2 | RP-170482 | Motivation for new WI on carrier aggregation in unsynchronized networks for LTE | Huawei, HiSilicon | discussion | - | - | - | - | .. | Rel-15 | - | | | | | | - | - | | | 2/24/2017 12:52 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 3980 | Yes | No | Discussion |
| 484 | RAN1 | Yes | revised | 10.1.1 | RP-170483 | New WI proposal: Enhancements on LTE-based V2X Services | Huawei, CATT, LGE, HiSilicon | WID new | - | - | - | - | .. | Rel-15 | - | RP-170724 | | new WI for LTE only; leading WG: RAN1; | | | - | - | | | 2/24/2017 12:52 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 1691 | Yes | No | Approval |
| 485 | motiv | Yes | noted | 10.1.1 | RP-170484 | Motivation for new WI proposal on enhancements on LTE-based V2X Services | Huawei, HiSilicon | discussion | - | - | - | - | .. | Rel-15 | - | | | | | | - | - | | | 2/24/2017 12:52 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 1690 | Yes | No | Discussion |
| 486 | RAN2 | Yes | revised | 10.1.2 | RP-170485 | New WI proposal: LTE connectivity to 5G-CN | Huawei, Ericsson | WID new | - | - | - | - | .. | Rel-15 | - | RP-170730 | | new WI for LTE only; leading WG: RAN2; | | | - | - | | | 2/24/2017 12:52 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 4851 | Yes | No | Approval |
| 487 | motiv | Yes | noted | 10.1.2 | RP-170486 | Motivation for new WI proposal on LTE connectivity to 5G-CN | Huawei, HiSilicon | discussion | - | - | - | - | .. | Rel-15 | - | | | | | | - | - | | | 2/24/2017 12:52 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 4850 | Yes | No | Discussion |
| 488 | | Yes | noted | 10.12.1 | RP-170487 | Discussion on the specification of shortened TTI in Rel-14 | Huawei, HiSilicon | discussion | - | - | - | - | .. | Rel-14 | - | | | | Proposals<br>–RAN tasks WG1 to provide RRC parameters to RAN2 after RAN1#88bis<br>–RAN tasks RAN WGs to start preparing CRs for sTTI after April WGs<br>–RAN tasks RAN WGs to agree CRs (including ASN.1) for sTTI by RAN#76, for approval at RAN#76<br><br>Samsung: not sure that RAN1 could provide such a level of detail at 40% completion level<br>Nokia: considers this as micro management of what WGs should take care of<br>Intel: same view, usually RAN1 is providing data when almost all work is done | | - | - | | | 2/24/2017 12:52 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 1130 | Yes | No | Discussion |
| 489 | | Yes | noted | 9.1 | RP-170488 | Discussion on 5G spectrum workplan in Rel-15 | Huawei, HiSilicon | discussion | - | - | - | - | .. | Rel-15 | - | | | | ZTE: no agreement about band package in RAN4, so why do we discuss it?<br>Dish: NR WI has bands in WI, was this agreed in RAN4? | | - | - | | | 2/24/2017 12:52 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 2390 | Yes | No | Discussion |
| 490 | | Yes | noted | 9.2.1 | RP-170489 | Discussion on channel models for 5G evaluations | Huawei, HiSilicon | discussion | - | - | - | - | .. | - | - | | | | Samsung, Ericsson: suggests to bring this proposal to next RAN1 meeting<br>NTT DOCOMO: we have discussed this already in RAN1 | | - | - | | | 2/24/2017 12:52 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 4390 | Yes | No | Discussion |
| 491 | RAN3 | Yes | approved | 9.2.1 | RP-170490 | TR 38.801 v2.0.0 on Study on New Radio Access Technology; Radio Access Architecture and Interfaces | NTT DOCOMO, INC. (Rapporteur) | draft TR | 38.801 | - | - | - | 2.0.0 | Rel-14 | FS_NR_new RAT | | | RAN3 TR 38.801 is provided for approval | conclusion: approved as REL-14 TR | | - | - | | | 2/24/2017 12:52 | 3/5/2017 21:53 | | Hideaki Takahashi | 60906 | 2490 | Yes | No | Approval |
| 492 | | Yes | noted | 9 | RP-170491 | Two-step RRC ASN.1 freezing for Rel-15 5G New Radio | Nokia, Alcatel-Lucent Shanghai Bell | discussion | - | - | - | - | .. | Rel-15 | - | | | The document discusses RRC ASN.1 freezing options and related maintenance for Rel-15 | moved from AI 9.1 to AI 9 | | - | - | | | 2/24/2017 12:54 | 3/5/2017 21:53 | | Sari Nielsen | 69936 | 4760 | Yes | No | Approval |
| 493 | | Yes | noted | 9.1 | RP-170492 | URLLC in Rel 15 | TELECOM ITALIA S.p.A. | discussion | - | - | - | - | .. | Rel-15 | - | | | | | | - | - | | | 2/24/2017 13:06 | 3/5/2017 21:53 | | Giovanni Romano | 10718 | 1341 | Yes | No | Agreement |
| 494 | | Yes | noted | 9.1 | RP-170493 | How to manage V2X in RAN | TELECOM ITALIA S.p.A. | discussion | - | - | - | - | .. | Rel-15 | - | | | | | | - | - | | | 2/24/2017 13:10 | 3/5/2017 21:53 | | Giovanni Romano | 10718 | 1790 | Yes | No | Agreement |
| 495 | RAN4 | Yes | approved | 10.5.8 | RP-170494 | TR 36.714-03-03 v1.0.0 on LTE Advanced Inter-band CA Rel-14 for 3DL/3UL; for approval | Nokia Corporation | draft TR | 36.714-03-03 | - | - | - | 1.0.0 | Rel-14 | LTE_CA_R14_3DL3UL-Core | | | RAN4 basket CA TR 36.714-03-03 is provided for 1-step approval | conclusion: approved as REL-14 TR | | - | - | | | 2/24/2017 13:18 | 3/5/2017 21:53 | | Petri Vasenkari | 69954 | 4940 | Yes | No | Approval |
| 496 | RAN5 | Yes | approved | 13.1 | RP-170495 | New WID on UE Conformance Test Aspects – New band support for Rel-14 NB-IoT | Ericsson | WID new | - | - | - | - | .. | Rel-14 | - | | | new WI for LTE; leading WG: RAN5; tested: REL-14 NB_IOT_R14_bands-Core; is the Core part completed at RAN #75? | | | - | - | | | 2/24/2017 13:27 | 3/5/2017 21:53 | | Leif Mattisson | 10602 | 4950 | Yes | No | Approval |
| 497 | RAN5 | Yes | revised | 13.1 | RP-170496 | New WID on UE Conformance Test Aspects - 4 Rx antenna ports with CA for LTE DL | Ericsson | WID new | - | - | - | - | .. | Rel-14 | - | RP-170704 | | new WI for LTE only; leading WG: RAN5; tested: REL-14 LTE_4Rx_AP_DL_CA-Core; WI code to be used: LTE_4Rx_AP_DL_CA-UEConTest | | | - | - | | | 2/24/2017 13:27 | 3/5/2017 21:53 | | Leif Mattisson | 10602 | 4960 | Yes | No | Approval |



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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 498 | | Yes | noted | 13.4.3 | RP-170497 | Status report for WI UE Conformance Test Aspects - Dual connectivity for LTE; rapporteur: Ericsson | RAN5 | WI status report | - | - | - | - | .. | Rel-12 | LTE_SC_enh_dualC-UEConTest | | | target date shifted: +3 months | conclusion: noted; approved: 90%, June 17 | | - | - | | | 2/24/2017 13:27 | 3/5/2017 21:53 | | Leif Mattisson | 10602 | 690 | Yes | No | |
| 499 | | Yes | noted | 13.4.6 | RP-170498 | Status report for WI UE Conformance Test Aspects - Increasing the minimum number of carriers for UE monitoring in UTRA and E-UTRA; rapporteur: Ericsson | RAN5 | WI status report | - | - | - | - | .. | Rel-12 | LTE_UTRA_IncMon-UEConTest | | | | conclusion: noted; approved: 10%, June 17 | | - | - | | | 2/24/2017 13:27 | 3/5/2017 21:53 | | Leif Mattisson | 10602 | 710 | Yes | No | |
| 500 | | Yes | noted | 13.5.1 | RP-170499 | Status report for WI UE Conformance Test Aspects - Rel-13 CA configurations; rapporteur: Ericsson | RAN5 | WI status report | - | - | - | - | .. | Rel-13 | LTE_CA_Rel13-UEConTest | | | target date shifted: +9 months,<br>Includes all Rel-13 CA configurations associated with the 138 RAN4 Rel-13 CA WIs. The completion per CA configuration is provided by the attached RAN5 work plan attached to the SR (34 CA configurations completed). | conclusion: noted; approved: 56%, Dec.17 | | - | - | | | 2/24/2017 13:27 | 3/5/2017 21:53 | | Leif Mattisson | 10602 | 730 | Yes | No | |
| 501 | | Yes | noted | 13.5.2 | RP-170500 | Status report for WI UE Conformance Test Aspects - LTE DL 4 Rx antenna ports; rapporteur: Ericsson | RAN5 | WI status report | - | - | - | - | .. | Rel-13 | LTE_4Rx_AP_DL-UEConTest | | | target dated shifte:: +3 months | conclusion: noted; approved: 70%, June 17 | | - | - | | | 2/24/2017 13:27 | 3/5/2017 21:53 | | Leif Mattisson | 10602 | 750 | Yes | No | |
| 502 | | Yes | noted | 13.5.4 | RP-170501 | Status report for WI UE Conformance Test Aspects – Further LTE Physical Layer Enhancements for MTC; rapporteur: Ericsson | RAN5 | WI status report | - | - | - | - | .. | Rel-13 | LTE_MTCe2_L1-UEConTest | | | Test: 85%, June 17. The work is split into 3 phases. Phase 1 (CE Mode A, FDD) is 97% completed. Phase 2 (CE Mode B, TDD) is 80% completed. Phase 3: Control Plane IoT optimization etc is 20% completed. | conclusion: noted; approved: 85%, June 17 | | - | - | | | 2/24/2017 13:27 | 3/5/2017 21:53 | | Leif Mattisson | 10602 | 770 | Yes | No | |
| 503 | | Yes | noted | 13.6.2 | RP-170502 | Status report for WI UE Conformance Test Aspects - Rel-14 CA configurations; rapporteur: Ericsson | RAN5 | WI status report | - | - | - | - | .. | Rel-13 | LTE_CA_R14-UEConTest | | | Includes all Rel-14 CA associated with the RAN4 Rel-14 bucket CA WIs (currently 506 Rel-14 CA configurations included in the RAN5 work plan). The completion per CA configuration is provided by the attached RAN5 work plan attached to the SR (8 Rel-14 CA configurations | conclusion: noted; approved: 9%, March 18 | | - | - | | | 2/24/2017 13:27 | 3/5/2017 21:53 | | Leif Mattisson | 10602 | 890 | Yes | No | |
| 504 | | Yes | noted | 9.2.1 | RP-170503 | Decision on N2 and N3 reference points for 5G system | Nokia, Alcatel-Lucent Shanghai Bell | discussion | - | - | - | - | .. | - | - | | | Related to LSin in RP-170035 and RAN WG3 Status Report in RP-170007 | ATT: we support this Nokia proposal and ask to take a decision for it<br>Nokia: do we make it access-agnostic is the question<br>PST: this topic is also important for regulators<br>RAN chair: maybe we can discuss this in the joint session<br>SA chair: who defines the access-independent procedures needs to clear<br>RAN3 chair: we will have a problem to define what an access-specific; we cannot take "agnostic" for any new thing that will be brought up<br>RAN chair: try to have an input for the joint RAN-SA session | | - | - | | | 2/24/2017 13:34 | 3/5/2017 21:53 | | Sean Kelley | 70295 | 5030 | Yes | No | |
| 505 | | No | withdrawn | 10.14.2 | RP-170504 | On the study on LTE bandwidth flexibility enhancements | Ericsson LM | discussion | - | - | - | - | .. | Rel-15 | FS_LTE_BW_flex | | | | | | - | - | | | 2/24/2017 14:21 | | | Daniel Larsson | 39861 | 5040 | Yes | Yes | Agreement |
| 506 | | Yes | noted | 13.6.7 | RP-170505 | WI Status report: UE Conformance Test Aspects – CBRS 3.5GHz Band for LTE in the United States (Band 48); rapporteur: Nokia | RAN5 | WI status report | - | - | - | - | .. | Rel-14 | LTE_TDD_3550_CBRS_US-UEConTest | | | | conclusion: noted; approved: 60%, June 17 | | - | - | | | 2/24/2017 14:30 | 3/5/2017 21:53 | | Antti Toskala | 69921 | 930 | Yes | No | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 507 | | Yes | noted | 10.5 | RP-170506 | Basket CA Rapporteurship and Workload | Qualcomm Japan Inc | discussion | - | - | - | - | .. | - | - | | | In this paper we discuss some problems related to the workload that basket CA rapporteurs have and make some proposals on how the work process can be improved | proposals:<br>1.Approve the "big CRs" over e-mail within 1 week after the meeting ends. The CRs are usually just a collection of already agreed TPs<br>2.Drafting of the "big CRs" could also be handled by MCC if resources are available.<br><br>MCC: 2. is not realistic as it will fall in the busy period where a large number of RAN4 CRs need to be packed<br>RAN4 chair: proposes to go for option 1.<br>RAN chair: you can establish a deadline | | - | - | | | 2/24/2017 14:52 | 3/5/2017 21:53 | | Valentin Gheorghiu | 43117 | 5060 | Yes | No | Discussio n |
| 508 | RAN1 | Yes | revised | 10.1.1 | RP-170507 | New WI: Further enhancements of NB-IoT | Ericsson LM | WID new | - | - | - | - | .. | - | - | RP-170718 | | new WI for LTE only; leading WG: RAN1; WI code to be used: NB_IOTenh2; compare RP-170336 | | | - | - | | | 2/24/2017 14:52 | 3/5/2017 21:53 | | Olof Liberg | 43670 | 1061 | Yes | No | Approval |
| 509 | motiv | Yes | noted | 10.1.1 | RP-170508 | Motivation for Work item on Further enhancements of NB-IoT | Ericsson LM | discussion | - | - | - | - | .. | Rel-15 | - | | | | | | - | - | | | 2/24/2017 14:53 | 3/5/2017 21:53 | | Olof Liberg | 43670 | 1060 | Yes | No | Discussio n |
| 510 | RAN1 | Yes | not treated | 10.1.1 | RP-170509 | New Work Item on NB-IoT operation in unlicensed spectrum | Ericsson LM | WID new | - | - | - | - | .. | Rel-15 | - | | | new WI for LTE only; leading WG: RAN1 | only 2 supporting companies<br>RAN chair: does not have 4 supporters | | - | - | | | 2/24/2017 14:54 | 3/5/2017 21:53 | | Olof Liberg | 43670 | 1560 | Yes | No | Approval |
| 511 | motiv | Yes | noted | 10.1.1 | RP-170510 | Motivation for Work Item on NB-IoT operation in unlicensed spectrum | Ericsson LM | discussion | - | - | - | - | .. | Rel-15 | - | | | | | | - | - | | | 2/24/2017 14:55 | 3/5/2017 21:53 | | Olof Liberg | 43670 | 1550 | Yes | No | Discussio n |
| 512 | | Yes | noted | 10.1.1 | RP-170511 | On eMTC 5G mMTC requirement fulfilment | Ericsson LM | discussion | - | - | - | - | .. | Rel-15 | - | | | | | | - | - | | | 2/24/2017 14:57 | 3/5/2017 21:53 | | Olof Liberg | 43670 | 1510 | Yes | No | Informatio n |
| 513 | | Yes | noted | 10.1.1 | RP-170512 | On NB-IoT 5G mMTC requirement fulfilment | Ericsson LM | discussion | - | - | - | - | .. | Rel-15 | - | | | | | | - | - | | | 2/24/2017 14:57 | 3/5/2017 21:53 | | Olof Liberg | 43670 | 1520 | Yes | No | Discussio n |
| 514 | | Yes | noted | 8.5 | RP-170513 | Input to LS reply on Smart grid communications to ITU-R WP1A | Ericsson LM | discussion | - | - | - | - | .. | - | - | | | related to LSin RP-170029 | Huawei: we had a comment to correct a sentence<br>Ericsson: we covered this | | - | - | | | 2/24/2017 15:02 | 3/5/2017 21:53 | | Olof Liberg | 43670 | 291 | Yes | No | Discussio n |
| 515 | RAN4 | Yes | revised | 10.1.5 | RP-170514 | New WI: LAA/eLAA for the CBRS 3.5GHz band in the United States | AT&T GNS Belgium SPRL | WID new | - | - | - | - | .. | Rel-15 | - | RP-170804 | | new WI for LTE; leading WG: RAN4; related to CBRS LTE band 48, intending a new band definition | | | - | - | | | 2/24/2017 15:12 | 3/5/2017 21:53 | | Marc Grant | 16986 | 5140 | Yes | No | Approval |
| 516 | | Yes | noted | 9.2.1 | RP-170515 | On Access Agnostic Design Principles for NG-C | Ericsson | discussion | - | - | - | - | .. | - | - | | | | Broadcom: SI is completed and SA2 is in normative phase<br>Intel: we do not discuss when to do it but who should do it and we agree with Nokia that RAN3 should do it<br>Telecom Italia: there are access-specific and access-agnostic procedures and we should not simply copy-and-past<br>SA chair: SA2 has finished work for REL-15 but they will discuss trusted accesses in the future | | - | - | | | 2/24/2017 15:35 | 3/5/2017 21:53 | | Martin Israelsson | 2462 | 5260 | Yes | No | Agreemen t |
| 517 | | Yes | noted | 10.1.3 | RP-170516 | Discussion on feasibility of Network Based Synchronisation Solution 1 | Ericsson | discussion | - | - | - | - | .. | Rel-15 | - | | | | | | - | - | | | 2/24/2017 15:35 | 3/5/2017 21:53 | | Martin Israelsson | 2462 | 5160 | Yes | No | Agreemen t |
| 518 | RAN3 | Yes | revised | 10.3.15 | RP-170517 | OTDOA Enhancements for FeMTC | Ericsson | CR | 36.455 | 73 | - | B | 14.0.0 | Rel-14 | LTE_feMTC-Core | RP-170691 | | company CR; late RAN3 impact discovered; discussion on the RAN3 reflector; CR is povided to finalize RAN3 part of the WI (so CR was not seen by RAN3 in Athens and a revised WID is provided in RP-170532) | | | - | - | | | 2/24/2017 15:35 | 3/5/2017 21:53 | | Martin Israelsson | 2462 | 5320 | Yes | No | Approval |
| 519 | | Yes | noted | 10.4.4 | RP-170518 | Status report of WI Enhancements of Dedicated Core Networks for UMTS and LTE; rapporteur: Ericsson | RAN3 | WI status report | - | - | - | - | .. | Rel-14 | eDECOR-UTRA_LTE-Core | | | | conclusion: noted; approved: Core: 100%, March 17; Core part WI is completed | | - | - | | | 2/24/2017 15:35 | 3/5/2017 21:53 | | Martin Israelsson | 2462 | 5180 | Yes | No | |
| 520 | motiv | Yes | noted | 11.1 | RP-170519 | Motivation for SI: Study on a simplified HS-SCCH for UMTS | Ericsson | discussion | - | - | - | - | .. | Rel-15 | - | | | SID in RP-170520 | | | - | - | | | 2/24/2017 15:35 | 3/5/2017 21:53 | | Martin Israelsson | 2462 | 5190 | Yes | No | Discussio n |
| 521 | RAN1 | Yes | revised | 11.1 | RP-170520 | New SI proposal: Study on a simplified HS-SCCH for UMTS | Ericsson | SID new | - | - | - | - | .. | Rel-15 | - | RP-170725 | | new SI for UTRAN only; leading WG: RAN1; postponed at RAN#74 in RP-162290 | | | - | - | | | 2/24/2017 15:35 | 3/5/2017 21:53 | | Martin Israelsson | 2462 | 5200 | Yes | No | Approval |
| 522 | | Yes | approved | 16 | RP-170521 | Proposed update to RAN1 Terms of Reference | Ericsson | ToR | - | - | - | - | .. | - | - | | | last approved ToR of RAN1: RP-110963 (RAN #53) | becoming effective after RAN #76 in June 2017 | | - | - | | | 2/24/2017 15:35 | 3/5/2017 21:53 | | Martin Israelsson | 2462 | 5210 | Yes | No | Agreemen t |
| 523 | | Yes | approved | 16 | RP-170522 | Proposed update to RAN2 Terms of Reference | Ericsson | ToR | - | - | - | - | .. | - | - | | | last approved ToR of RAN1: RP-110964 (RAN #53) | becoming effective after RAN #76 in June 2017 | | - | - | | | 2/24/2017 15:35 | 3/5/2017 21:53 | | Martin Israelsson | 2462 | 5220 | Yes | No | Agreemen t |
| 524 | | Yes | approved | 16 | RP-170523 | Proposed update to RAN6 Terms of Reference | Ericsson | ToR | - | - | - | - | .. | - | - | | | last approved ToR of RAN6: RP-160058 (RAN #71) | becoming effective after RAN #76 in June 2017 | | - | - | | | 2/24/2017 15:35 | 3/5/2017 21:53 | | Martin Israelsson | 2462 | 5230 | Yes | No | Agreemen t |


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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 525 | RAN1 | Yes | revised | 10.1.1 | RP-170524 | New WI proposal: Enhancements for high capacity stationary wireless link and introduction of 1024 QAM for LTE | Huawei, HiSilicon | WID new | - | - | - | - | .. | Rel-15 | - | RP-170801 | | new WI for LTE only; leading WG: RAN1; | Hauwei: has more supporting companies now | | - | - | | | 2/24/2017 15:43 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 1610 | Yes | No | Approval |
| 526 | motiv | Yes | noted | 10.1.1 | RP-170525 | Motivation for new WI on Enhancements for high capacity stationary wireless link and introduction of 1024 QAM for LTE | Huawei, HiSilicon | discussion | - | - | - | - | .. | Rel-15 | - | | | | | | - | - | | | 2/24/2017 15:43 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 1605 | Yes | No | Discussion |
| 527 | RAN1 | Yes | revised | 9.1 | RP-170526 | New SID: Study on Self Evaluation towards IMT-2020 submission | Huawei, Ericsson | SID new | - | - | - | - | .. | Rel-15 | - | RP-170832 | | moved from AI 10.1.1 to AI 9.1; new SI for NR and LTE; leading WG: RAN1; | | | - | - | | | 2/24/2017 15:43 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 1710 | Yes | No | Approval |
| 528 | | Yes | noted | 9.1 | RP-170527 | Workplan for Self Evaluation towards IMT-2020 submission | Huawei | discussion | - | - | - | - | .. | Rel-15 | - | | | moved from AI 10.1.1 to AI 9.1; | RAN chair: so we start self-evaluation in Sep.2017<br>Qualcomm: there should be also tasks for RAN and RAN2<br>Telecom Italia: evaluation can also be carried out in ITU-R ad hoc | | - | - | | | 2/24/2017 15:43 | 3/5/2017 21:53 | | David Mazzarese | 44044 | 3010 | Yes | No | Discussion |
| 529 | motiv | No | withdrawn | 10.1.5 | RP-170528 | Motivation document for new WI on LAA for the "CBRS" 3.5GHz band in the United States | QUALCOMM UK Ltd | discussion | - | - | - | - | .. | - | - | | | | | | - | - | | | 2/24/2017 15:55 | | | Luis Lopes | 47178 | 5280 | Yes | Yes | Discussion |
| 530 | RAN4 | No | withdrawn | 10.1.5 | RP-170529 | New WI: LAA for the "CBRS" 3.5GHz LTE band in the United States | QUALCOMM UK Ltd | WID new | - | - | - | - | .. | - | - | | | new WI for LTE; leading WG: RAN4 | | | - | - | | | 2/24/2017 15:56 | | | Luis Lopes | 47178 | 5290 | Yes | Yes | Approval |
| 531 | RAN2 | Yes | postponed | 9.1 | RP-170530 | New SI: Study on high accuracy positioning of NR | ESA, Deutsche Telekom, Fraunhofer IIS | SID new | - | - | - | - | .. | Rel-15 | - | | | new SI for NR; leading WG: RAN2?; adressing hybrid positioning technologies and subsequent impact on NR positioning | | | - | - | | | 2/24/2017 16:00 | 3/5/2017 21:53 | | Lionel RIES | 67046 | 1960 | Yes | No | Approval |
| 532 | | Yes | noted | 9 | RP-170531 | On the overall 5G-NR workplan | Qualcomm | discussion | - | - | - | - | .. | Rel-15 | - | | RP-170196 | late input | moved from AI 9.1 to AI 9 | | - | - | | | 2/26/2017 9:48 | 2/26/2017 11:40 | | Joern Krause | 12578 | 3840 | Yes | No | |
| 533 | RAN1 | Yes | approved | 10.3.15 | RP-170532 | Revised WID for WI Further enhanced MTC for LTE | Ericsson | WID revised | - | - | - | - | .. | Rel-14 | LTE_feMTC | | | last approved WID: RP-162520; related company CR in RP-170517 | affected specs updated<br>Note: The rapporteur confirmed after RAN #75 that the target date for WI LTE_feMTC-Perf is Dec.17 (so the WID has a mistake but the status report is correct) | | - | - | | | 2/26/2017 11:35 | 3/5/2017 21:53 | | Joern Krause | 12578 | 5600 | Yes | No | Approval |
| 534 | | Yes | approved | 3 | RP-170533 | Revised agenda for RAN #75 held in Dubrovnik, Croatia, 05.03.-08.03.2017 | RAN chairman (Qualcomm) | agenda | - | - | - | - | .. | - | - | | RP-170001 | | | | - | - | | | 2/26/2017 14:06 | 2/26/2017 15:07 | | Joern Krause | 12578 | 19350 | Yes | No | Approval |
| 535 | | Yes | noted | 10.8.3 | RP-170534 | LS on additional RRC parameters for PRACH resource configuration for high speed scenario (R1-1704133; to: RAN2; cc: RAN; contact: Huawei) | RAN1 | LS in | - | - | - | - | .. | Rel-14 | LTE_high_speed-Core | | | Note: WI LTE_high_speed-Core was completed at RAN #74 in Dec.16; no RAN action requested | | R1-1704133 | RAN2 | RAN | | | 2/26/2017 20:56 | 3/5/2017 21:53 | | Joern Krause | 12578 | 3210 | Yes | No | |
| 536 | | Yes | approved | 10.3.5 | RP-170535 | RAN3 CRs for Enhanced LTE-WLAN Aggregation (LWA)-Core Part | RAN3 | CR pack | - | - | - | - | .. | Rel-14 | LTE_WLAN_aggr-Core | | | | | | - | - | | | 2/27/2017 2:44 | 3/5/2017 21:53 | | Issam Toufik | 53262 | 3310 | Yes | No | Approval |
| 537 | | Yes | approved | 10.3.8 | RP-170536 | RAN3 CRs for Further mobility enhancements in LTE-Core Part | RAN3 | CR pack | - | - | - | - | .. | Rel-14 | LTE_eMob-Core | | | | | | - | - | | | 2/27/2017 2:44 | 3/5/2017 21:53 | | Issam Toufik | 53262 | 5360 | Yes | No | Approval |
| 538 | | Yes | approved | 10.3.9 | RP-170537 | RAN3 CRs for Uplink Capacity Enhancements for LTE-Core Part | RAN3 | CR pack | - | - | - | - | .. | Rel-14 | LTE_UL_CAP_enh-Core | | | | | | - | - | | | 2/27/2017 2:44 | 3/5/2017 21:53 | | Issam Toufik | 53262 | 6310 | Yes | No | Approval |
| 539 | | Yes | approved | 10.3.14 | RP-170538 | RAN3 CRs for LTE-based V2X Services-Core Part | RAN3 | CR pack | - | - | - | - | .. | Rel-14 | LTE_V2X-Core | | | | | | - | - | | | 2/27/2017 2:44 | 3/5/2017 21:53 | | Issam Toufik | 53262 | 5380 | Yes | No | Approval |
| 540 | flag M | Yes | partially approved | 10.3.16 | RP-170539 | RAN3 CRs for Enhancements of NB-IoT-Core Part | RAN3 | CR pack | - | - | - | - | .. | Rel-14 | NB_IOTenh-Core | | | MCC: company CR RP-170319 is trying to replace RAN3 agreed CR R3-170912 of RP-170539 | conclusion: all CRs approved except R3-170912 which is replaced by RP-170319 | | - | - | | | 2/27/2017 2:44 | 3/5/2017 21:53 | | Issam Toufik | 53262 | 5390 | Yes | No | Approval |
| 541 | | Yes | approved | 10.3.16 | RP-170540 | RAN3 CRs related to SA CIoT_Ext WI | RAN3 | CR pack | - | - | - | - | .. | Rel-14 | TEI14, CIoT_Ext | | | | | | - | - | | | 2/27/2017 2:44 | 3/5/2017 21:53 | | Issam Toufik | 53262 | 5610 | Yes | No | Approval |
| 542 | | Yes | approved | 10.3.17 | RP-170541 | RAN3 CRs for Voice and Video Enhancement for LTE-Core Part | RAN3 | CR pack | - | - | - | - | .. | Rel-14 | LTE_VoLTE_ViLTE_enh-Core | | | | | | - | - | | | 2/27/2017 2:44 | 3/5/2017 21:53 | | Issam Toufik | 53262 | 6250 | Yes | No | Approval |
| 543 | flag M | Yes | approved | 10.3.18 | RP-170542 | RAN3 CRs for Flexible eNB-ID and Cell-ID in E-UTRAN-Core Part | RAN3 | CR pack | - | - | - | - | .. | Rel-14 | LTE_FNBID-Core | | | MCC: R3-170844 of RP-170542 is linked to CT4 CR C4-171466 to TS 29.274 (submitted to CT #75 for approval in CP-170040) but linking is not indicated on RAN3 CR | | | - | - | | | 2/27/2017 2:44 | 3/5/2017 21:53 | | Issam Toufik | 53262 | 4780 | Yes | No | Approval |
| 544 | | Yes | approved | 10.3.21 | RP-170543 | RAN3 CRs for Enhanced LTE WLAN Radio Level Integration with IPsec Tunnel (eLWIP)-Core Part | RAN3 | CR pack | - | - | - | - | .. | Rel-14 | LTE_WLAN_eLWIP-Core | | | | | | - | - | | | 2/27/2017 2:44 | 3/5/2017 21:53 | | Issam Toufik | 53262 | 5430 | Yes | No | Approval |


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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 545 | | Yes | approved | 10.4.4 | RP-170544 | RAN3 CRs for Enhancements of Dedicated Core (DECOR) Networks for UMTS and LTE-Core Part | RAN3 | CR pack | - | - | - | - | .. | Rel-14 | eDECOR-UTRA_LTE-Core | | | | | | - | - | | | 2/27/2017 2:44 | 3/5/2017 21:53 | | Issam Toufik | 53262 | 5470 | Yes | No | Approval |
| 546 | | Yes | approved | 11.2.1 | RP-170545 | RAN3 CRs for Quality of Experience (QoE) Measurement Collection for streaming services in UTRAN-Core Part | RAN3 | CR pack | - | - | - | - | .. | Rel-14 | UMTS_QMC_Streaming-Core | | | | | | - | - | | | 2/27/2017 2:44 | 3/5/2017 21:53 | | Issam Toufik | 53262 | 5450 | Yes | No | Approval |
| 547 | motiv | Yes | noted | 9.1 | RP-170546 | Motivation for SI Study on MBMS for NR | EBU | discussion | - | - | - | - | .. | Rel-15 | - | | | related to RP-170131; late input | | | - | - | | | 3/5/2017 21:53 | 3/5/2017 21:53 | | Joern Krause | 12578 | 1550 | Yes | No | Discussion |
| 548 | RAN3 | Yes | noted | 10.4.4 | RP-170547 | WI summary for WI Enhancements of Dedicated Core Networks for UMTS and LTE | Ericsson | WI summary | - | - | - | - | .. | Rel-14 | eDECOR-UTRA_LTE-Core | | | late input | | | - | - | | | 3/5/2017 21:53 | 3/5/2017 21:53 | | Joern Krause | 12578 | 6410 | Yes | No | |
| 549 | | Yes | revised | 8.5 | RP-170548 | Draft response LS to ITU-R WP4B/TEMP/17 = RP-161971 on the integration of satellite in IMT2020 (to: ITU-R WP4B; cc: ETSI TC SES, ITU-R WP5D, ITU-T SG13; contact: Thales) | THALES | LS out | - | - | - | - | .. | Rel-15 | - | RP-170765 | RP-170371 | integration of satellite solutions into IMT-2020 networks | moved from AI 7 to AI 8.5<br>RAN chair: can be handled in the ITU-R session on Wed;<br>Qualcomm: The sentences "3GPP encourages ..." was requested to be removed on the ITU-R ad hoc reflector.<br>ITU-R ad hoc convener: as there is a SI under approval this week should we wait until the end of the meeting?<br><br>conclusion: we come back to RP-170765 on Thu | RP-161971 | ITU-R WP4B | ETSI TC SES, ITU-R WP 5D, ITU-T SG 13 | | | 2/27/2017 18:45 | 3/5/2017 21:53 | | Joern Krause | 12578 | 8000 | Yes | No | Agreement |
| 550 | | Yes | noted | 10.1.1 | RP-170549 | Discussion on the evolution of IOT for LTE | Qualcomm | discussion | - | - | - | - | .. | Rel-15 | - | | | late input | | | - | - | | | 2/27/2017 20:43 | 3/5/2017 21:53 | | Joern Krause | 12578 | 1505 | Yes | No | Discussion |
| 551 | RAN2 | Yes | approved | 10.3.21 | RP-170550 | Introducing eLWIP enhancements | Intel | CR | 36.300 | 990 | - | B | 14.1.0 | Rel-14 | LTE_WLAN_eLWIP-Core | | | company CR; this 36.300 CR R3-170903 was endorsed by RAN3 by email but was arriving too late in RAN2 to be handled by official email agreement, therefore it is submitted to RAN; late input | note: It turned out that the correct WI code of CR RP-170550 is LTE_WLAN_eLWIP-Core and not LTE_WLAN_aggr-Core; therefore moved from AI 10.3.5 to AI 10.3.21 | | - | - | | | 3/5/2017 21:53 | 3/5/2017 21:53 | | Joern Krause | 12578 | 5350 | Yes | No | Approval |
| 552 | | Yes | approved | 12.2.1 | RP-170551 | RAN6 agreed CR for REL-14 WI: Positioning Enhancements for GERAN (ePOS_GERAN-Perf) | RAN6 | CR pack | - | - | - | - | .. | Rel-14 | ePOS_GERAN-Perf | | | | | | - | - | | | 3/5/2017 21:53 | 3/5/2017 21:53 | | Paolino Usai | 3209 | 1920 | Yes | No | Approval |
| 553 | | Yes | noted | 13.5.10 | RP-170552 | Status report for WI UE Conformance Test Aspects - Support for Mission Critical Push To Talk over LTE (MCPTT); rapporteur: US Department of Commerce | RAN5 | WI status report | - | - | - | - | .. | Rel-14 | MCPTT-ConTest | | | late input | conclusion: noted; approved: 5%, Dec.17 | | - | - | | | 3/5/2017 21:53 | 3/5/2017 21:53 | | Joern Krause | 12578 | 5520 | Yes | No | |
| 554 | | Yes | approved | 10.3.1 | RP-170553 | RAN4 CRs to Core part: Enhanced LAA for LTE | RAN4 | CR pack | - | - | - | - | .. | Rel-14 | LTE_eLAA-Core | | | | | | - | - | | | 2/28/2017 7:54 | 3/5/2017 21:53 | | Kyoungsook OH | 66120 | 6260 | Yes | No | Approval |
| 555 | | Yes | approved | 10.3.2 | RP-170554 | RAN4 CRs to Perf. part: Support for V2V services based on LTE sidelink | RAN4 | CR pack | - | - | - | - | .. | Rel-14 | LTE_SL_V2V-Perf | | | | | | - | - | | | 2/28/2017 7:54 | 3/5/2017 21:53 | | Kyoungsook OH | 66120 | 5540 | Yes | No | Approval |
| 556 | | Yes | approved | 10.3.3 | RP-170555 | RAN4 CRs to Perf. part: Performance enhancements for high speed scenario in LTE | RAN4 | CR pack | - | - | - | - | .. | Rel-14 | LTE_high_speed-Perf | | | | | | - | - | | | 2/28/2017 7:54 | 3/5/2017 21:53 | | Kyoungsook OH | 66120 | 5550 | Yes | No | Approval |
| 557 | | Yes | approved | 10.3.6 | RP-170556 | RAN4 CRs to Core part: Radiated performance requirements for the verification of multi-antenna reception of UEs in LTE | RAN4 | CR pack | - | - | - | - | .. | Rel-14 | LTE_MIMO_OTA-Core | | | | | | - | - | | | 2/28/2017 7:54 | 3/5/2017 21:53 | | Kyoungsook OH | 66120 | 2770 | Yes | No | Approval |
| 558 | | Yes | approved | 10.3.8 | RP-170557 | RAN4 CRs to Core part: Further mobility enhancements in LTE | RAN4 | CR pack | - | - | - | - | .. | Rel-14 | LTE_eMob-Core | | | | | | - | - | | | 2/28/2017 7:54 | 3/5/2017 21:53 | | Kyoungsook OH | 66120 | 5570 | Yes | No | Approval |
| 559 | | Yes | approved | 10.3.9 | RP-170558 | RAN4 CRs to Core part: Uplink Capacity Enhancements for LTE | RAN4 | CR pack | - | - | - | - | .. | Rel-14 | LTE_UL_CAP_enh-Core | | | | | | - | - | | | 2/28/2017 7:54 | 3/5/2017 21:53 | | Kyoungsook OH | 66120 | 6320 | Yes | No | Approval |
| 560 | | Yes | approved | 10.3.14 | RP-170559 | RAN4 CRs to LTE-based V2X Services | RAN4 | CR pack | - | - | - | - | .. | Rel-14 | LTE_V2X | | | | | | - | - | | | 2/28/2017 7:54 | 3/5/2017 21:53 | | Kyoungsook OH | 66120 | 5590 | Yes | No | Approval |
| 561 | | Yes | approved | 10.3.15 | RP-170560 | RAN4 CRs to Core part: Further enhanced MTC for LTE | RAN4 | CR pack | - | - | - | - | .. | Rel-14 | LTE_feMTC-Core | | | | | | - | - | | | 2/28/2017 7:54 | 3/5/2017 21:53 | | Kyoungsook OH | 66120 | 5170 | Yes | No | Approval |
| 562 | | Yes | approved | 10.3.16 | RP-170561 | RAN4 CRs to Core part: Enhancements of NB-IoT | RAN4 | CR pack | - | - | - | - | .. | Rel-14 | NB_IOTenh-Core | | | | | | - | - | | | 2/28/2017 7:54 | 3/5/2017 21:53 | | Kyoungsook OH | 66120 | 6240 | Yes | No | Approval |
| 563 | | Yes | approved | 10.3.19 | RP-170562 | RAN4 CRs to 4 receiver (4Rx) antenna ports with Carrier Aggregation (CA) for LTE downlink (DL) | RAN4 | CR pack | - | - | - | - | .. | Rel-14 | LTE_4Rx_AP_DL_CA | | | | | | - | - | | | 2/28/2017 7:54 | 3/5/2017 21:53 | | Kyoungsook OH | 66120 | 5620 | Yes | No | Approval |

| | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z | AA | AB | AC | AD | AE | AF | AG |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 564 | | Yes | approved | 10.3.20 | RP-170563 | RAN4 CRs to Requirements for a new UE category with single receiver based on Category 1 for LTE | RAN4 | CR pack | - | - | - | - | .. | Rel-14 | LTE_UE_cat_1RX | | | | | | - | - | | | 2/28/2017 7:54 | 3/5/2017 21:53 | | Kyoungsook OH | 66120 | 6401 | Yes | No | Approval |
| 565 | | Yes | approved | 10.4.1 | RP-170564 | RAN4 CRs to Perf. part: Further Indoor Positioning Enhancements for UTRA and LTE | RAN4 | CR pack | - | - | - | - | .. | Rel-13 | UTRA_LTE_iPos_enh2-Perf | | | | | | - | - | | | 2/28/2017 7:54 | 3/5/2017 21:53 | | Kyoungsook OH | 66120 | 5640 | Yes | No | Approval |
| 566 | | Yes | approved | 10.5.1 | RP-170565 | RAN4 CRs to Core part: LTE Advanced intra-band Carrier Aggregation for xDL/yUL including contiguous and non-contiguous spectrum | RAN4 | CR pack | - | - | - | - | .. | Rel-14 | LTE_CA_R14_intra-Core | | | | | | - | - | | | 2/28/2017 7:54 | 3/5/2017 21:53 | | Kyoungsook OH | 66120 | 1880 | Yes | No | Approval |
| 567 | | Yes | approved | 10.5.2 | RP-170566 | RAN4 CRs to Core part: LTE Advanced inter-band Carrier Aggregation Rel-14 for 2DL/1UL | RAN4 | CR pack | - | - | - | - | .. | Rel-14 | LTE_CA_R14_2DL1UL-Core | | | | | | - | - | | | 2/28/2017 7:54 | 3/5/2017 21:53 | | Kyoungsook OH | 66120 | 1250 | Yes | No | Approval |
| 568 | | Yes | approved | 10.5.3 | RP-170567 | RAN4 CRs to Core part: LTE Advanced inter-band Carrier Aggregation Rel-14 for 3DL/1UL | RAN4 | CR pack | - | - | - | - | .. | Rel-14 | LTE_CA_R14_3DL1UL-Core | | | | | | - | - | | | 2/28/2017 7:54 | 3/5/2017 21:53 | | Kyoungsook OH | 66120 | 3090 | Yes | No | Approval |
| 569 | | Yes | approved | 10.5.4 | RP-170568 | RAN4 CRs to Core part: LTE Advanced inter-band Carrier Aggregation Rel-14 for 4DL/1UL | RAN4 | CR pack | - | - | - | - | .. | Rel-14 | LTE_CA_R14_4DL1UL-Core | | | | | | - | - | | | 2/28/2017 7:54 | 3/5/2017 21:53 | | Kyoungsook OH | 66120 | 1890 | Yes | No | Approval |
| 570 | | Yes | approved | 10.5.5 | RP-170569 | RAN4 CRs to LTE Advanced inter-band Carrier Aggregation Rel-14 for 5DL/1UL | RAN4 | CR pack | - | - | - | - | .. | Rel-14 | LTE_CA_R14_5DL1UL | | | | | | - | - | | | 2/28/2017 7:54 | 3/5/2017 21:53 | | Kyoungsook OH | 66120 | 1430 | Yes | No | Approval |
| 571 | | Yes | approved | 10.5.6 | RP-170570 | RAN4 CRs to Core part: LTE Advanced inter-band Carrier Aggregation Rel-14 for 2DL/2UL | RAN4 | CR pack | - | - | - | - | .. | Rel-14 | LTE_CA_R14_2DL2UL-Core | | | | | | - | - | | | 2/28/2017 7:54 | 3/5/2017 21:53 | | Kyoungsook OH | 66120 | 3120 | Yes | No | Approval |
| 572 | | Yes | approved | 10.5.7 | RP-170571 | RAN4 CRs to Core part: LTE Advanced inter-band Carrier Aggregation Rel-14 for xDL/2UL with x=3,4,5 | RAN4 | CR pack | - | - | - | - | .. | Rel-14 | LTE_CA_R14_xDL2UL-Core | | | | | | - | - | | | 2/28/2017 7:54 | 3/5/2017 21:53 | | Kyoungsook OH | 66120 | 1290 | Yes | No | Approval |
| 573 | | Yes | approved | 10.5.9 | RP-170572 | RAN4 CRs to Core part: New band support for Rel-14 Narrowband Internet of Things (NB-IOT) | RAN4 | CR pack | - | - | - | - | .. | Rel-14 | NB_IOT_R14_bands-Core | | | | | | - | - | | | 2/28/2017 7:54 | 3/5/2017 21:53 | | Kyoungsook OH | 66120 | 1400 | Yes | No | Approval |
| 574 | | Yes | approved | 10.5.10 | RP-170573 | RAN4 CRs to Core part: Addition of 1.4 and 3 MHz Channel Bandwidth to E-UTRA operating band 65 for CGC (Complementary Ground Component) operations in Region 1 | RAN4 | CR pack | - | - | - | - | .. | Rel-13 | LTE_1980_2170_REG1_addBWs-Core | | | | | | - | - | | | 2/28/2017 7:54 | 3/5/2017 21:53 | | Kyoungsook OH | 66120 | 1110 | Yes | No | Approval |
| 575 | | Yes | approved | 10.5.11 | RP-170574 | RAN4 CRs to Core part: Introduction of new band support for 4Rx antenna ports for LTE | RAN4 | CR pack | - | - | - | - | .. | Rel-14 | LTE_4Rx_AP_DL_bands-Core | | | | | | - | - | | | 2/28/2017 7:54 | 3/5/2017 21:53 | | Kyoungsook OH | 66120 | 3060 | Yes | No | Approval |
| 576 | | Yes | approved | 10.5.12 | RP-170575 | RAN4 CRs to Core part: Addition of band 25 and 26 to LTE MTC cat.0 | RAN4 | CR pack | - | - | - | - | .. | Rel-14 | LC_MTC_LTE_cat0_B25_B26-Core | | | | | | - | - | | | 2/28/2017 7:54 | 3/5/2017 21:53 | | Kyoungsook OH | 66120 | 5750 | Yes | No | Approval |
| 577 | | Yes | approved | 10.5.13 | RP-170576 | RAN4 CRs to Addition of bands 25 and 40 to LTE MTC cat.1 | RAN4 | CR pack | - | - | - | - | .. | Rel-14 | LTE_MTCe2_L1_cat1_B25_B40-Core | | | | | | - | - | | | 2/28/2017 7:54 | 3/5/2017 21:53 | | Kyoungsook OH | 66120 | 5760 | Yes | No | Approval |
| 578 | | Yes | approved | 10.6 | RP-170577 | RAN4 CRs to TEI14 | RAN4 | CR pack | - | - | - | - | .. | Rel-14 | TEI14 | | | | | | - | - | | | 2/28/2017 7:54 | 3/5/2017 21:53 | | Kyoungsook OH | 66120 | 6420 | Yes | No | Approval |
| 579 | | Yes | approved | 10.8.1 | RP-170578 | RAN4 CRs to Core part: Support for V2V services based on LTE sidelink | RAN4 | CR pack | - | - | - | - | .. | Rel-14 | LTE_SL_V2V-Core | | | | | | - | - | | | 2/28/2017 7:54 | 3/5/2017 21:53 | | Kyoungsook OH | 66120 | 6440 | Yes | No | Approval |
| 580 | | Yes | approved | 10.8.3 | RP-170579 | RAN4 CRs to Core part: Performance enhancements for high speed scenario in LTE | RAN4 | CR pack | - | - | - | - | .. | Rel-14 | LTE_high_speed-Core | | | | | | - | - | | | 2/28/2017 7:54 | 3/5/2017 21:53 | | Kyoungsook OH | 66120 | 6170 | Yes | No | Approval |
| 581 | | Yes | approved | 14.4.4 | RP-170580 | RAN4 CRs to TEI11 | RAN4 | CR pack | - | - | - | - | .. | Rel-11 | TEI11 | | | | | | - | - | | | 2/28/2017 7:54 | 3/5/2017 21:53 | | Kyoungsook OH | 66120 | 5800 | Yes | No | Approval |
| 582 | | Yes | approved | 14.4.5 | RP-170581 | RAN4 CRs to Perf. part: Low cost & enhanced coverage MTC UE for LTE | RAN4 | CR pack | - | - | - | - | .. | Rel-12 | LC_MTC_LTE-Perf | | | | | | - | - | | | 2/28/2017 7:54 | 3/5/2017 21:53 | | Kyoungsook OH | 66120 | 5810 | Yes | No | Approval |
| 583 | | Yes | approved | 14.4.5 | RP-170582 | RAN4 CRs to Perf. part: LTE Advanced inter-band Carrier Aggregation of Band 39 and Band 41 | RAN4 | CR pack | - | - | - | - | .. | Rel-12 | LTE_CA_B39_B41-Perf | | | | | | - | - | | | 2/28/2017 7:54 | 3/5/2017 21:53 | | Kyoungsook OH | 66120 | 5820 | Yes | No | Approval |
| 584 | | Yes | approved | 14.4.5 | RP-170583 | RAN4 CRs to Core part: Carrier Aggregation for LTE | RAN4 | CR pack | - | - | - | - | .. | Rel-12 | LTE_CA-Core | | | | | | - | - | | | 2/28/2017 7:54 | 3/5/2017 21:53 | | Kyoungsook OH | 66120 | 5830 | Yes | No | Approval |


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| | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z | AA | AB | AC | AD | AE | AF | AG |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 585 | | Yes | approved | 14.4.5 | RP-170584 | RAN4 CRs to Perf. part: E-UTRA Small cell enhancements - Physical layer aspects | RAN4 | CR pack | - | - | - | - | .. | Rel-12 | LTE_SC_enh_L1-Perf | | | | | | - | - | | | 2/28/2017 7:54 | 3/5/2017 21:53 | | Kyoungsook OH | 66120 | 5840 | Yes | No | Approval |
| 586 | | Yes | approved | 14.4.5 | RP-170585 | RAN4 CRs to TEI12 | RAN4 | CR pack | - | - | - | - | .. | Rel-12 | TEI12 | | | | | | - | - | | | 2/28/2017 7:54 | 3/5/2017 21:53 | | Kyoungsook OH | 66120 | 5850 | Yes | No | Approval |
| 587 | | Yes | approved | 14.4.6 | RP-170586 | RAN4 CRs to Base Station (BS) RF requirements for Active Antenna System (AAS) | RAN4 | CR pack | - | - | - | - | .. | Rel-13 | AAS_BS_LTE_UTRA | | | | | | - | - | | | 2/28/2017 7:54 | 3/5/2017 21:53 | | Kyoungsook OH | 66120 | 5860 | Yes | No | Approval |
| 588 | | Yes | approved | 14.4.6 | RP-170587 | RAN4 CRs to Perf. part: LTE DL 4 Rx antenna ports | RAN4 | CR pack | - | - | - | - | .. | Rel-13 | LTE_4Rx_AP_DL-Perf | | | | | | - | - | | | 2/28/2017 7:54 | 3/5/2017 21:53 | | Kyoungsook OH | 66120 | 5870 | Yes | No | Approval |
| 589 | | Yes | approved | 14.4.6 | RP-170588 | RAN4 CRs to Perf. Part: LTE Advanced inter-band Carrier Aggregation of Band 1 and Band 40 | RAN4 | CR pack | - | - | - | - | .. | Rel-13 | LTE_CA_B1_B40-Perf | | | | | | - | - | | | 2/28/2017 7:54 | 3/5/2017 21:53 | | Kyoungsook OH | 66120 | 5880 | Yes | No | Approval |
| 590 | | Yes | approved | 14.4.6 | RP-170589 | RAN4 CRs to Core part: Carrier Aggregation for LTE | RAN4 | CR pack | - | - | - | - | .. | Rel-13 | LTE_CA-Core | | | | | | - | - | | | 2/28/2017 7:54 | 3/5/2017 21:53 | | Kyoungsook OH | 66120 | 5890 | Yes | No | Approval |
| 591 | | Yes | approved | 14.4.6 | RP-170590 | RAN4 CRs to Perf. part: Interference mitigation for downlink control channels of LTE | RAN4 | CR pack | - | - | - | - | .. | Rel-14 | LTE_IM_DLCCH-Perf | | | | | | - | - | | | 2/28/2017 7:54 | 3/5/2017 21:53 | | Kyoungsook OH | 66120 | 5900 | Yes | No | Approval |
| 592 | | Yes | approved | 14.4.6 | RP-170591 | RAN4 CRs to Core part: Licensed-Assisted Access using LTE | RAN4 | CR pack | - | - | - | - | .. | Rel-13 | LTE_LAA-Core | | | | | | - | - | | | 2/28/2017 7:54 | 3/5/2017 21:53 | | Kyoungsook OH | 66120 | 5910 | Yes | No | Approval |
| 593 | | Yes | approved | 14.4.6 | RP-170592 | RAN4 CRs to Perf. part: Licensed-Assisted Access using LTE | RAN4 | CR pack | - | - | - | - | .. | Rel-13 | LTE_LAA-Perf | | | | | | - | - | | | 2/28/2017 7:54 | 3/5/2017 21:53 | | Kyoungsook OH | 66120 | 5920 | Yes | No | Approval |
| 594 | | Yes | approved | 14.4.6 | RP-170593 | RAN4 CRs to Perf. part: Performance requirements of MMSE-IRC receiver for LTE BS | RAN4 | CR pack | - | - | - | - | .. | Rel-13 | LTE_MMSE_IRC_BS-Perf | | | | | | - | - | | | 2/28/2017 7:54 | 3/5/2017 21:53 | | Kyoungsook OH | 66120 | 5930 | Yes | No | Approval |
| 595 | | Yes | approved | 14.4.6 | RP-170594 | RAN4 CRs to Core part: Further LTE Physical Layer Enhancements for MTC | RAN4 | CR pack | - | - | - | - | .. | Rel-13 | LTE_MTCe2_L1-Core | | | | | | - | - | | | 2/28/2017 7:54 | 3/5/2017 21:53 | | Kyoungsook OH | 66120 | 5940 | Yes | No | Approval |
| 596 | | Yes | approved | 14.4.6 | RP-170595 | RAN4 CRs to Perf. Part: Further LTE Physical Layer Enhancements for MTC, part 1 | RAN4 | CR pack | - | - | - | - | .. | Rel-13 | LTE_MTCe2_L1-Perf | | | | | | - | - | | | 2/28/2017 7:54 | 3/5/2017 21:53 | | Kyoungsook OH | 66120 | 5950 | Yes | No | Approval |
| 597 | | Yes | approved | 14.4.6 | RP-170596 | RAN4 CRs to Perf. Part: Further LTE Physical Layer Enhancements for MTC, part 2 | RAN4 | CR pack | - | - | - | - | .. | Rel-13 | LTE_MTCe2_L1-Perf | | | | | | - | - | | | 2/28/2017 7:54 | 3/5/2017 21:53 | | Kyoungsook OH | 66120 | 5960 | Yes | No | Approval |
| 598 | | Yes | approved | 14.4.6 | RP-170597 | RAN4 CRs to Perf. Part: Further LTE Physical Layer Enhancements for MTC, part 3 | RAN4 | CR pack | - | - | - | - | .. | Rel-13 | LTE_MTCe2_L1-Perf | | | | | | - | - | | | 2/28/2017 7:54 | 3/5/2017 21:53 | | Kyoungsook OH | 66120 | 5970 | Yes | No | Approval |
| 599 | | Yes | approved | 14.4.6 | RP-170598 | RAN4 CRs to Core part: Narrowband Internet of Things (IOT), part1 | RAN4 | CR pack | - | - | - | - | .. | Rel-13 | NB_IOT-Core | | | | | | - | - | | | 2/28/2017 7:54 | 3/5/2017 21:53 | | Kyoungsook OH | 66120 | 5980 | Yes | No | Approval |
| 600 | | Yes | approved | 14.4.6 | RP-170599 | RAN4 CRs to Core part: Narrowband Internet of Things (IOT), part2 | RAN4 | CR pack | - | - | - | - | .. | Rel-13 | NB_IOT-Core | | | | | | - | - | | | 2/28/2017 7:54 | 3/5/2017 21:53 | | Kyoungsook OH | 66120 | 5990 | Yes | No | Approval |
| 601 | | Yes | approved | 14.4.6 | RP-170600 | RAN4 CRs to Perf. part: Narrowband Internet of Things (IOT), part1 | RAN4 | CR pack | - | - | - | - | .. | Rel-13 | NB_IOT-Perf | | | | | | - | - | | | 2/28/2017 7:54 | 3/5/2017 21:53 | | Kyoungsook OH | 66120 | 6000 | Yes | No | Approval |
| 602 | | Yes | approved | 14.4.6 | RP-170601 | RAN4 CRs to Perf. part: Narrowband Internet of Things (IOT), part2 | RAN4 | CR pack | - | - | - | - | .. | Rel-13 | NB_IOT-Perf | | | | | | - | - | | | 2/28/2017 7:54 | 3/5/2017 21:53 | | Kyoungsook OH | 66120 | 6010 | Yes | No | Approval |
| 603 | | Yes | approved | 14.4.6 | RP-170602 | RAN4 CRs to Core part: Radiated requirements for the verification of multi-antenna reception performance of UEs | RAN4 | CR pack | - | - | - | - | .. | Rel-14 | UTRA_LTE_MIMO_OTA-Core | | | | | | - | - | | | 2/28/2017 7:54 | 3/5/2017 21:53 | | Kyoungsook OH | 66120 | 6020 | Yes | No | Approval |
| 604 | | Yes | approved | 14.4.6 | RP-170603 | RAN4 CRs to TEI13 | RAN4 | CR pack | - | - | - | - | .. | Rel-13 | TEI13 | | | | | | - | - | | | 2/28/2017 7:54 | 3/5/2017 21:53 | | Kyoungsook OH | 66120 | 6030 | Yes | No | Approval |
| 605 | RAN1 | Yes | withdrawn | 10.1.1 | RP-170604 | New Work Item on Further enhancements of NB-IoT | Qualcomm | WID new | - | - | - | - | .. | Rel-15 | - | | | new WID for LTE; leading WG: RAN1; late input | was merged with Ericsson | | - | - | | | 2/28/2017 12:48 | 3/5/2017 21:53 | | Joern Krause | 12578 | 1507 | Yes | Yes | Approval |
| 606 | | Yes | approved | 10.3.9 | RP-170605 | Introduction of Uplink Capacity Enhancements for LTE | RAN1 | CR pack | - | - | - | - | .. | Rel-14 | LTE_UL_CAP_enh-Core | | | | | | - | - | | | 2/28/2017 17:35 | 3/5/2017 21:53 | | Patrick Merias | 52292 | 1150 | Yes | No | Approval |
| 607 | | Yes | approved | 14.1.6 | RP-170606 | Maintenance of Rel-13 LTE carrier aggregation enhancement beyond 5 carriers | RAN1 | CR pack | - | - | - | - | .. | Rel-13 | LTE_CA_enh_b5C-Core | | | | | | - | - | | | 2/28/2017 17:35 | 3/5/2017 21:53 | | Patrick Merias | 52292 | 6060 | Yes | No | Approval |
| 608 | | Yes | approved | 10.3.7 | RP-170607 | Introduction of eFD-MIMO | RAN1 | CR pack | - | - | - | - | .. | Rel-14 | LTE_eFDMIMO-Core | | | | | | - | - | | | 2/28/2017 17:35 | 3/5/2017 21:53 | | Patrick Merias | 52292 | 1740 | Yes | No | Approval |
| 609 | | Yes | approved | 10.3.10 | RP-170608 | Introduction of eMBMS enhancements for LTE | RAN1 | CR pack | - | - | - | - | .. | Rel-14 | MBMS_LTE_enh2-Core | | | | | | - | - | | | 2/28/2017 17:35 | 3/5/2017 21:53 | | Patrick Merias | 52292 | 2000 | Yes | No | Approval |



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| | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z | AA | AB | AC | AD | AE | AF | AG |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 610 | | Yes | approved | 14.1.6 | RP-170609 | Maintenance of Rel-13 Further LTE Physical Layer Enhancements for MTC | RAN1 | CR pack | - | - | - | - | .. | Rel-13 | LTE_MTCe2_L1-Core | | | | | | - | - | | | 2/28/2017 17:35 | 3/5/2017 21:53 | | Patrick Merias | 52292 | 6090 | Yes | No | Approval |
| 611 | | Yes | approved | 14.1.6 | RP-170610 | Maintenance of Rel-13 NB-IoT feature | RAN1 | CR pack | - | - | - | - | .. | Rel-13 | NB_IOT-Core | | | | | | - | - | | | 2/28/2017 17:35 | 3/5/2017 21:53 | | Patrick Merias | 52292 | 6100 | Yes | No | Approval |
| 612 | | Yes | approved | 14.1.4 | RP-170611 | Correction on single layer precoding for EPCCH | RAN1 | CR pack | - | - | - | - | .. | Rel-11 | TEI11 | | | | | | - | - | | | 2/28/2017 17:35 | 3/5/2017 21:53 | | Patrick Merias | 52292 | 6110 | Yes | No | Approval |
| 613 | | Yes | approved | 14.1.6 | RP-170612 | Corrections for Rel-13 (36.211/36212) | RAN1 | CR pack | - | - | - | - | .. | Rel-13 | TEI13 | | | | | | - | - | | | 2/28/2017 17:35 | 3/5/2017 21:53 | | Patrick Merias | 52292 | 6120 | Yes | No | Approval |
| 614 | | Yes | approved | 10.8.1 | RP-170613 | Maintenance of Rel-14 Support for V2V services based on LTE sidelink | RAN1 | CR pack | - | - | - | - | .. | Rel-14 | LTE_SL_V2V-Core | | | | | | - | - | | | 2/28/2017 17:35 | 3/5/2017 21:53 | | Patrick Merias | 52292 | 5780 | Yes | No | Approval |
| 615 | | Yes | approved | 11.4.3 | RP-170614 | Clarification on the TTI switching for single cell E-DCH and dual cell E-DCH | RAN1 | CR pack | - | - | - | - | .. | Rel-14 | UTRA_MCe-Core | | | | | | - | - | | | 2/28/2017 17:35 | 3/5/2017 21:53 | | Patrick Merias | 52292 | 6140 | Yes | No | Approval |
| 616 | | Yes | approved | 10.8.4 | RP-170615 | Maintenance of Rel-14 SRS (sounding reference signal) switching between LTE component carriers | RAN1 | CR pack | - | - | - | - | .. | Rel-14 | LTE_SRS_switch-Core | | | | | | - | - | | | 2/28/2017 17:35 | 3/5/2017 21:53 | | Patrick Merias | 52292 | 6150 | Yes | No | Approval |
| 617 | | Yes | approved | 10.8.5 | RP-170616 | Maintenance of Rel-14 Downlink Multiuser Superposition Transmission for LTE | RAN1 | CR pack | - | - | - | - | .. | Rel-14 | LTE_MUST-Core | | | | | | - | - | | | 2/28/2017 17:35 | 3/5/2017 21:53 | | Patrick Merias | 52292 | 6160 | Yes | No | Approval |
| 618 | | Yes | approved | 10.8.3 | RP-170617 | Maintenance of Rel-14 Performance enhancements for high speed scenario in LTE | RAN1 | CR pack | - | - | - | - | .. | Rel-14 | LTE_high_speed-Core | | | | | | - | - | | | 2/28/2017 17:35 | 3/5/2017 21:53 | | Patrick Merias | 52292 | 5340 | Yes | No | Approval |
| 619 | | Yes | approved | 10.3.1 | RP-170618 | Maintenance of Rel-14 Enhanced LAA | RAN1 | CR pack | - | - | - | - | .. | Rel-14 | LTE_eLAA-Core | | | | | | - | - | | | 2/28/2017 17:35 | 3/5/2017 21:53 | | Patrick Merias | 52292 | 5530 | Yes | No | Approval |
| 620 | | Yes | approved | 14.1.5 | RP-170619 | Maintenance to TR36.873 - Study on 3D channel model for LTE | RAN1 | CR pack | - | - | - | - | .. | Rel-12 | FS_LTE_3D_channel | | | | | | - | - | | | 2/28/2017 17:35 | 3/5/2017 21:53 | | Patrick Merias | 52292 | 6190 | Yes | No | Approval |
| 621 | | Yes | approved | 14.1.2 | RP-170620 | Maintenance to TR36.814 - Further advancements for E-UTRA physical layer aspects | RAN1 | CR pack | - | - | - | - | .. | Rel-9 | FS_RAN_LTEA | | | | | | - | - | | | 2/28/2017 17:35 | 3/5/2017 21:53 | | Patrick Merias | 52292 | 6200 | Yes | No | Approval |
| 622 | | Yes | approved | 14.1.1 | RP-170621 | Maintenance to TR25.996 - Spatial channel model for Multiple Input Multiple Output (MIMO) simulations | RAN1 | CR pack | - | - | - | - | .. | Rel-13 | MIMO | | | | | | - | - | | | 2/28/2017 17:35 | 3/5/2017 21:53 | | Patrick Merias | 52292 | 6210 | Yes | No | Approval |
| 623 | | Yes | approved | 10.3.14 | RP-170622 | Introduction of V2X | RAN1 | CR pack | - | - | - | - | .. | Rel-14 | LTE_V2X-Core | | | | | | - | - | | | 2/28/2017 17:35 | 3/5/2017 21:53 | | Patrick Merias | 52292 | 2360 | Yes | No | Approval |
| 624 | | Yes | approved | 10.3.15 | RP-170623 | Introduction of FeMTC | RAN1 | CR pack | - | - | - | - | .. | Rel-14 | LTE_feMTC-Core | | | MCC: late submission | | | - | - | | | 2/28/2017 17:35 | 3/5/2017 21:53 | | Patrick Merias | 52292 | 4630 | Yes | No | Approval |
| 625 | | Yes | approved | 10.3.16 | RP-170624 | Introduction of NB-IoT enhancements for LTE | RAN1 | CR pack | - | - | - | - | .. | Rel-14 | NB_IOTenh-Core | | | | | | - | - | | | 2/28/2017 17:35 | 3/5/2017 21:53 | | Patrick Merias | 52292 | 2890 | Yes | No | Approval |
| 626 | | Yes | approved | 10.3.17 | RP-170625 | Introduction of Voice and Video enhancement for LTE | RAN1 | CR pack | - | - | - | - | .. | Rel-14 | LTE_VoLTE_ViLTE_enh-Core | | | | | | - | - | | | 2/28/2017 17:35 | 3/5/2017 21:53 | | Patrick Merias | 52292 | 3230 | Yes | No | Approval |
| 627 | | Yes | approved | 10.3.1 | RP-170626 | RAN2 CRs to Enhanced LAA for LTE | RAN2 | CR pack | - | - | - | - | .. | Rel-14 | LTE_eLAA | | | | | | - | - | | | 2/28/2017 22:42 | 3/5/2017 21:53 | | Juha Korhonen | 21609 | 6180 | Yes | No | Approval |
| 628 | | Yes | postponed | 10.3.4 | RP-170627 | RAN2 CRs to Core part: Signalling reduction to enable light connection for LTE | RAN2 | CR pack | - | - | - | - | .. | Rel-14 | LTE_LIGHT_CON-Core | | | | | | - | - | | | 2/28/2017 22:42 | 3/5/2017 21:53 | | Juha Korhonen | 21609 | 6270 | Yes | No | Approval |
| 629 | | Yes | approved | 10.3.5 | RP-170628 | RAN2 CRs to Core part: Enhanced LTE-WLAN Aggregation (LWA) | RAN2 | CR pack | - | - | - | - | .. | Rel-14 | LTE_WLAN_aggr-Core | | | | | | - | - | | | 2/28/2017 22:42 | 3/5/2017 21:53 | | Juha Korhonen | 21609 | 3300 | Yes | No | Approval |
| 630 | | Yes | approved | 10.3.7 | RP-170629 | RAN2 CRs to Enhancements on Full-Dimension (FD) MIMO for LTE | RAN2 | CR pack | - | - | - | - | .. | Rel-14 | LTE_eFDMIMO | | | | | | - | - | | | 2/28/2017 22:42 | 3/5/2017 21:53 | | Juha Korhonen | 21609 | 6070 | Yes | No | Approval |
| 631 | | Yes | approved | 10.3.8 | RP-170630 | RAN2 CRs to Further mobility enhancements in LTE | RAN2 | CR pack | - | - | - | - | .. | Rel-14 | LTE_eMob | | | | | | - | - | | | 2/28/2017 22:42 | 3/5/2017 21:53 | | Juha Korhonen | 21609 | 3690 | Yes | No | Approval |
| 632 | flag M | Yes | rejected | 10.3.9 | RP-170631 | RAN2 CRs to Uplink Capacity Enhancements for LTE with 4 categories (technically endorsed CRs) | RAN2 | CR pack | - | - | - | - | .. | Rel-14 | LTE_UL_CAP_enh | | | MCC: RAN has to decide among 2 alternative CR sets defining new categories to support 256QAM in uplink: RP-170631 (4 categories, in line with a RAN1 LS R1-166044) or RP-170632 (5 categories, one more category recently defined by RAN1) | | | - | - | | | 2/28/2017 22:42 | 3/5/2017 21:53 | | Juha Korhonen | 21609 | 5370 | Yes | No | Approval |



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| | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z | AA | AB | AC | AD | AE | AF | AG |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 633 | flag M | Yes | approved | 10.3.9 | RP-170632 | RAN2 CRs to Uplink Capacity Enhancements for LTE with 5 categories (technically endorsed CRs) | RAN2 | CR pack | - | - | - | - | .. | Rel-14 | LTE_UL_CAP_enh | | | MCC: RAN has to decide among 2 alternative CR sets defining new categories to support 256QAM in uplink: RP-170631 (4 categories, in line with a RAN1 LS R1-166044) or RP-170632 (5 categories, one more category recently defined by RAN1) | | | - | - | | | 2/28/2017 22:42 | 3/5/2017 21:53 | | Juha Korhonen | 21609 | 5580 | Yes | No | Approval |
| 634 | | Yes | approved | 10.3.10 | RP-170633 | RAN2 CRs to eMBMS enhancements for LTE | RAN2 | CR pack | - | - | - | - | .. | Rel-14 | MBMS_LTE_enh2 | | | | | | - | - | | | 2/28/2017 22:42 | 3/5/2017 21:53 | | Juha Korhonen | 21609 | 2010 | Yes | No | Approval |
| 635 | | Yes | approved | 10.3.13 | RP-170634 | RAN2 CRs to LTE Measurement Gap Enhancement | RAN2 | CR pack | - | - | - | - | .. | Rel-14 | LTE_meas_gap_enh | | | | | | - | - | | | 2/28/2017 22:42 | 3/5/2017 21:53 | | Juha Korhonen | 21609 | 2750 | Yes | No | Approval |
| 636 | | Yes | approved | 10.3.14 | RP-170635 | RAN2 CRs to LTE-based V2X Services | RAN2 | CR pack | - | - | - | - | .. | Rel-14 | LTE_V2X | | | | | | - | - | | | 2/28/2017 22:42 | 3/5/2017 21:53 | | Juha Korhonen | 21609 | 2370 | Yes | No | Approval |
| 637 | | Yes | approved | 10.3.15 | RP-170636 | RAN2 CRs to Further enhanced MTC for LTE | RAN2 | CR pack | - | - | - | - | .. | Rel-14 | LTE_feMTC | | | | LG: one MAC CR was not agreed and should also belong to NB-IOT<br>RAN2 chair: we concluded it can be approved as it is (LG concern can be addressed in a future CR); CR R2-1702438 includes more NB_IOTenh-Core changes than LTE_feMTC-Core changes, so it would have been more appropriate to package this CR in RP-170637; | | - | - | | | 2/28/2017 22:42 | 3/5/2017 21:53 | | Juha Korhonen | 21609 | 4640 | Yes | No | Approval |
| 638 | | Yes | approved | 10.3.16 | RP-170637 | RAN2 CRs to Enhancements of NB-IoT | RAN2 | CR pack | - | - | - | - | .. | Rel-14 | NB_IOTenh-Core | | | | Ericsson: CRs depend on SA3<br>Mediatek: CRs are complete in what they are adding and we should approve them<br>SA3: will have an ad hoc which will have a mandate to agree CRs<br>RAN chair: RAN2 chairman is asked to discuss offline to come with a way forward | | - | - | | | 2/28/2017 22:42 | 3/5/2017 21:53 | | Juha Korhonen | 21609 | 2900 | Yes | No | Approval |
| 639 | | Yes | approved | 10.3.17 | RP-170638 | RAN2 CRs to Core part: Voice and Video Enhancement for LTE | RAN2 | CR pack | - | - | - | - | .. | Rel-14 | LTE_VoLTE_ViLTE_enh-Core | | | | | | - | - | | | 2/28/2017 22:42 | 3/5/2017 21:53 | | Juha Korhonen | 21609 | 5410 | Yes | No | Approval |
| 640 | | Yes | approved | 10.3.20 | RP-170639 | RAN2 CRs to Requirements for a new UE category with single receiver based on Category 1 for LTE | RAN2 | CR pack | - | - | - | - | .. | Rel-14 | LTE_UE_cat_1RX | | | | | | - | - | | | 2/28/2017 22:42 | 3/5/2017 21:53 | | Juha Korhonen | 21609 | 3900 | Yes | No | Approval |
| 641 | flag M | Yes | approved | 10.3.20 | RP-170640 | RAN2 CRs to Requirements for a new UE category with single receiver based on Category 1 for LTE, part 2 | RAN2 | CR pack | - | - | - | - | .. | Rel-13 | LTE_UE_cat_1RX | | | | MCC: General comment: Acc. to the specification drafting rules it is not possible that cat.B CRs of a Rel-14 WI (LTE_UE_cat_1Rx-Core) are modifying REL-13 specifications, otherwise REL-13 is not frozen<br>RAN2 chair: This was a special decision at RAN #74 to have REL-13 signalling for this (RAN #74 endorsed the way forward of RP-172569: "Introduce related signaling in Rel. 13") | | - | - | | | 2/28/2017 22:42 | 3/5/2017 21:53 | | Juha Korhonen | 21609 | 4170 | Yes | No | Approval |
| 642 | | Yes | approved | 10.4.4 | RP-170641 | RAN2 CRs to Core part: Enhancements of Dedicated Core (DECOR) Networks for UMTS and LTE | RAN2 | CR pack | - | - | - | - | .. | Rel-14 | eDECOR-UTRA_LTE-Core | | | | | | - | - | | | 2/28/2017 22:42 | 3/5/2017 21:53 | | Juha Korhonen | 21609 | 5440 | Yes | No | Approval |
| 643 | | Yes | approved | 10.6 | RP-170642 | RAN2 CRs to Small Technical Enhancements and Improvements for REL-14 | RAN2 | CR pack | - | - | - | - | .. | Rel-14 | TEI14 | | | | | | - | - | | | 2/28/2017 22:42 | 3/5/2017 21:53 | | Juha Korhonen | 21609 | 5770 | Yes | No | Approval |
| 644 | | Yes | approved | 10.8.1 | RP-170643 | RAN2 CRs to Core part: Support for V2V services based on LTE sidelink | RAN2 | CR pack | - | - | - | - | .. | Rel-14 | LTE_SL_V2V-Core | | | | MCC: warning: CR R2-1702068 (of RP-170643) and R2-1702069 (of RP-170643) are introducing the same changes as also covered in CR R2-1702414 of RP-170635 | | - | - | | | 2/28/2017 22:42 | 3/5/2017 21:53 | | Juha Korhonen | 21609 | 6130 | Yes | No | Approval |
| 645 | flag M | Yes | approved | 10.8.1 | RP-170644 | RAN2 CRs to Core part: Support for V2V services based on LTE sidelink, part 2 | RAN2 | CR pack | 36.331 | - | - | - | .. | Rel-14 | LTE_SL_V2V-Core | | | MCC: cat. B 36.331 CR for a REL-14 WI (LTE_SL_V2V-Core) that was declared to be 100% complete in Sep.2016 | | - | - | | | 2/28/2017 22:42 | 3/5/2017 21:53 | | Juha Korhonen | 21609 | 6430 | Yes | No | Approval |
| 646 | | Yes | approved | 10.8.4 | RP-170645 | RAN2 CRs to Core part: SRS (sounding reference signal) switching between LTE component carriers | RAN2 | CR pack | 36.331 | - | - | - | .. | Rel-14 | LTE_SRS_switch-Core | | | | | | - | - | | | 2/28/2017 22:42 | 3/5/2017 21:53 | | Juha Korhonen | 21609 | 6450 | Yes | No | Approval |
| 647 | flag M | Yes | approved | 10.8.4 | RP-170646 | RAN2 CRs to Core part: SRS (sounding reference signal) switching between LTE component carriers, part 2 | RAN2 | CR pack | - | - | - | - | .. | Rel-14 | LTE_SRS_switch-Core | | | | MCC: cat B CRs for a REL-14 WI (LTE_SRS_switch-Core) that was declared to be 100% complete in Dec.2016 | | - | - | | | 2/28/2017 22:42 | 3/5/2017 21:53 | | Juha Korhonen | 21609 | 6460 | Yes | No | Approval |
| 648 | | Yes | approved | 10.9.2 | RP-170647 | RAN2 CRs to Core part: Further Indoor Positioning Enhancements for UTRA and LTE | RAN2 | CR pack | 36.305 | - | - | - | .. | Rel-14 | UTRA_LTE_iPos_enh2-Core | | | | | | - | - | | | 2/28/2017 22:42 | 3/5/2017 21:53 | | Juha Korhonen | 21609 | 6470 | Yes | No | Approval |

| | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z | AA | AB | AC | AD | AE | AF | AG |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 649 | | Yes | approved | 11.2.1 | RP-170648 | RAN2 CRs to Core part: Quality of Experience (QoE) Measurement Collection for streaming services in UTRAN | RAN2 | CR pack | - | - | - | - | .. | Rel-14 | UMTS_QMC_Streaming-Core | | | | | | - | - | | | 2/28/2017 22:42 | 3/5/2017 21:53 | | Juha Korhonen | 21609 | 2590 | Yes | No | Approval |
| 650 | | Yes | approved | 11.3 | RP-170649 | RAN2 CRs to Small Technical Enhancements and Improvements for REL-14 | RAN2 | CR pack | 25.331 | - | - | - | .. | Rel-14 | TEI14 | | | | | | - | - | | | 2/28/2017 22:42 | 3/5/2017 21:53 | | Juha Korhonen | 21609 | 6490 | Yes | No | Approval |
| 651 | | Yes | approved | 14.2.5 | RP-170650 | RAN2 CRs to Approval of CRs to closed Rel-12 WIs (incl. TEI12) | RAN2 | CR pack | - | - | - | - | .. | Rel-12 | EDCH_enh-Core, LTE_SC_enh_dualC-Core, UTRA_DCHenh-Core, UTRA_LTE_WLAN_interw-Core | | | | | | - | - | | | 2/28/2017 22:42 | 3/5/2017 21:53 | | Juha Korhonen | 21609 | 6500 | Yes | No | Approval |
| 652 | | Yes | approved | 14.2.6 | RP-170651 | RAN2 CRs to Approval of CRs to closed Rel-13 WIs (incl. TEI13), part 1 | RAN2 | CR pack | - | - | - | - | .. | Rel-13 | DC_HSUPA_CS-Core, LTE_CA_enh_b5C-Core, LTE_extDRX-Core, LTE_WLAN_radio-Core, UTRA_EDL_L23-Core | | | | | | - | - | | | 2/28/2017 22:42 | 3/5/2017 21:53 | | Juha Korhonen | 21609 | 6510 | Yes | No | Approval |
| 653 | | Yes | approved | 14.2.6 | RP-170652 | RAN2 CRs to Approval of CRs to closed Rel-13 WIs (incl. TEI13), part 2 | RAN2 | CR pack | - | - | - | - | .. | Rel-13 | LTE_MTCe2_L1-Core | | | | | | - | - | | | 2/28/2017 22:42 | 3/5/2017 21:53 | | Juha Korhonen | 21609 | 6520 | Yes | No | Approval |
| 654 | | Yes | approved | 14.2.6 | RP-170653 | RAN2 CRs to Approval of CRs to closed Rel-13 WIs (incl. TEI13), part 3 | RAN2 | CR pack | - | - | - | - | .. | Rel-13 | LTE_MTCe2_L1-Core | | | | | | - | - | | | 2/28/2017 22:42 | 3/5/2017 21:53 | | Juha Korhonen | 21609 | 6530 | Yes | No | Approval |
| 655 | | Yes | approved | 14.2.6 | RP-170654 | RAN2 CRs to Approval of CRs to closed Rel-13 WIs (incl. TEI13), part 4 | RAN2 | CR pack | - | - | - | - | .. | Rel-13 | TEI13 | | | | | | - | - | | | 2/28/2017 22:42 | 3/5/2017 21:53 | | Juha Korhonen | 21609 | 6540 | Yes | No | Approval |
| 656 | | Yes | approved | 14.2.6 | RP-170655 | RAN2 CRs to Approval of CRs to closed Rel-13 WIs (incl. TEI13), part 5 | RAN2 | CR pack | - | - | - | - | .. | Rel-13 | NB_IOT-Core | | | | | | - | - | | | 2/28/2017 22:42 | 3/5/2017 21:53 | | Juha Korhonen | 21609 | 6550 | Yes | No | Approval |
| 657 | | Yes | approved | 14.2.6 | RP-170656 | RAN2 CRs to Approval of CRs to closed Rel-13 WIs (incl. TEI13), part 6 | RAN2 | CR pack | - | - | - | - | .. | Rel-13 | NB_IOT-Core | | | | | | - | - | | | 2/28/2017 22:42 | 3/5/2017 21:53 | | Juha Korhonen | 21609 | 6560 | Yes | No | Approval |
| 658 | flag M | Yes | approved | 14.2.6 | RP-170657 | RAN2 CRs for UP data transfer without CIOT UP optimization (technically endorsed CRs) | RAN2 | CR pack | - | - | - | - | .. | Rel-13 | NB_IOT-Core | | | MCC: RAN has to decide whether to approve this CR set of not; the CRs are intended to align RAN2 specs with CT1/SA2 specs acc. to an SA2 LS S2-170518 = R2-1700719; however no consensus was achieved in RAN2 whether this RAN2 CRs are needed | | | - | - | | | 2/28/2017 22:42 | 3/5/2017 21:53 | | Juha Korhonen | 21609 | 6570 | Yes | No | Approval |
| 659 | | No | withdrawn | 10.3.16 | RP-170658 | RAN2 CRs to Enhancements of NB-IoT, part 2 | RAN2 | CR pack | - | - | - | - | .. | Rel-13 | NB_IOTenh-Core | | | Rel-14 WI, Rel-13 CR | | | - | - | | | 2/28/2017 22:53 | | | Juha Korhonen | 21609 | 3190 | Yes | Yes | Approval |
| 660 | | Yes | noted | 5.2 | RP-170659 | Proposal for RAN2 meeting organization in 2Q | LG Electronics | discussion | - | - | - | - | .. | - | - | | | late input | proposal for RAN2 meeting organization in 2Q:<br>Three parallel sessions for 4 days<br>Two parallel sessions for NR (CP/UP)<br>1.5-day CP/UP common topics<br>2-day CP/UP specific topics<br>0.5-day NR phase II study<br>One parallel session for LTE<br>1.5-day ASN.1 review<br>1.5-day LTE Rel-14 corrections<br>1-day ongoing LTE Rel-15 items<br>Recommendation<br>Do not approve a new LTE Rel-15 items related to RAN2.<br>Alternatively, do not allocate meeting time for new LTE Rel-15 items in 2Q, if approved.<br><br>RAN2 chairman: we discussed whether we should reduce LTE capacity in LTE REL-15 and the answer was a clear no but we can discuss this more during this meeting | | - | - | | | 3/5/2017 21:53 | 3/5/2017 21:53 | | Joern Krause | 12578 | 19500 | Yes | No | Discussion |
| 661 | RAN2 | Yes | revised | 11.1 | RP-170660 | New SI proposal: Study on scheduling enhancements with carrier aggregation for UMTS | Huawei | SID new | - | - | - | - | .. | Rel-15 | - | RP-170719 | | late input; new SI for UMTS only; leading WG: RAN1 | | | - | - | | | 3/5/2017 21:53 | 3/5/2017 21:53 | | Joern Krause | 12578 | 66100 | Yes | No | Approval |



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| | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z | AA | AB | AC | AD | AE | AF | AG |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 662 | motiv | Yes | noted | 11.1 | RP-170661 | Motivation for new SI Study on scheduling enhancements with carrier aggregation for UMTS | Huawei | discussion | - | - | - | - | .. | Rel-15 | - | | | new SI for UMTS only; leading WG: RAN2; late input | | | - | - | | | 3/5/2017 21:53 | 3/5/2017 21:53 | | Joern Krause | 12578 | 66000 | Yes | No | Discussion |
| 663 | | Yes | noted | 10.1.1 | RP-170662 | Positioning enhancements for IoT | Sequans | discussion | - | - | - | - | .. | Rel-15 | - | | | late input | Telecom Italia, Deutsche Telekom: we need to avoid competition between NB-IOT and eMTC | | - | - | | | 3/5/2017 21:53 | 3/5/2017 21:53 | | Joern Krause | 12578 | 1509 | Yes | No | Discussion |
| 664 | RAN1 | Yes | postponed | 9.1 | RP-170663 | New SI: Study on enhanced duplexing for NR | China Telecom, Huawei, HiSilicon | SID new | - | - | - | - | .. | Rel-15 | - | | RP-170317 | new SI for NR; leading WG: RAN1; | | | - | - | | | 2/24/2017 6:56 | 3/6/2017 12:28 | | Xiaoming She | 46899 | 2130 | Yes | No | Approval |
| 665 | motiv | Yes | noted | 9.1 | RP-170664 | Motivation for new SI on enhanced duplexing for NR | China Telecom, Huawei, HiSilicon | discussion | - | - | - | - | .. | Rel-15 | - | | RP-170318 | | | | - | - | | | 2/24/2017 6:57 | 3/6/2017 12:28 | | Xiaoming She | 46899 | 2110 | Yes | No | Discussion |
| 666 | | Yes | revised | 10.2.1 | RP-170665 | Comments on RAN4 Multi-node test for LAA status | CableLabs, Broadcom, Hewlett-Packard Enterprises | discussion | - | - | - | - | .. | Rel-13 | FS_LTE_LAA_multinode_test | RP-170726 | | late input | | | - | - | | | 3/5/2017 21:53 | 3/5/2017 21:53 | | Joern Krause | 12578 | 6650 | Yes | No | Discussion |
| 667 | | Yes | revised | 9 | RP-170666 | Way Forward on the overall 5G NR workplan | Alcatel-Lucent Shanghai-Bell, Alibaba, Apple, AT&T, British Telecom, Broadcom, Convida Wireless, Deutsche Telekom, DOCOMO, Ericsson, Etisalat, Huawei, Intel, KDDI, KT, LG Electronics, LGU+, NEC, Nokia, Ooredoo, Qualcomm, Samsung, Sierra Wireless, SK Telec | discussion | - | - | - | - | .. | Rel-15 | - | RP-170710 | | late input | Telecom Italia: this Tdoc is for eMBB and not for URLLC<br>RAN chair: yes, this will happen separately<br>Samsung: we consider low latency as part of eMBB<br>Orange: we are in general ok with it but we have to consider bands and URLLC as a whole<br>NTT DOCOMO: our workplan is in line with this proposal, we consider common parts until Dec.17<br>Qualcomm: what the proposal is looking for is the baseline and no enhancements<br>Fujitsu: how can bands for standalone and non-standalone separately?<br>Mediatek: it seems companies are not fully agreeing to the proposal<br>ZTE: understands that by Dec.17 RAN1 work for standalone and non-standalone needs to be completed<br>LG: what is clear now is that we will have further work on L1 MIMO after Jan.17<br>Sprint: what is intermediate freeze of ASN.1, got different answers<br>Samsung: L1/L2 should be really frozen in Dec.17<br>RAN4 chair: are bands discussed in RAN4<br>RAN chair: no, we have some Tdocs on this and will come back to the bands for NR | | - | - | | | 3/5/2017 21:53 | 3/6/2017 12:28 | | Joern Krause | 12578 | 6660 | Yes | No | Discussion |
| 668 | | Yes | revised | 9.1 | RP-170667 | Work plan for Rel-15 New Radio access technology WI | NTT DOCOMO, INC. | discussion | - | - | - | - | .. | Rel-15 | - | RP-170794 | RP-170381 | | RAN2 chiar: we need to clarify when majority of RRC parameters are coming from RAN1<br>Huawei: workplan is informative but we should get it correct | | - | - | | | 2/24/2017 8:52 | 3/6/2017 12:28 | | Kazuaki Takeda | 59634 | 1170 | Yes | No | Decision |
| 669 | | Yes | approved | 10.3.9 | RP-170668 | RAN2 CRs to Uplink Capacity Enhancements for LTE | RAN2 | CR pack | - | - | - | - | .. | Rel-14 | LTE_UL_CAP_enh-Core | | | | | | - | - | | | 3/5/2017 21:53 | 3/5/2017 21:53 | | Joern Krause | 12578 | 4190 | Yes | No | Approval |
| 670 | | Yes | noted | 9 | RP-170669 | Discussion on overall WI and SI of R15 | ZTE Corporation | discussion | - | - | - | - | .. | Rel-15 | - | | RP-170385 | | moved from AI 9.1 to AI 9<br>ATT: MIMO is not important?<br>ZTE: we have already a lot of work in NR | | - | - | | | 2/24/2017 8:57 | 3/6/2017 9:18 | | Zhongda Du | 38890 | 2260 | Yes | No | |
| 671 | | Yes | noted | 9 | RP-170670 | Discussion on NR WI and time line | ZTE Corporation | discussion | - | - | - | - | .. | Rel-15 | - | | RP-170384 | | moved from AI 9.1 to AI 9 | | - | - | | | 2/24/2017 8:54 | 3/6/2017 12:28 | | Zhongda Du | 38890 | 3910 | Yes | No | |
| 672 | RAN1 | Yes | postponed | 9.1 | RP-170671 | New SID: Study on NR UE Positioning | CATT | SID new | - | - | - | - | .. | Rel-15 | - | | RP-170406 | new SID for NR; leading WG: RAN1 | | | - | - | | | 2/24/2017 9:22 | 3/6/2017 12:28 | | Haiyang Quan | 35212 | 2025 | Yes | No | Approval |
| 673 | RAN1 | Yes | postponed | 9.1 | RP-170672 | New SID: Study on NR Sidelink Framework | CATT | SID new | - | - | - | - | .. | Rel-15 | - | | RP-170409 | new SID for NR; leading WG: RAN1 | | | - | - | | | 2/24/2017 9:22 | 3/6/2017 12:28 | | Haiyang Quan | 35212 | 2330 | Yes | No | Approval |
| 674 | RAN1 | Yes | not treated | 9.1 | RP-170673 | New SID: Study on UE Wakeup Mechanism in NR | CATT | SID new | - | - | - | - | .. | Rel-15 | - | | RP-170411 | new SID for NR; leading WG: RAN1 | | | - | - | | | 2/24/2017 9:22 | 3/6/2017 12:28 | | Haiyang Quan | 35212 | 2565 | Yes | No | Approval |
| 675 | motiv | Yes | noted | 10.1.1 | RP-170674 | Motivation for new WI: Further Enhancements on Full-Dimension (FD) MIMO for LTE | Samsung | discussion | - | - | - | - | .. | Rel-15 | - | | RP-170170 | | | | - | - | | | 2/23/2017 8:16 | 3/6/2017 12:28 | | Younsun Kim | 43499 | 1910 | Yes | No | Discussion |


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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 676 | | Yes | noted | 9 | RP-170675 | Way Forward on 5G Time Plan | MediaTek Inc. | discussion | - | - | - | - | .. | Rel-15 | - | | | late input | RAN2 chair: we allowed non-backward compatible changes after a freeze of a RELin the past but it requires wide consensus on this<br><br>Qualcomm: Could we integrate the following bullets:<br>- may only apply to NSA deployment scenario Options 3<br>- shall not apply to any of the 5GS deployment scenario Options 2, 4, 5, 7<br>- shall not apply to any Rel-15 feature other than NR Ph1 WID (version approved @RAN#75) and Option 3 enablers. This applies across RAN/SA/CT.<br>of RP-170675 into RP-170666 and then everybody<br>should able to agree to the modified RP-170666<br>OPPO: UE capability part is also essential<br><br>RAN chair: proponents are not so far from each other so work offline to produce a synthesis meeting | | - | - | | | 3/5/2017 21:53 | 3/6/2017 12:28 | | Joern Krause | 12578 | 6690 | Yes | No | |
| 677 | RAN1 | Yes | rejected | 10.1.1 | RP-170676 | New WID: Further enhancements of NB-IoT | Samsung | WID new | - | - | - | - | .. | Rel-15 | - | | | based on RP-170171; new WI for LTE only; leading WI: RAN1 | see RP-170852 instead | | - | - | | | 3/5/2017 21:53 | 3/7/2017 23:55 | | Joern Krause | 12578 | 1096 | Yes | No | Approval |
| 678 | motiv | Yes | noted | 10.1.1 | RP-170677 | Motivation for new WI: Further enhancements of NB-IoT | Samsung | discussion | - | - | - | - | .. | Rel-15 | - | | | based on RP-170172 | | | - | - | | | 3/5/2017 21:53 | 3/7/2017 23:55 | | Joern Krause | 12578 | 1093 | Yes | No | Discussion |
| 679 | RAN1 | Yes | rejected | 10.1.1 | RP-170678 | New WID: Even further enhanced MTC for LTE | Samsung | WID new | - | - | - | - | .. | Rel-15 | - | | | based on RP-170171; new WI for LTE only; leading WI: RAN1; compare RP-170465 | see RP-170732 instead | | - | - | | | 3/5/2017 21:53 | 3/7/2017 23:55 | | Joern Krause | 12578 | 1100 | Yes | No | Approval |
| 680 | motiv | Yes | noted | 10.1.1 | RP-170679 | Motivation for new WI: Even further enhanced MTC for LTE | Samsung | discussion | - | - | - | - | .. | Rel-15 | - | | | based on RP-170172 | | | - | - | | | 3/5/2017 21:53 | 3/7/2017 23:55 | | Joern Krause | 12578 | 1099 | Yes | No | Discussion |
| 681 | RAN1 | Yes | revised | 9.1 | RP-170680 | New SI proposal: Study on 3GPP V2X phase 3 for LTE & NR | LG Electronics | SID new | - | - | - | - | .. | Rel-15 | - | RP-170753 | RP-170238 | new SI for LTE and NR; leading WG: RAN1; | | | - | - | | | 2/23/2017 23:18 | 3/6/2017 14:52 | | Youngwoo Yun | 45048 | 1705 | Yes | No | Approval |
| 682 | RAN1 | Yes | revised | 9.1 | RP-170681 | New SI: Study on 5G Non-Orthogonal Multiple Access | ZTE Corporation | SID new | - | - | - | - | .. | Rel-15 | - | RP-170829 | RP-170383 | new SID for NR; leading WG: RAN1 | | | - | - | | | 2/24/2017 8:53 | 3/6/2017 12:28 | | Zhongda Du | 38890 | 1445 | Yes | No | Approval |
| 683 | RAN1 | Yes | revised | 10.1.1 | RP-170682 | New WID: Further enhancements to Coordinated Multi-Point (CoMP) Operation for LTE | Intel Corporation, ZTE | WID new | - | - | - | - | .. | Rel-15 | - | RP-170750 | RP-170425 | new WI for LTE only; leading WG: RAN1; follow-up WI of SI FS_feCOMP_LTE | | | - | - | | | 2/24/2017 9:26 | 3/7/2017 23:55 | | Seunghee Han | 47329 | 1600 | Yes | No | Approval |
| 684 | RAN1 | Yes | postponed | 10.1.1 | RP-170683 | New SID: Study on LTE vehicular positioning technologies | Intel Corporation | SID new | - | - | - | - | .. | Rel-15 | - | | RP-170427 | new SI for LTE only; leading WG: RAN1; | | | - | - | | | 2/24/2017 9:26 | 3/7/2017 23:55 | | Seunghee Han | 47329 | 1660 | Yes | No | Approval |
| 685 | motiv | Yes | noted | 10.1.1 | RP-170684 | Motivation for new WI: Further enhancements on NB-IoT | ZTE Corporation | discussion | - | - | - | - | .. | Rel-15 | - | | | based on RP-170372 | | | - | - | | | 2/24/2017 8:47 | 3/6/2017 12:28 | | Zhongda Du | 38890 | 1113 | Yes | No | Discussion |
| 686 | RAN1 | Yes | rejected | 10.1.1 | RP-170685 | New WI: Further enhancements on NB-IoT | ZTE Corporation | WID new | - | - | - | - | .. | Rel-15 | - | | | based on RP-170373; new WI for LTE; leading WG: RAN1 | see RP-170852 instead | | - | - | | | 2/24/2017 8:48 | 3/6/2017 12:28 | | Zhongda Du | 38890 | 1116 | Yes | No | Approval |
| 687 | motiv | Yes | noted | 10.1.1 | RP-170686 | Motivation for new WI: Even further enhanced MTC for LTE | ZTE Corporation | discussion | - | - | - | - | .. | Rel-15 | - | | | based on RP-170372 | | | - | - | | | 2/24/2017 8:47 | 3/6/2017 12:28 | | Zhongda Du | 38890 | 1119 | Yes | No | Discussion |
| 688 | RAN1 | Yes | rejected | 10.1.1 | RP-170687 | New WI: Even further enhanced MTC for LTE | ZTE Corporation | WID new | - | - | - | - | .. | Rel-15 | - | | | based on RP-170373; new WI for LTE; leading WG: RAN1 | see RP-170732 instead | | - | - | | | 2/24/2017 8:48 | 3/6/2017 12:28 | | Zhongda Du | 38890 | 1120 | Yes | No | Approval |
| 689 | | Yes | not treated | 9.1 | RP-170688 | New SI: Study on Integrated Access and Backhaul for NR | AT&T | SID new | - | - | - | - | .. | Rel-15 | - | | RP-170148 | | | | - | - | - | - | 3/6/2017 8:52 | 3/6/2017 12:28 | - | | | 2231 | Yes | No | Approval |
| 690 | | Yes | revised | 9.1 | RP-170689 | New SI: Study on NR to support Non-Terrestrial Networks | THALES | SID new | - | - | - | - | .. | Rel-15 | - | RP-170709 | RP-170132 | new SI for NR; leading WG: RAN1; | | | - | - | - | - | 3/6/2017 8:55 | 3/6/2017 12:28 | - | | | 1412 | Yes | No | Approval |
| 691 | | Yes | approved | 4 | RP-170690 | Report of RAN #74 held in Vienna, Austria, 05.12.-08.12.2016 | ETSI MCC | report | - | - | - | - | .. | - | - | | RP-170002 | | | | - | - | - | - | 3/6/2017 9:12 | 3/12/2017 18:41 | - | | | 19361 | Yes | No | Approval |
| 692 | RAN3 | Yes | approved | 10.3.15 | RP-170691 | OTDOA Enhancements for FeMTC | Ericsson | CR | 36.455 | 73 | 1 | B | 14.0.0 | Rel-14 | LTE_feMTC-Core | | RP-170517 | company CR; late RAN3 impact discovered; discussion on the RAN3 reflector; CR is povided to finalize RAN3 part of the WI (so CR was not seen by RAN3 in Athens and a revised WID is provided in RP-170532) | | | - | - | - | - | 3/6/2017 9:27 | 3/6/2017 12:28 | - | | | 5321 | Yes | No | Approval |
| 693 | | Yes | postponed | 9.1 | RP-170692 | New SID on Study on NR/non-3GPP integration, interworking and aggregation | Intel Corporation | SID new | - | - | - | - | .. | Rel-15 | - | | RP-170332 | | | | - | - | - | - | 3/6/2017 9:29 | 3/7/2017 23:55 | - | | | 1910 | Yes | No | Approval |


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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 694 | | Yes | postponed | 9.1 | RP-170693 | New SID on Study on Ultra-Reliable and Low Latency Communications with New Radio | Ericsson LM | SID new | - | - | - | - | .. | Rel-15 | - | | RP-170116 | | | | - | - | - | - | 3/6/2017 9:54 | 3/6/2017 12:28 | - | | | 1320 | Yes | No | Approval |
| 695 | | Yes | revised | 10.1.1 | RP-170694 | New WI: Highly Reliable Low Latency Communication for LTE | Ericsson LM | WID new | - | - | - | - | .. | Rel-15 | - | RP-170796 | RP-170119 | new WI for LTE; leading WG: RAN1; WI code to be used: LTE_HRLLC; | | | - | - | - | - | 3/6/2017 9:55 | 3/7/2017 23:55 | - | | | 1800 | Yes | No | Approval |
| 696 | | Yes | noted | 9.1 | RP-170695 | Way forward on UL spectrum sharing of LTE and NR | Huawei, Telefonica, CMCC, China Telecom, China Unicom, Orange, Coolpad | discussion | - | - | - | - | .. | Rel-15 | - | | | related to RP-170488 | Sprint: we are against this for REL-15 | | - | - | | | 3/6/2017 10:12 | 3/7/2017 23:55 | - | | | 2392 | Yes | No | discussion |
| 697 | | Yes | postponed | 9.1 | RP-170696 | New Study Item Proposal: Study on Self-Organising Networks in New Radio | China Mobile Com. Corporation | SID new | - | - | - | - | .. | Rel-15 | - | | RP-170335 | | | | - | - | - | - | 3/6/2017 10:15 | 3/7/2017 23:55 | - | | | 2615 | Yes | No | Approval |
| 698 | motiv | Yes | noted | 9.1 | RP-170697 | Motivation for new SI Study on Self-Organising Networks in New Radio | CMCC | discussion | - | - | - | - | .. | Rel-15 | - | | | related to RP-170697 | | | - | - | | | 3/6/2017 11:02 | 3/7/2017 23:55 | - | | | 2611 | Yes | No | discussion |
| 699 | | Yes | noted | 10.4.3 | RP-170698 | LS on Definition of Wide hand Phantom within 3GPP for use in Antenna Performance measurements (GSMA_LS_170222; to: RAN, RAN4; cc: CTIA OTA WG, GCF SG; contact: China Unicom) | GSMA | LS in | - | - | - | - | .. | Rel-14 | LTE_UTRA_TRP_TRS-Core | | | LS arrived on 08.03.2017 during RAN #75 | conclusion: no LS answer | GSMA_LS_170222 | - | - | | | 3/6/2017 11:10 | 3/8/2017 6:35 | - | | | 2210 | Yes | No | discussion |
| 700 | | Yes | revised | 7 | RP-170699 | Draft reply LS to IEEE802.11-16_1573r4 = RP-170026 to on Requesting status and technical information on radio-level integration between 3GPP and 802.11 systems (to: IEEE 802.11 WG; cc:-; contact: Intel) | Intel | LS out | - | - | - | - | .. | - | - | RP-170849 | | | problems to download this file | | IEEE 802.11 WG | - | RP-170026 | | 3/6/2017 11:10 | 3/9/2017 19:01 | - | | | 261 | Yes | No | approval |
| 701 | | Yes | approved | 7 | RP-170700 | Reply LS to ITU-T SG15/COM 15-LS405-E = RP-161984 on Requirements for mobile backhaul/fronthaul in a G.fast Deployment Environment (to: ITU-T SG15; cc: -; contact: Nokia) | RAN | LS out | - | - | - | - | .. | Rel-14 | FS_NR_new RAT | | RP-170479 | | | | | ITU-T SG15 | - | ITU-T SG15/COM 15-LS405-E = RP-161984 | - | 3/6/2017 11:16 | 3/6/2017 12:28 | - | | | 5481 | Yes | No | Approval |
| 702 | | Yes | rejected | 9.1 | RP-170701 | New SID: Study on NR vehicular services | Intel Corporation | SID new | - | - | - | - | .. | Rel-15 | - | | RP-170420 | | see RP-170837 instead | | - | - | - | - | 3/6/2017 11:47 | 3/7/2017 23:55 | - | | | 1810 | Yes | No | Approval |
| 703 | | Yes | revised | 9.1 | RP-170702 | New SID: Study on NR positioning technologies | Intel Corporation | SID new | - | - | - | - | .. | Rel-15 | - | RP-170743 | RP-170422 | | | | - | - | - | - | 3/6/2017 11:48 | 3/7/2017 23:55 | - | | | 2090 | Yes | No | Approval |
| 704 | RAN2 | Yes | approved | 11.1 | RP-170703 | New WID on DL interference mitigation for UMTS | Qualcomm Incorporated | WID new | - | - | - | - | .. | Rel-15 | - | | RP-170256 | new WI for UMTS only; leading WG: RAN2 | | | - | - | - | - | 3/6/2017 11:49 | 3/7/2017 23:55 | - | | | 2571 | Yes | No | Approval |
| 705 | RAN5 | Yes | approved | 13.1 | RP-170704 | New WID on UE Conformance Test Aspects - 4 Rx antenna ports with CA for LTE DL | Ericsson | WID new | - | - | - | - | .. | Rel-14 | - | | RP-170496 | new WI for LTE; leading WG: RAN5; tested: REL-14 LTE_4Rx_AP_DL_CA-Core; WI code to be used: LTE_4Rx_AP_DL_CA-UEConTest; | RAN5 chair: this was not endorsed in RAN5; Ericsson: RAN4 performance part is done and it was also circulated on the RAN5 reflector | | - | - | - | - | 3/6/2017 11:51 | 3/6/2017 12:28 | - | | | 4961 | Yes | No | Approval |
| 706 | | Yes | noted | 9.1 | RP-170705 | Outcomes of RAN3 discussions on RAN Low Layer Splits for NR | Ericsson, Huawei, Nokia , HiSilicon, Alcatel Lucent Shanghai Bell, InterDigital | discussion | - | - | - | - | .. | - | - | | | | NTT DOCOMO: this was a late paper and we should not treat it<br>ZTE: disagrees with this Tdoc<br>RAN3 chair: as some companies are strongly against a WI we should discuss a SI | | - | - | | | 3/6/2017 11:57 | 3/6/2017 12:28 | - | | | 1395 | Yes | No | discussion |
| 707 | | Yes | noted | 10.3.21 | RP-170706 | WI summary for "Enhanced LTE WLAN Radio Level Integration with IPsec Tunnel (eLWIP)" | Nokia | WI summary | - | - | - | - | .. | Rel-14 | LTE_WLAN_eLWIP-Core | | | | | | - | - | | | 3/6/2017 12:19 | 3/7/2017 23:55 | - | | | 70600 | Yes | No | discussion |
| 708 | | Yes | postponed | 9.1 | RP-170707 | New SI proposal: Study on flexible and full duplex for NR | LG Electronics | SID new | - | - | - | - | .. | Rel-15 | - | | RP-170240 | | | | - | - | - | - | 3/6/2017 12:37 | 3/6/2017 14:52 | - | | | 2200 | Yes | No | Approval |
| 709 | | Yes | noted | 10.14.1 | RP-170708 | Status report for SI: Further Enhancements LTE Device to Device, UE to Network Relays for IoT and Wearables; rapporteur: Huawei | RAN2 | WI status report | - | - | - | - | .. | Rel-15 | FS_feD2D_IoT_relay_wearable | | RP-170294 | | conclusion: noted; approved: 35%, Sep.17 | | - | - | - | - | 3/6/2017 12:39 | 3/7/2017 23:55 | - | | | 2941 | Yes | No | - |
| 710 | | Yes | revised | 9.1 | RP-170709 | New SI: Study on NR to support Non-Terrestrial Networks | THALES | SID new | - | - | - | - | .. | Rel-15 | - | RP-170717 | RP-170689 | new SI for NR; leading WG: RAN1; | Qualcomm: not sure what should be the outcome apart from a new channel model<br>Ericsson: not so clear what the deployment scenario is (BS in the air, mobile on the ground?)<br>RAN chair: can be a first bullet to study the deployment scenarios<br>Fujitsu: link budgets expected as outcome of SI | | - | - | - | - | 3/6/2017 14:17 | 3/7/2017 23:55 | - | | | 1413 | Yes | No | Approval |

| | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z | AA | AB | AC | AD | AE | AF | AG |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 711 | | Yes | revised | 9 | RP-170710 | Way Forward on the overall 5G NR workplan | Alcatel-Lucent Shanghai-Bell, Alibaba, Apple, AT&T, British Telecom, Broadcom, Convida Wireless, Deutsche Telekom, DOCOMO, Ericsson, Etisalat, Huawei, Intel, KDDI, KT, LG Electronics, LGU+, NEC, Nokia, Ooredoo, Qualcomm, Samsung, Sierra Wireless, SK Telec | discussion | - | - | - | - | .. | Rel-15 | - | RP-170741 | RP-170666 | | Mediatek: prefers version instead of freeze<br>Ericsson: prefers to keep "freeze" as this is a well defined process<br>RAN chair: what about "implementable version with frozen ASN.1"<br>Mediatek: would like to go offline<br>Qualcomm: then we should see a Tdoc from Mediatek to see what the proposal is<br>Vodafone, RAN1 chair: would prefer to decide now to avoid further offline discussion<br>Mediatek: we had no agreement in the offline discussion and we were surprised that this Tdoc is treated now (Tue morning)<br>Qualcomm: so offline discussion in the morning coffee break of Tue<br>RAN chair: we will come back on Tue evening | | - | - | - | - | 3/6/2017 14:20 | 3/7/2017 23:55 | - | | | 6661 | Yes | No | Discussion |
| 712 | | Yes | withdrawn | 13.5.6 | RP-170711 | Void | Huawei | WI status report | - | - | - | - | .. | Rel-14 | NB_IOT-UEConTest | | RP-170366 | | wrong Tdoc request | | - | - | - | - | 3/6/2017 14:22 | 3/7/2017 23:55 | - | | | 821 | Yes | Yes | - |
| 713 | | Yes | revised | 10.3.16 | RP-170712 | WI exception request for Core part: Enhancements of NB-IoT | RAN1 | WI exception request | - | - | - | - | .. | Rel-14 | NB_IOTenh-Core | RP-170842 | RP-170290 | | | | - | - | - | - | 3/6/2017 14:23 | 3/8/2017 22:22 | - | | | 6371 | Yes | No | Approval |
| 714 | flag M | Yes | noted | 10.3.20 | RP-170713 | Status report of WI: Requirements for a new UE category with single receiver based on Category 1 for LTE; rapporteur Qualcomm Incorporated | RAN4 | WI status report | - | - | - | - | .. | Rel-14 | LTE_UE_cat_1RX | | RP-170389 | | MCC: previous version was flagged by Ericsson<br><br>conclusion: noted; approved: Core: 95%, June 17; Perf.: 70%, Sep.17 | | - | - | - | - | 3/6/2017 14:28 | 3/9/2017 14:00 | - | | | 3891 | Yes | No | - |
| 715 | | Yes | revised | 9.1 | RP-170714 | New SID: Study of test methods for New Radio | Intel Corporation | SID new | - | - | - | - | .. | Rel-15 | - | RP-170748 | RP-170282 | | | | - | - | - | - | 3/6/2017 14:39 | 3/6/2017 14:52 | - | | | 2622 | Yes | No | Approval |
| 716 | | Yes | revised | 10.1.2 | RP-170715 | New WID: Enhancing LTE CA Utilization | Nokia, Alcatel-Lucent Shanghai Bell | WID new | - | - | - | - | .. | Rel-15 | - | RP-170805 | RP-170447 | new WI for LTE; leading WG: RAN2 | | | - | - | - | - | 3/6/2017 15:06 | 3/7/2017 23:55 | - | | | 3971 | Yes | No | Approval |
| 717 | | Yes | noted | 10.3.4 | RP-170716 | On the Completion of Light Connection | Nokia, Alcatel-Lucent Shanghai Bell | discussion | - | - | - | - | .. | Rel-14 | - | | RP-170470 | | | | - | - | - | - | 3/6/2017 15:09 | 3/7/2017 23:55 | - | | | 2921 | Yes | No | Decision |
| 718 | RAN1 | Yes | approved | 9.1 | RP-170717 | New SI: Study on NR to support Non-Terrestrial Networks | THALES | SID new | - | - | - | - | .. | Rel-15 | - | | RP-170709 | new SI for NR; leading WG: RAN1; | | | - | - | - | 3/6/2017 17:12 | 3/9/2017 19:01 | - | | | 1420 | Yes | No | Approval |
| 719 | | No | withdrawn | 10.1.1 | RP-170718 | New WI: Further enhancements of NB-IoT | Ericsson LM; Qualcomm | WID new | - | - | - | - | .. | - | - | | RP-170507 | | | | - | - | - | - | 3/6/2017 17:14 | | - | | | 1070 | No | Yes | Approval |
| 720 | RAN1 | Yes | approved | 11.1 | RP-170719 | New SI proposal: Study on scheduling enhancements with carrier aggregation for UMTS | Huawei | SID new | - | - | - | - | .. | Rel-15 | - | | RP-170660 | new SI for UMTS only; leading WG: RAN1 | Nokia: wants to come back later on this | | - | - | - | - | 3/6/2017 17:18 | 3/7/2017 23:55 | - | | | 66101 | Yes | No | Approval |
| 721 | | Yes | not treated | 10.1.1 | RP-170720 | New Work Item on Further enhancements for dedicated eMBMS in LTE | Qualcomm | WID new | - | - | - | - | .. | Rel-15 | - | | | new WI for LTE only; leading WG: RAN1 | only 1 supporting company | | - | - | | | 3/7/2017 7:01 | 3/7/2017 23:55 | - | | | 72000 | Yes | No | Approval |
| 722 | | Yes | noted | 10.2.1 | RP-170721 | Way forward on RAN4 multi-node tests SI | Qualcomm | discussion | - | - | - | - | .. | Rel-13 | FS_LTE_LAA_multinode_test | | | | RAN chair: we committed ourself to do this work, so an ad hoc may be an option<br>RAN4 chair: 1TU for online and 1TU for offline session was used but there was a blocking situation<br>Nokia: confirms that this work is important and should be solved as soon as possible and if we agree on an ad hoc then we should also come out with a solution<br>RAN chair: heard also that people do not focus on this topic so an ad hoc may help<br>Broadcom: would like to have a deadline<br>RAN chair: target dates are our deadlines<br>Ericsson: there is already an NR ad hoc in next quarter<br>Orange: prefers to have time allocated in main meeting and not to have ad hocs with a limited number of people<br>RAN4 chair: we can try to solve the problem in next RAN4 meetings and if this does not get solved there we will have an extra ad hoc<br>RAN chair: seems to be useful; target date is June 2017<br>Nokia: company should come prepared and with a constructive attitude<br>ZTE: could extend June ad hoc by 1 day<br><br>conclusion: evening ad hoc in RAN4 in April (if no online time for this topic), afterwards decision whether RAN4 ad hoc for this topic at the end of Q2/2017 is needed | | - | - | | | 3/7/2017 7:06 | 3/7/2017 23:55 | - | | | 6651 | Yes | No | discussion |

| | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z | AA | AB | AC | AD | AE | AF | AG |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 723 | | Yes | revised | 10.1.1 | RP-170722 | New WID: UE Positioning Accuracy Enhancements for LTE | Nokia, Alcatel-Lucent Shanghai Bell | WID new | - | - | - | - | .. | Rel-15 | - | RP-170813 | RP-170244 | new WI for LTE only; leading WI: RAN2 | MCC: leading WG changed from RAN1 to RAN2 | | - | - | - | - | 3/7/2017 7:09 | 3/8/2017 22:22 | - | | | 1942 | Yes | No | Approval |
| 724 | | Yes | revised | 10.1.1 | RP-170723 | New WID: Enhancements to LTE operation in unlicensed spectrum | Nokia, Ericsson, Qualcomm, Intel | WID new | - | - | - | - | .. | Rel-15 | - | RP-170814 | RP-170246 | new WI for LTE only; leading WI: RAN1 | | | - | - | - | - | 3/7/2017 7:10 | 3/8/2017 22:22 | - | | | 1740 | Yes | No | Approval |
| 725 | | Yes | revised | 10.1.1 | RP-170724 | New WI proposal: Enhancements on LTE-based V2X Services | Huawei, CATT, LGE, HiSilicon | WID new | - | - | - | - | .. | Rel-15 | - | RP-170798 | RP-170483 | new WI for LTE only; leading WG: RAN1; WI code to be used: LTE_eV2X; follow-up WI of REL-14 WI LTE_V2X: | | | - | - | - | - | 3/7/2017 7:11 | 3/7/2017 23:55 | - | | | 1700 | Yes | No | Approval |
| 726 | | Yes | rejected | 11.1 | RP-170725 | New SI proposal: Study on a simplified HS-SCCH for UMTS | Ericsson | SID new | - | - | - | - | .. | Rel-15 | - | | RP-170520 | | note: After RAN #75, MCC indicated that this SI has no TR impact and no target date to add the SI into the workplan (rapporteurs were reminded multiple times in the meeting and via the RAN reflector that basic requirements for new WIs/SIs to respect 3GPP working procedures must to be fulfilled).<br>RAN chair insisted to keep the SI approved with target date RAN #76. The missing TR has to be clarified in a SID revision at RAN #76. | | - | - | - | - | 3/7/2017 7:14 | 3/7/2017 23:55 | - | | | 5201 | Yes | No | Approval |
| 727 | | Yes | noted | 10.2.1 | RP-170726 | Comments on RAN4 Multi-node test for LAA status | CableLabs, Broadcom, Hewlett-Packard Enterprises, Brocade | discussion | - | - | - | - | .. | Rel-13 | FS_LTE_LAA_multinode_test | | RP-170665 | | presented by Broadcom with 3 requests regarding this multi-node testing SI:<br>1. The tests shall be mandatory.<br>2. The work shall be allocated more time and prioritized.<br>3. There shall be a clear timeline and end date. | | - | - | - | - | 3/7/2017 7:15 | 3/7/2017 23:55 | - | | | 72100 | Yes | No | Discussion |
| 728 | | Yes | revised | 10.1.5 | RP-170727 | New Work Item on V2X new band combinations for LTE | LG Electronics Inc. | WID new | - | - | - | - | .. | Rel-15 | - | RP-170752 | RP-170151 | new WI for LTE; leading WG: RAN4; | | | - | - | - | - | 3/7/2017 7:17 | 3/7/2017 23:55 | - | | | 1511 | Yes | No | Approval |
| 729 | | Yes | revised | 10.1.3 | RP-170728 | New WID: Architecture Evolution for E-UTRAN | China Unicom, Orange, Huawei,HiSilicon | WID new | - | - | - | - | .. | Rel-15 | - | RP-170785 | RP-170262 | | | | - | - | - | - | 3/7/2017 7:18 | 3/7/2017 23:55 | - | | | 2621 | Yes | No | Approval |
| 730 | | Yes | noted | 10.1.3 | RP-170729 | Motivation for WI on Architecture Evolution for E-UTRAN | China Unicom, Orange, Huawei, HiSilicon | discussion | - | - | - | - | .. | Rel-15 | - | | RP-170265 | | | | - | - | - | - | 3/7/2017 7:18 | 3/7/2017 23:55 | - | | | 2651 | Yes | No | Discussion |
| 731 | | Yes | revised | 10.1.2 | RP-170730 | New WI proposal: LTE connectivity to 5G-CN | Huawei, Ericsson | WID new | - | - | - | - | .. | Rel-15 | - | RP-170782 | RP-170485 | new WI for LTE only; leading WG: RAN2; | | | - | - | - | - | 3/7/2017 7:20 | 3/7/2017 23:55 | - | | | 4852 | Yes | No | Approval |
| 732 | | Yes | postponed | 10.1.2 | RP-170731 | New WI proposal: carrier aggregation in unsynchronized networks for LTE | Huawei, HiSilicon | WID new | - | - | - | - | .. | Rel-15 | - | | RP-170481 | | | | - | - | - | - | 3/7/2017 7:21 | 3/7/2017 23:55 | - | | | 4320 | Yes | No | Approval |
| 733 | RAN1 | Yes | approved | 10.1.1 | RP-170732 | New WI: Even further enhanced MTC for LTE | Ericsson | WID new | - | - | - | - | .. | Rel-15 | - | | RP-170465 | new WI for LTE; leading WG: RAN1; WI code to be used: LTE_eMTC4 | Huawei: has a problem with this proposal, there 2 technologies which are optimized for their areas; we could approve both MTC and NB-IOT WIs with removing a sentence<br>ATT: MTC will still not cover the whole NB-IOT use cases<br>Nokia: prefers to enhance both technologies<br>RAN chair: the 732 & 836<br>Huawei: sustains objection on approval of 732<br>RAN chair: then we do not approve both<br>Nokia: can we have a working agreement?<br><br>conclusion: RP-170732 & revised RP-170836 (to clarify rapporteur) in RP-170852 are approved with one working agreement | | - | - | - | - | 3/7/2017 7:24 | 3/9/2017 19:01 | - | | | 1001 | Yes | No | Approval |
| 734 | | No | withdrawn | 10.1.1 | RP-170733 | Motivation for New WI on Even further enhanced MTC for LTE | Ericsson | discussion | - | - | - | - | .. | Rel-15 | - | | RP-170466 | | | | - | - | - | - | 3/7/2017 7:24 | | - | | | 1011 | Yes | Yes | Discussion |
| 735 | | Yes | revised | 8.3 | RP-170734 | Draft Reply to ITU-R WP5D/TEMP/255r1 = RP-170046 on the schedule for updating Recommendation ITU-R M.1457 to revision 14 (to: SA; cc: -; contact: Telecom Italia) | Telecom Italia | LS out | - | - | - | - | .. | - | - | RP-170762 | | | | | SA | - | RP-170046 | | 3/7/2017 8:07 | 3/8/2017 8:22 | - | | | 461 | Yes | No | approval |
| 736 | | Yes | approved | 9.2.1 | RP-170735 | pCR for TR38.912 | NTT DOCOMO, INC. | pCR | 38.912 | - | - | - | 0.0.2 | Rel-14 | FS_NR_new RAT | | RP-170378 | | | | - | - | - | - | 3/7/2017 9:21 | 3/9/2017 19:01 | - | | | 1011 | Yes | No | Approval |
| 737 | | Yes | withdrawn | 9.2.1 | RP-170736 | TP for TR 38.912: Radio transmission/reception | NTT DOCOMO INC. | pCR | 38.912 | - | - | - | 0.0.2 | Rel-14 | FS_NR_new RAT | | RP-170433 | | withdrawn as captured in RP-170735 | | - | - | - | - | 3/7/2017 9:21 | 3/9/2017 14:22 | - | | | 1031 | Yes | Yes | Approval |
| 738 | RAN1 | Yes | approved | 9.2.1 | RP-170737 | TR 38.901 v1.0.1 Study on channel model for frequencies from 0.5 to 100 GHz | Samsung | draft TR | 38.901 | - | - | - | 1.0.0 | Rel-14 | FS_NR_new RAT | | RP-170394 | RAN1 TR 38.901 is provided for 1-step approval; | conclusion: approved as REL-14 TR | | - | - | - | - | 3/7/2017 9:22 | 3/7/2017 23:55 | - | | | 3940 | Yes | No | Approval |
| 739 | RAN | Yes | approved | 9.2.1 | RP-170738 | TR 38.805 v1.0.0 "Study on New Radio Access Technology; 60 GHz Unlicensed Spectrum" | Nokia Corporation | draft TR | 38.805 | - | - | - | 1.0.0 | Rel-14 | FS_NR_new RAT | | | RAN TR for 1-step approval | conclusion: approved as REL-14 TR | | - | - | - | - | 3/7/2017 9:29 | 3/9/2017 9:12 | - | | | 4895 | Yes | No | Agreement |


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| | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z | AA | AB | AC | AD | AE | AF | AG |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 740 | | Yes | postponed | 10.1.1 | RP-170739 | New WI proposal: Further MIMO enhancements for LTE | Huawei, HiSilicon | WID new | - | - | - | - | .. | Rel-15 | - | | RP-170348 | | | | - | - | - | - | 3/7/2017 10:29 | 3/7/2017 23:55 | - | | | 1931 | Yes | No | Approval |
| 741 | RAN4 | Yes | approved | 10.1.5 | RP-170740 | New WI: US 600 MHz Band for LTE | T-Mobile USA Inc. | WID new | - | - | - | - | .. | Rel-15 | - | | RP-170051 | new WI for LTE; leading WG: RAN4 | note: Rapporteur confirmed that the new TR is created by the Core part WI. | | - | - | - | - | 3/7/2017 10:30 | 3/7/2017 23:55 | - | | | 511 | Yes | No | Approval |
| 742 | | Yes | endorsed | 9 | RP-170741 | Way Forward on the overall 5G NR workplan | Alcatel-Lucent Shanghai-Bell, Alibaba, Apple, AT&T, British Telecom, Broadcom, Convida Wireless, Deutsche Telekom, DOCOMO, Ericsson, Etisalat, Huawei, Intel, KDDI, KT, LG Electronics, LGU+, NEC, Nokia, Ooredoo, Qualcomm, Samsung, Sierra Wireless, SK Telec | discussion | - | - | - | - | .. | Rel-15 | - | | RP-170710 | | RAN chair: will be sent to joint RAN-SA session on Wed | | - | - | - | - | 3/7/2017 10:31 | 3/7/2017 23:55 | - | | | 6662 | Yes | No | Discussio n |
| 743 | RAN2 | Yes | revised | 10.1.2 | RP-170742 | New SID on Study on enhanced LTE Support for Aerial Vehicles | NTT DOCOMO, INC., Ericsson | SID new | - | - | - | - | .. | Rel-15 | - | RP-170779 | RP-170156 | new SI for LTE only; leading WG: RAN2 | | | - | - | - | - | 3/7/2017 10:38 | 3/7/2017 23:55 | - | | | 4342 | Yes | No | Approval |
| 744 | | Yes | postponed | 9.1 | RP-170743 | New SID: Study on NR positioning support | Intel Corporation | SID new | - | - | - | - | .. | Rel-15 | - | | RP-170702 | | | | - | - | - | - | 3/7/2017 10:43 | 3/9/2017 19:01 | - | | | 2091 | Yes | No | Approval |
| 745 | | Yes | revised | 10.1.1 | RP-170744 | New WI proposal: Further NB-IoT enhancements | Huawei, HiSilicon | WID new | - | - | - | - | .. | Rel-15 | - | RP-170836 | RP-170336 | new WI for LTE only; leading WG: RAN1; WI code to be used: NB_IOTenh2- | | | - | - | - | - | 3/7/2017 11:06 | 3/9/2017 19:01 | - | | | 1040 | Yes | No | Informatio n |
| 746 | | Yes | revised | 9.1 | RP-170745 | New WID on New Radio Access Technology | NTT DOCOMO, INC. | WID new | - | - | - | - | .. | Rel-15 | - | RP-170777 | RP-170380 | new WI for NR only; leading WG: RAN1 | | | - | - | - | - | 3/7/2017 11:47 | 3/8/2017 22:22 | - | | | 21 | Yes | No | Approval |
| 747 | | Yes | revised | 9.1 | RP-170746 | Way forward for Integrated access and Backhaul | ATT | discussion | - | - | - | - | .. | - | - | RP-170760 | | related to RP-170148, RP-170688, RP-170217 | | | - | - | | | 3/7/2017 11:52 | 3/7/2017 23:55 | - | | | 2243 | Yes | No | discussio n |
| 748 | | No | withdrawn | 10.1.4 | RP-170747 | New WI Proposal: Enhanced CRS and SU-MIMO Interference Mitigation Performance Requirements for LTE | Intel | WID new | - | - | - | - | .. | Rel-15 | - | | RP-170271 | | | | - | - | - | - | 3/7/2017 15:49 | | - | | | 2670 | No | Yes | Approval |
| 749 | | Yes | revised | 9.1 | RP-170748 | New SID: Study of test methods for New Radio | Intel Corporation | SID new | - | - | - | - | .. | Rel-15 | - | RP-170817 | RP-170714 | | | | - | - | - | - | 3/7/2017 15:49 | 3/8/2017 22:22 | - | | | 2623 | Yes | No | Approval |
| 750 | | No | withdrawn | 9.1 | RP-170749 | Way forward on Uplink channel sharing NR-LTE in Rel-15 | Vodafone | discussion | - | - | - | - | .. | - | - | | | related to RP-170695 | | | - | - | | | 3/7/2017 16:39 | | - | | | 2395 | No | Yes | discussio n |
| 751 | RAN1 | Yes | approved | 10.1.1 | RP-170750 | New WID: Further enhancements to Coordinated Multi-Point (CoMP) Operation for LTE | Intel Corporation, ZTE | WID new | - | - | - | - | .. | Rel-15 | - | | RP-170682 | new WI for LTE only; leading WG: RAN1; follow-up WI of SI FS_feCOMP_LTE | | | - | - | - | - | 3/7/2017 22:53 | 3/9/2017 19:01 | - | | | 1601 | Yes | No | Approval |
| 752 | | Yes | not treated | 9.1 | RP-170751 | Way forward on on new Study Item on multi antenna enhancements for NR | Mitsubishi Electric, Nokia, Alcatel-Lucent Shanghai Bell, Telefonica, IITH, CEWiT, IITM, Tejas Networks, Reliance Jio | discussion | - | - | - | - | .. | Rel-15 | - | | | related to RP-170364 | | | - | - | | | 3/7/2017 23:06 | 3/8/2017 22:22 | - | | | 2510 | Yes | No | discussio n |
| 753 | RAN4 | Yes | approved | 10.1.5 | RP-170752 | New Work Item on V2X new band combinations for LTE | LG Electronics Inc. | WID new | - | - | - | - | .. | Rel-15 | - | | RP-170727 | new WI for LTE; leading WG: RAN4; | | | - | - | - | - | 3/7/2017 23:12 | 3/9/2017 14:00 | - | | | 1512 | Yes | No | Approval |
| 754 | | No | withdrawn | 9.1 | RP-170753 | New SI proposal: Study on 3GPP V2X phase 3 for LTE & NR | LG Electronics | SID new | - | - | - | - | .. | Rel-15 | - | | RP-170680 | | | | - | - | - | - | 3/7/2017 23:14 | | - | | | 1706 | Yes | Yes | Approval |
| 755 | | Yes | endorsed | 9.1 | RP-170754 | Guideline for RAN4 work for NR bands/band combinations | NTT DOCOMO INC. | discussion | - | - | - | - | .. | Rel-15 | - | | | related to RP-170443 | | | - | - | - | - | 3/7/2017 23:15 | 3/9/2017 14:00 | - | | | 2381 | Yes | No | Approval |
| 756 | | Yes | endorsed | 9.1 | RP-170755 | Way forward on RAN4 NR Ad Hoc meetings | NTT DOCOMO INC. | discussion | - | - | - | - | .. | Rel-15 | - | | | related to RP-170440 | | | - | - | - | - | 3/7/2017 23:18 | 3/9/2017 14:00 | - | | | 2491 | Yes | No | Approval |



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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 757 | | Yes | revised | 9.1 | RP-170756 | Process for NR bands and LTE-NR band combinations specification work | NTT DOCOMO | discussion | - | - | - | - | .. | Rel-15 | - | RP-170826 | | related to RP-170380 | Huawei: one band for NR-LTE coexistence should be defined as new NR band; guidance should cover whole REL-15 for NR;<br>NTT DOCOMO: not aware of such an agreement<br>RAN chair: but it seems the rest is stable?<br>CMCC: would like to add another note<br>RAN4 chair: we could have a placeholder for the band and discuss this then further<br><br>Deutsche Telekom: revealing business plans is not useful on slide 3<br>RAN4 chair: was agreed in the past<br>RAN chair: but it says "taking into account deployment plan, spectrum holding possibility, regional/national regulatory requirements, global harmonization and implementation feasibility"<br>T-Mobile USA: agrees with Deutsche Telekom<br>TeliaSonera: "based on operator needs and requirements" would be better<br>Telecom Italia: supports TeliaSonera<br>Vodafone: also worried about the sentence as in some countries an exchange of deployment plans may have legal implications<br>RAN chair: maybe we better remove the whole bullet<br>RAN4 chair: do not remove the bullet but just "deployment plan" otherwise the rest has no sense<br>Deutsche Telekom: we cannot accept based on market needs but we could accept based on | | - | - | | | 3/7/2017 23:20 | 3/9/2017 14:00 | - | | | 500 | Yes | No | discussion |
| 758 | | Yes | revised | 8.2 | RP-170757 | Draft Reply LTI to ITU-R WP5D 5D/TEMP/279 = RP-170044 and ITU-R WP5D 5D/TEMP/287 = RP-170045 on Further information on the invitation for submission of proposals for candidate radio interface technologies for the terrestrial components of the radio interface(s) for IMT-2020 and invitation to participate in their subsequent evaluation (to: SA; cc:-; contact: Telecom Italia) | Telecom Italia | LS out | - | - | - | - | .. | - | - | RP-170761 | | | | | ITU-R WP5D | - | RP-170044, RP-170045 | | 3/7/2017 23:32 | 3/8/2017 8:22 | - | | | 19830 | Yes | No | approval |
| 759 | | Yes | not treated | 9.1 | RP-170758 | Uplink Coverage Analysis of LTE and NR | Qualcomm | discussion | - | - | - | - | .. | Rel-15 | - | | | related to RP-170444 | | | - | - | | | 3/7/2017 23:46 | 3/8/2017 8:22 | - | | | 1100 | Yes | No | discussion |
| 760 | | Yes | noted | 10.15 | RP-170759 | Way Forward on new TBS for DL 256QAM | Qualcomm Incorporated | discussion | - | - | - | - | .. | Rel-14 | - | | RP-170185 | | Mediatek: thought the CR would not be needed with Qualcomm CRs we want to approve acc. to the decision of Wed morning?<br>RAN chair: double-check offline and if there is a problem we can come back if needed<br><br>conclusion: Finally proposal was accepted, RAN2/RAN3 are requested to prepare the CRs | | - | - | - | - | 3/7/2017 23:49 | 3/8/2017 22:22 | - | | | 1850 | Yes | No | Approval |
| 761 | | Yes | noted | 9.1 | RP-170760 | Way forward for Integrated access and Backhaul | ATT | discussion | - | - | - | - | .. | - | - | | RP-170746 | | will be part of an offline discussion | | - | - | - | - | 3/8/2017 8:14 | 3/8/2017 22:22 | - | | | 2244 | Yes | No | discussion |
| 762 | | Yes | agreed | 8.2 | RP-170761 | Draft Reply LTI to ITU-R WP5D 5D/TEMP/279 = RP-170044 and ITU-R WP5D 5D/TEMP/287 = RP-170045 on Further information on the invitation for submission of proposals for candidate radio interface technologies for the terrestrial components of the radio interface(s) for IMT-2020 and invitation to participate in their subsequent evaluation (to: SA; cc:-; contact: Telecom Italia) | RAN | LS out | - | - | - | - | .. | - | - | | RP-170757 | | conclusion: LS is sent to SA for review and from there to PCG for review before it is sent from PCG to ITU-R WP5D | | SA | - | ITU-R WP5D 5D/TEMP/279 = RP-170044, ITU-R WP5D 5D/TEMP/287 = RP-170045 | - | 3/8/2017 8:20 | 3/8/2017 22:22 | - | | | 19831 | Yes | No | Agreement |
| 763 | | Yes | agreed | 8.3 | RP-170762 | Draft Reply to ITU-R WP5D/TEMP/255r1 = RP-170046 on the schedule for updating Recommendation ITU-R M.1457 to revision 14 (to: SA; cc: -; contact: Telecom Italia) | RAN | LS out | - | - | - | - | .. | - | - | | RP-170734 | | conclusion: LS is sent to SA for review and from there to PCG for review before it is sent from PCG to ITU-R WP5D | | SA | - | ITU-R WP5D/TEMP/255r1 = RP-170046 | - | 3/8/2017 8:26 | 3/8/2017 22:22 | - | | | 462 | Yes | No | Agreement |


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| | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z | AA | AB | AC | AD | AE | AF | AG |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 764 | | Yes | agreed | 8.4 | RP-170763 | Draft reply LTI to ITU-R WP5A/TEMP/131(Rev.1) = RP-161979 on Intelligent Transport Systems (ITS) (to: SA; cc: -; contact: Telecom Italia) | RAN | LS out | - | - | - | - | .. | - | - | | | | conclusion: LS is sent to SA for review and from there to PCG for review before it is sent from PCG to ITU-R WP5A (cc: ITU-R WP5D, CCSA) | | SA | - | ITU-R WP5A/TEMP/131(Rev.1) = RP-161979 | - | 3/8/2017 8:31 | 3/8/2017 22:22 | - | | | 471 | Yes | No | Agreement |
| 765 | | Yes | revised | 8.5 | RP-170764 | Draft reply to ITU-R WP1A/TEMP/45 = RP-170029 on Preliminary draft revision of report ITU-R SM.2351-1 on Smart Grid utility management systems (to: SA; cc: -; contact: Telecom Italia) | Telecom Italia | LS out | - | - | - | - | .. | - | - | RP-170802 | | | Tdoc will include RP-170513<br>will require SA and PCG review;<br>cc: WP5D, WP5A | | ITU-R WP1A | - | RP-170029 | | 3/8/2017 8:35 | 3/8/2017 22:22 | - | | | 5130 | Yes | No | approval |
| 766 | | Yes | revised | 8.5 | RP-170765 | Draft response LS to ITU-R WP4B/TEMP/17 = RP-161971 on the integration of satellite in IMT2020 (to: SA; cc: -; Telecom Italia) | Telecom Italia | LS out | - | - | - | - | .. | Rel-15 | - | RP-170850 | RP-170548 | | will have to go to SA and PCG;<br>pending approval of the SI | RP-161971 | ITU-R WP4B | ETSI TC SES, ITU-R WP 5D, ITU-T SG 13 | - | - | 3/8/2017 8:45 | 3/9/2017 19:01 | - | | | 8001 | Yes | No | Agreement |
| 767 | | Yes | approved | 10.3.6 | RP-170766 | LS on MIMO OTA (to: GCF CAG, GCF PAG; cc: -; contact: Intel) | RAN | LS out | - | - | - | - | .. | Rel-14 | LTE_MIMO_OTA-Core | | RP-170279 | | | | GCF CAG, GCF PAG | - | - | - | 3/8/2017 9:15 | 3/9/2017 14:00 | - | | | 5561 | Yes | No | Approval |
| 768 | | Yes | approved | 10.3.14 | RP-170767 | Reply LS to ITS(17)000026r6 = RP-170027 on LTE-based vehicle-to-vehicle communications (to: ETSI TC ITS; cc: -; contact: RAN chairman (Qualcomm)) | RAN | LS out | - | - | - | - | .. | Rel-14 | LTE_V2X-Core | | | | based on RP-170031 | | ETSI TC ITS | - | ITS(17)000026r6 = RP-170027 | | 3/8/2017 9:30 | 3/9/2017 9:12 | - | | | 310 | Yes | No | Approval |
| 769 | | Yes | approved | 10.3.20 | RP-170768 | WI exception request for Core part: Requirements for a new UE category with single receiver based on Category 1 for LTE | Qualcomm Japan Inc | WI exception request | - | - | - | - | .. | Rel-14 | LTE_UE_cat_1RX-Core | | RP-170390 | | | | - | - | - | - | 3/8/2017 10:00 | 3/9/2017 14:00 | - | | | 80800 | Yes | No | Approval |
| 770 | | Yes | revised | 10.4.2 | RP-170769 | Revision of WI: Enhancements of Base Station (BS) RF and EMC requirements for Active Antenna System (AAS) | Huawei | WID revised | - | - | - | - | .. | Rel-14 | AASenh_BS_LTE_UTRA | RP-170844 | RP-170298 | | | | - | - | - | 3/8/2017 10:45 | 3/9/2017 14:00 | - | | | 2991 | Yes | No | Approval |
| 771 | | Yes | revised | 9.1 | RP-170770 | Way forward on NR testability SI | Intel | discussion | - | - | - | - | .. | - | - | RP-170789 | | related to RP-170748 | MCC: multiple versions of RP-170770 exist | | - | - | | | 3/8/2017 12:13 | 3/8/2017 22:22 | - | | | 2624 | Yes | No | discussion |
| 772 | | Yes | noted | 9.2.1 | RP-170771 | RAN WF on N2 and N3 reference points for 5G system | RAN3 chairman | discussion | - | - | - | - | .. | - | - | | | related to RP-170035 | Will be a RAN3 chairman's input to joint session SA-RAN | | - | - | | | 3/8/2017 12:21 | 3/8/2017 22:22 | - | | | 5150 | Yes | No | discussion |
| 773 | | Yes | noted | 9.1 | RP-170772 | Way forward on REL-15 WIs/SIs | Ericssson | discussion | - | - | - | - | .. | - | - | | | | Mediatek: this is another fish market approach which tiny unrealistic TUs<br>Telecom Italia: agrees that we need to know what we take out if we put further topics into the workplan<br>ATT: we should ask the people who buy the features, i.e. the operators, and not just look at long lists of supporters<br>RAN4 chair: do not forget RAN4 in TU considerations<br><br>RAN chair: asks the new chairman to organize an offline discussion to come up with a joint way forward (considering RP-170760, RP-170772, RP-170774), preferred with an LTE way forward and an NR way forward<br><br>See RP-170810 for NR and RP-170819 for LTE. | | - | - | | | 3/8/2017 12:23 | 3/8/2017 22:22 | - | | | 77200 | Yes | No | discussion |
| 774 | | Yes | postponed | 10.1.1 | RP-170773 | New WID Proposal: Further Enhancements on Full-Dimension (FD) MIMO for LTE | Samsung | WID new | - | - | - | - | .. | Rel-15 | - | | RP-170169 | | | | - | - | - | - | 3/8/2017 14:08 | 3/8/2017 22:22 | - | | | 1841 | Yes | No | Approval |
| 775 | | Yes | noted | 9.1 | RP-170774 | Way Forward on multicast/broadcast specifications | Qualcomm | discussion | - | - | - | - | .. | - | - | | | related to RP-170164 | proposal to add 1 objective to NR WI: "Specify features to ensure forward compatibility with multicast / broadcast services"<br>NTT DOCOMO: seems to be redundant to what we have | | - | - | | | 3/8/2017 14:12 | 3/8/2017 22:22 | - | | | 1593 | Yes | No | discussion |
| 776 | | Yes | approved | 14.2.6 | RP-170775 | Reply LS to S2-170518 on Multiple bearer capability handling independent of CIoT user plane optimization (to: SA2, CT1, RAN2; cc: -; contact: Qualcomm) | RAN | LS out | - | - | - | - | .. | Rel-13 | NB_IOT-Core | | RP-170414 | | | note: LSin S2-170518 was sent to: RAN2; cc: CT1 and not to/cc RAN; | | SA2, CT1, RAN2 | - | S2-170518 | - | 3/8/2017 15:19 | 3/8/2017 22:22 | - | | | 4141 | Yes | No | Approval |
| 777 | | Yes | revised | 18 | RP-170776 | TR 21.914 v.0.2.0 on Release 14 Description | ETSI MCC | report | - | - | - | - | .. | Rel-14 | - | RP-170833 | | | | | - | - | | | 3/8/2017 15:29 | 3/8/2017 22:22 | - | | | 77600 | Yes | No | discussion |



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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 778 | | Yes | revised | 9.1 | RP-170777 | New WID on New Radio Access Technology | NTT DOCOMO, INC. | WID new | - | - | - | - | .. | Rel-15 | - | RP-170793 | RP-170745 | new WI for NR only; leading WG: RAN1 | MCC: multiple versions of RP-170777 exist | | - | - | - | - | 3/8/2017 15:37 | 3/8/2017 22:22 | - | | | 22 | Yes | No | Approval |
| 779 | | Yes | noted | 15 | RP-170778 | Agenda for joint SA-RAN session of TSG #75 | RAN chairman (Qualcomm), SA chairman (Samsung) | agenda | - | - | - | - | .. | - | - | | | | treated in joint RAN-SA session on Wed evening | | - | - | | | 3/8/2017 15:54 | 3/8/2017 22:22 | - | | | 77800 | Yes | No | discussion |
| 780 | RAN2 | Yes | approved | 10.1.2 | RP-170779 | New SID on Study on enhanced LTE Support for Aerial Vehicles | NTT DOCOMO, INC., Ericsson | SID new | - | - | - | - | .. | Rel-15 | - | | RP-170742 | new SI for LTE only; leading WG: RAN2 | | | - | - | - | - | 3/8/2017 16:11 | 3/9/2017 19:01 | - | | | 4450 | Yes | No | Approval |
| 781 | | Yes | noted | 15 | RP-170780 | Discussion on inter-RAT interworking between NR and other 3GPP RATs | Deutsche Telekom, BT, MediaTek | discussion | - | - | - | - | .. | - | - | | | | treated in joint RAN-SA session on Wed evening | | - | - | | | 3/8/2017 16:51 | 3/8/2017 22:22 | - | | | 78000 | Yes | No | discussion |
| 782 | RAN2 | Yes | approved | 10.1.2 | RP-170781 | New Work Item proposal: Further enhancements on Video for LTE | China Mobile Com. Corporation | WID new | - | - | - | - | .. | Rel-15 | - | | RP-170324 | new WI for LTE only; leading WG: RAN2; | | | - | - | - | - | 3/8/2017 17:03 | 3/9/2017 19:01 | - | | | 3260 | Yes | No | Approval |
| 783 | | Yes | revised | 10.1.2 | RP-170782 | New WI proposal: LTE connectivity to 5G-CN | Huawei, Ericsson | WID new | - | - | - | - | .. | Rel-15 | - | RP-170840 | RP-170730 | new WI for LTE only; leading WG: RAN2; | MCC: multiple version of RP-170782 exist | | - | - | - | - | 3/8/2017 18:18 | 3/9/2017 14:00 | - | | | 4853 | Yes | No | Approval |
| 784 | | Yes | noted | 15 | RP-170783 | SA input to joint RAN-SA session on LTE light connection | SA | discussion | - | - | - | - | .. | Rel-14 | - | | | | treated in joint RAN-SA session on Wed evening | | - | - | | | 3/8/2017 18:29 | 3/17/2017 17:35 | - | | | 78300 | Yes | No | discussion |
| 785 | | Yes | noted | 15 | RP-170784 | Minutes of joint session RAN - SA during TSG #75 | ETSI MCC | report | - | - | - | - | .. | - | - | | | | | | - | - | | | 3/8/2017 18:35 | 3/8/2017 22:22 | - | | | 78400 | Yes | No | |
| 786 | | Yes | revised | 10.1.3 | RP-170785 | New SID: Study on Architecture Evolution for E-UTRAN | China Unicom, Orange, Huawei,HiSilicon | SID new | - | - | - | - | .. | Rel-15 | - | RP-170843 | RP-170728 | new SI for LTE only; leading WG: RAN3; | changed from WI to SI;<br>Ericsson: has not yet seen the TU allocation | | - | - | - | - | 3/8/2017 20:17 | 3/9/2017 19:01 | - | | | 2622 | Yes | No | Approval |
| 787 | RAN2 | Yes | approved | 10.1.2 | RP-170786 | New WI Proposal on Quality of Experience (QoE) Measurement Collection for streaming services in E-UTRAN | China Unicom,Huawei, China Telecom | WID new | - | - | - | - | .. | Rel-15 | - | | RP-170432 | new WI for LTE; leading WG: RAN2; | | | - | - | - | - | 3/8/2017 20:18 | 3/9/2017 14:22 | - | | | 3240 | Yes | No | Approval |
| 788 | | Yes | revised | 10.3.4 | RP-170787 | Status report for WI: Signalling reduction to enable light connection for LTE, rapporteur: Huawei | RAN2 | WI status report | - | - | - | - | .. | Rel-14 | LTE_LIGHT_CON-Core | RP-170845 | RP-170291 | | | | - | - | - | - | 3/8/2017 20:22 | 3/9/2017 14:00 | - | | | 2911 | Yes | No | - |
| 789 | | Yes | approved | 10.3.4 | RP-170788 | Revision of WI: Signalling reduction to enable light connection for LTE | Huawei | WID revised | - | - | - | - | .. | Rel-14 | LTE_LIGHT_CON-Core | | RP-170292 | | Nokia: WID does not indicate 36.133 as affected spec<br>Huawei: will add 36.133<br>RAN3 chair: if SA does not agree, then RAN3 work is on hold, otherwise we can start<br>Huawei: RAN3 has a part which is independent from SA3 and a part that is dependent<br>RAN chair: we come back on it<br><br>Nokia: aim is to align with SA WI | | - | - | - | - | 3/8/2017 20:23 | 3/9/2017 14:00 | - | | | 2931 | Yes | No | Approval |
| 790 | | Yes | not treated | 9.1 | RP-170789 | Way forward on NR testability SI | Intel | discussion | - | - | - | - | .. | - | - | | RP-170770 | | | | - | - | - | - | 3/9/2017 4:54 | 3/9/2017 14:00 | - | | | 2630 | Yes | No | discussion |
| 791 | | No | withdrawn | 9 | RP-170790 | Way Forward on 5G NR TU Allocation | MediaTek | discussion | - | - | - | - | .. | Rel-15 | - | | | related to RP-170473 | | | - | - | | | 3/9/2017 5:14 | | - | | | 3350 | No | Yes | discussion |
| 792 | | Yes | approved | 10.3.20 | RP-170791 | Revised WID: Requirements for a new UE category with single receiver based on Category 1 for LTE | Qualcomm | WID revised | - | - | - | - | .. | Rel-14 | LTE_UE_cat_1RX | | | last approved WID: RP-1702570 | | | - | - | | | 3/9/2017 5:23 | 3/9/2017 14:00 | - | | | 80900 | Yes | No | Approval |
| 793 | | Yes | postponed | 7 | RP-170792 | LS requesting support for defining next generation protocol (NGP(17)000038; to: RAN, CT, SA, IETF; cc: -; contact: Vodafone) | ETSI ISG NGP | LS in | - | - | - | - | .. | - | - | | | LS arrived on 08.03.2017 | note: As CT #75 is already over and this LS has CT impact, it was decided to postpone its treatment also in RAN and SA to TSG #76. | NGP(17)000038 | - | - | | | 3/9/2017 5:53 | 3/12/2017 18:41 | - | | | 79200 | Yes | No | discussion |
| 794 | | Yes | revised | 9.1 | RP-170793 | New WID on New Radio Access Technology | NTT DOCOMO, INC. | WID new | - | - | - | - | .. | Rel-15 | - | RP-170812 | RP-170777 | new WI for NR only; leading WG: RAN1 | Ericsson: would prefer to remove references to SA2 specs<br>Deutsche Telekom: did we fail on the reduction of the number of architecture options<br>RAN chair: suggests that operators come with a proposal to next WG meeting to downselect | | - | - | - | - | 3/9/2017 6:40 | 3/9/2017 14:00 | - | | | 23 | Yes | No | Approval |
| 795 | | Yes | noted | 9.1 | RP-170794 | Work plan for Rel-15 New Radio access technology WI | NTT DOCOMO, INC. | discussion | - | - | - | - | .. | Rel-15 | - | | RP-170667 | | | | - | - | - | - | 3/9/2017 6:42 | 3/9/2017 14:00 | - | | | 1171 | Yes | No | Decision |
| 796 | | Yes | not treated | 10.1.1 | RP-170795 | QoS enhancements for groups of UEs in NB-IoT | Huawei | discussion | - | - | - | - | .. | Rel-15 | - | | | related to RP-170744 | | | - | - | | | 3/9/2017 6:44 | 3/9/2017 14:00 | - | | | 1050 | Yes | No | discussion |
| 797 | RAN1 | Yes | approved | 10.1.1 | RP-170796 | New WI: Highly Reliable Low Latency Communication for LTE | Ericsson LM | WID new | - | - | - | - | .. | Rel-15 | - | | RP-170694 | new WI for LTE; leading WG: RAN1; WI code to be used: LTE_HRLLC; | | | - | - | - | - | 3/9/2017 7:22 | 3/9/2017 19:01 | - | | | 1801 | Yes | No | Approval |
| 798 | | Yes | revised | 9.1 | RP-170797 | New SI proposal: Study on evaluation methodology of new V2X use cases for LTE and NR | LG Electronics | SID new | - | - | - | - | .. | Rel-15 | - | RP-170837 | | new SI for LTE and NR; leading WG: RAN1; related to RP-170680 | | | - | - | | | 3/9/2017 7:25 | 3/9/2017 19:01 | - | | | 79700 | Yes | No | Approval |



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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 799 | RAN1 | Yes | approved | 10.1.1 | RP-170798 | New WI proposal: Enhancements on LTE-based V2X Services | Huawei, CATT, LGE, HiSilicon | WID new | - | - | - | - | .. | Rel-15 | - | | RP-170724 | new WI for LTE only; leading WG: RAN1; WI code to be used: LTE_eV2X; follow-up WI of REL-14 WI LTE_V2X; | | | - | - | - | - | 3/9/2017 7:30 | 3/9/2017 19:01 | - | | | 1701 | Yes | No | Approval |
| 800 | | Yes | revised | 10.1.1 | RP-170799 | Draft LS on the support of Unicast and Groupcast transmission over PC5 for eV2X (to: SA2; cc: -; contact: Huawei) | Huawei | LS out | - | - | - | - | .. | Rel-15 | - | RP-170841 | | related to RP-170798 | | | SA2 | - | | | | 3/9/2017 7:42 | 3/9/2017 19:01 | - | | | 1710 | Yes | No | discussion |
| 801 | | Yes | revised | 10.12.1 | RP-170800 | Status report for Shortened TTI and processing time for LTE; rapporteur: Ericsson | RAN1 | WI status report | - | - | - | - | .. | Rel-15 | LTE_sTTIandPT | RP-170851 | RP-170112 | | Huawei: why is there a TU increase?<br>Ericsson: was probably a misunderstanding<br>RAN chair: we can come back to it | | - | - | - | - | 3/9/2017 7:59 | 3/9/2017 14:00 | - | | | 1121 | Yes | No | - |
| 802 | | Yes | revised | 10.1.1 | RP-170801 | New WI proposal: Enhancements for high capacity stationary wireless link and introduction of 1024 QAM for LTE | Huawei, HiSilicon | WID new | - | - | - | - | .. | Rel-15 | - | RP-170830 | RP-170524 | new WI for LTE only; leading WG: RAN1; | | | - | - | - | - | 3/9/2017 9:22 | 3/9/2017 14:00 | - | | | 1611 | Yes | No | Approval |
| 803 | | Yes | agreed | 8.5 | RP-170802 | Draft reply to ITU-R WP1A/TEMP/45 = RP-170029 on Preliminary draft revision of report ITU-R SM.2351-1 on Smart Grid utility management systems (to: SA; cc: -; contact: Telecom Italia) | RAN | LS out | - | - | - | - | .. | - | - | | RP-170764 | | conclusion: LS is sent to SA for review and from there to PCG for review before it is sent from PCG to ITU-R WP1A (cc: ITU-R WP5A, ITU-R WP5D) | | SA | - | ITU-R WP1A/TEMP/45 = RP-170029 | - | 3/9/2017 9:27 | 3/9/2017 14:00 | - | | | 5131 | Yes | No | Agreement |
| 804 | | Yes | noted | 10.3.17 | RP-170803 | Status Report for WI Core part: Voice and Video Enhancement for LTE; rapporteur: CMCC | RAN2 | WI status report | - | - | - | - | .. | Rel-14 | LTE_VoLTE_ViLTE_enh-Core | | RP-170322 | | | | - | - | - | - | 3/9/2017 9:45 | 3/9/2017 14:22 | - | | | 3221 | Yes | No | - |
| 805 | RAN4 | Yes | approved | 10.1.5 | RP-170804 | New WI: LAA/eLAA for the CBRS 3.5GHz band in the United States | AT&T GNS Belgium SPRL | WID new | - | - | - | - | .. | Rel-15 | - | | RP-170514 | new WI for LTE; leading WG: RAN4; related to CBRS LTE band 48, intending a new band definition | | | - | - | - | - | 3/9/2017 9:52 | 3/9/2017 14:00 | - | | | 5141 | Yes | No | Approval |
| 806 | RAN2 | Yes | approved | 10.1.2 | RP-170805 | New WID: Enhancing LTE CA Utilization | Nokia, Alcatel-Lucent Shanghai Bell | WID new | - | - | - | - | .. | Rel-15 | - | | RP-170715 | new WI for LTE; leading WG: RAN2 | | | - | - | - | - | 3/9/2017 9:55 | 3/9/2017 19:01 | - | | | 3972 | Yes | No | Approval |
| 807 | RAN2 | Yes | approved | 10.3.20 | RP-170806 | Feature optionality for Cat.1bis UE | Qualcomm Incorporated | CR | 36.306 | 1434 | 1 | B | 14.1.0 | Rel-14 | LTE_UE_cat_1RX-Core | | RP-170418 | company CR; related LSin RP-170040 from RAN2; this CR had no previous CR in RAN2; features made optional for Category 1bis UE in this CR: crs-InterfHandl-r11, ss-CCH-InterfHandl-r11, FGI101 | | | - | - | - | - | 3/9/2017 10:19 | 3/9/2017 14:00 | - | | | 4181 | Yes | No | Approval |
| 808 | RAN2 | Yes | approved | 10.3.20 | RP-170807 | Feature optionality for Cat.1bis UE | Qualcomm Incorporated | CR | 36.331 | 2701 | 1 | B | 14.1.0 | Rel-14 | LTE_UE_cat_1RX-Core | | RP-170417 | company CR; related LSin RP-170040 from RAN2; this CR had no previous CR in RAN2; features made optional for Category 1bis UE in this CR: crs-InterfHandl-r11, ss-CCH-InterfHandl-r11, FGI101 | | | - | - | - | - | 3/9/2017 10:19 | 3/9/2017 14:00 | - | | | 5631 | Yes | No | Approval |
| 809 | RAN2 | Yes | approved | 10.3.20 | RP-170808 | Feature optionality for Cat.1bis UE | Qualcomm Incorporated | CR | 36.306 | 1435 | - | B | 13.4.0 | Rel-13 | LTE_UE_cat_1RX-Core | | | company CR; related LSin RP-170040 from RAN2; this CR had no previous CR in RAN2; features made optional for Category 1bis UE in this CR: crs-InterfHandl-r11, ss-CCH-InterfHandl-r11, FGI101 | | | - | - | | | 3/9/2017 10:19 | 3/9/2017 14:00 | - | | | 6390 | Yes | No | discussion |
| 810 | RAN2 | Yes | approved | 10.3.20 | RP-170809 | Feature optionality for Cat.1bis UE | Qualcomm Incorporated | CR | 36.331 | 2704 | - | B | 13.4.0 | Rel-13 | LTE_UE_cat_1RX-Core | | | company CR; related LSin RP-170040 from RAN2; this CR had no previous CR in RAN2; features made optional for Category 1bis UE in this CR: crs-InterfHandl-r11, ss-CCH-InterfHandl-r11, FGI101 | | | - | - | | | 3/9/2017 10:22 | 3/9/2017 14:00 | - | | | 6400 | Yes | No | discussion |
| 811 | | Yes | revised | 9.1 | RP-170810 | REL-15 NR SIDs | Nokia | report | - | - | - | - | .. | Rel-15 | - | RP-170827 | | | Telecom Italia: evaluation is usually done in a RAN ad hoc and it was suggested to have it in the ITU-R ad hoc<br>RAN chair: will be corrected in RP-170827 (evaluation will be done under RAN responsibility in ITU-R ad hoc) | | - | - | | | 3/9/2017 11:54 | 3/9/2017 19:01 | - | | | 81000 | Yes | No | discussion |


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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 812 | | Yes | revised | 9.1 | RP-170811 | Way forward on new RAN3 REL-15 (LTE & NR) | RAN3 chairman (Huawei) | discussion | - | - | - | - | .. | Rel-15 | - | RP-170816 | | | Telecom Italia: suggest to have one day of parallel session in RAN3<br>Intel: what about light connection TUs?<br>RAN3 chair: will keep them, if not needed (depending on SA) we will use them for NR | | - | - | | | 3/9/2017 11:58 | 3/9/2017 14:00 | - | | | 81100 | Yes | No | discussion |
| 813 | | Yes | revised | 9.1 | RP-170812 | New WID on New Radio Access Technology | NTT DOCOMO, INC. | WID new | - | - | - | - | .. | Rel-15 | - | RP-170823 | RP-170793 | new WI for NR only; leading WG: RAN1 | | | - | - | - | - | 3/9/2017 12:14 | 3/9/2017 14:22 | - | | | 24 | Yes | No | Approval |
| 814 | RAN1 | Yes | approved | 10.1.1 | RP-170813 | New WID: UE Positioning Accuracy Enhancements for LTE | Nokia, Alcatel-Lucent Shanghai Bell | WID new | - | - | - | - | .. | Rel-15 | - | | RP-170722 | new WI for LTE only; leading WI: RAN2 | MCC: leading WG: RAN2 | | - | - | - | - | 3/9/2017 12:24 | 3/9/2017 19:01 | - | | | 1950 | Yes | No | Approval |
| 815 | | Yes | revised | 10.1.1 | RP-170814 | New WID: Enhancements to LTE operation in unlicensed spectrum | Nokia, Ericsson, Qualcomm, Intel | WID new | - | - | - | - | .. | Rel-15 | - | RP-170835 | RP-170723 | new WI for LTE only; leading WI: RAN1 | | | - | - | - | - | 3/9/2017 12:24 | 3/9/2017 19:01 | - | | | 1741 | Yes | No | Approval |
| 816 | | Yes | postponed | 9.1 | RP-170815 | New SID: Study on NR support for high speed scenario | ETRI | SID new | - | - | - | - | .. | Rel-15 | - | | RP-170261 | | | | - | - | - | - | 3/9/2017 12:26 | 3/9/2017 19:01 | - | | | 2221 | Yes | No | Approval |
| 817 | | Yes | noted | 9.1 | RP-170816 | Way forward on new RAN3 REL-15 (LTE & NR) | RAN3 chairman (Huawei) | discussion | - | - | - | - | .. | Rel-15 | - | | RP-170811 | | Telecom Italia: first topic has high priority for us<br>RAN3 chair: The WI "CA utilization" should have 0 TUs in RAN3 #95bis and RAN #96 | | - | - | - | - | 3/9/2017 12:27 | 3/9/2017 19:01 | - | | | 81101 | Yes | No | discussion |
| 818 | RAN4 | Yes | revised | 9.1 | RP-170817 | New SID: Study of test methods for New Radio | Intel Corporation | SID new | - | - | - | - | .. | Rel-15 | - | RP-170824 | RP-170748 | new SI for NR only; leading WG: RAN4; | | | - | - | - | - | 3/9/2017 12:29 | 3/9/2017 14:22 | - | | | 2624 | Yes | No | Approval |
| 819 | | Yes | approved | 9.1 | RP-170818 | New SID on Study on CU-DU lower layer split for New Radio | NTT DOCOMO, INC. | SID new | - | - | - | - | .. | Rel-15 | - | | RP-170251 | new SI for NR only; leading WG: RAN3; | changed from WI to SI | | - | - | - | - | 3/9/2017 12:29 | 3/9/2017 19:01 | - | | | 1351 | Yes | No | Approval |
| 820 | | Yes | revised | 10.1 | RP-170819 | New LTE REL-15 WIDs/SIDs | Nokia | discussion | - | - | - | - | .. | Rel-15 | - | RP-170834 | | | Mediatek: concerned about having LAA evolution<br>Telecom Italia: yesterday, it was close to be taken out and not it's back, we have a problem with this<br>ATT: autononmous UL still needs a grant from the network<br>Telecom Italia: can we consider autonomous UL only from June 17 onwards?<br><br>conclusion: autonomous UL will only start in June 17 | | - | - | | | 3/9/2017 12:42 | 3/9/2017 19:01 | - | | | 81900 | Yes | No | discussion |
| 821 | RAN1 | Yes | revised | 9.1 | RP-170820 | New SI: Study on NR-based Access to Unlicensed Spectrum | QUALCOMM CDMA Technologies | SID new | - | - | - | - | .. | Rel-15 | - | RP-170828 | RP-170205 | new SI for NR; leading WG: RAN1 | Qualcomm: DT, ZTE, ZTE Microelectronics are supporting this Tdoc as well<br>Telecom Italia: lack of basic NR functionality should not block the start of a SI | | - | - | - | - | 3/9/2017 13:10 | 3/9/2017 19:01 | - | | | 1501 | Yes | No | Approval |
| 822 | RAN2 | Yes | revised | 9.1 | RP-170821 | New SI: Integrated access and backhaul for NR | AT&T | SID new | - | - | - | - | .. | Rel-15 | - | RP-170831 | | related to RP-170760; new SI for NR only; leading WG: RAN2 | ATT: RAN1 TUs were missed, will start in Q1/2018<br>RAN chair: in case of inconsistency the endorsed Nokia slides take precedence | | - | - | | | 3/9/2017 14:01 | 3/9/2017 14:22 | - | | | 82100 | Yes | No | discussion |
| 823 | | Yes | endorsed | 18 | RP-170822 | Status of time budgets for RAN1/2/3/4/6 REL-14 & beyond WIs/SIs after RAN #75 | RAN1/RAN2/RAN3/RAN4/RAN6 chairmen | report | - | - | - | - | .. | - | - | | | endorsed by RAN #74: RP-162530 | | | - | - | | | 3/9/2017 14:02 | | - | | | 82200 | Yes | No | Endorsement |
| 824 | | Yes | revised | 9.1 | RP-170823 | New WID on New Radio Access Technology | NTT DOCOMO, INC. | WID new | - | - | - | - | .. | Rel-15 | - | RP-170847 | RP-170812 | new WI for NR only; leading WG: RAN1 | RAN4 chair: different companies have different interpretations of the table which should be discussed in RAN4<br>RAN chair: will be done<br>Vodafone: LTE Band 1/3/7/20 as LTE 4CC in combination with NR in freq. 3.3-4.2GHz was proposed at the last RAN4 meeting and included in the WF from RAN4, although due to an open issue on the "more than 1 CC for LTE" it was not captured accurately in the table (due to the way the table was defined), and now that combination seems to have been removed from the WID attachment just before final submission. | | - | - | - | - | 3/9/2017 14:09 | 3/9/2017 19:01 | - | | | 25 | Yes | No | Approval |
| 825 | RAN4 | Yes | approved | 9.1 | RP-170824 | New SID: Study of test methods for New Radio | Intel Corporation | SID new | - | - | - | - | .. | Rel-15 | - | | RP-170817 | new SI for NR only; leading WG: RAN4; | | | - | - | - | - | 3/9/2017 14:12 | 3/9/2017 14:22 | - | | | 2625 | Yes | No | Approval |
| 826 | | Yes | not treated | 9.1 | RP-170825 | Proposals on frequency range of a set of NR paired bands | Huawi, Telefonica, CMCC, China Telecom | discussion | - | - | - | - | .. | Rel-15 | - | | | related to RP-170756 | | | - | - | | | 3/9/2017 14:16 | 3/9/2017 19:01 | - | | | 600 | Yes | No | discussion |
| 827 | | Yes | endorsed | 9.1 | RP-170826 | Process for NR bands and LTE-NR band combinations specification work | NTT DOCOMO | discussion | - | - | - | - | .. | Rel-15 | - | | RP-170756 | | | | - | - | - | - | 3/9/2017 14:52 | 3/9/2017 19:01 | - | | | 501 | Yes | No | discussion |
| 828 | | Yes | endorsed | 9.1 | RP-170827 | REL-15 NR SIDs | Nokia | report | - | - | - | - | .. | Rel-15 | - | | RP-170810 | | | | - | - | - | - | 3/9/2017 14:59 | 3/9/2017 19:01 | - | | | 81001 | Yes | No | discussion |
| 829 | RAN1 | Yes | approved | 9.1 | RP-170828 | New SI: Study on NR-based Access to Unlicensed Spectrum | QUALCOMM CDMA Technologies | SID new | - | - | - | - | .. | Rel-15 | - | | RP-170820 | new SI for NR; leading WG: RAN1 | Brocade is also supporting this SI | | - | - | - | - | 3/9/2017 15:04 | 3/9/2017 19:01 | - | | | 1502 | Yes | No | Approval |
| 830 | RAN1 | Yes | approved | 9.1 | RP-170829 | New SI: Study on 5G Non-Orthogonal Multiple Access | ZTE Corporation | SID new | - | - | - | - | .. | Rel-15 | - | | RP-170681 | new SID for NR; leading WG: RAN1 | | | - | - | - | - | 3/9/2017 15:05 | 3/9/2017 19:01 | - | | | 1446 | Yes | No | Approval |

| | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z | AA | AB | AC | AD | AE | AF | AG |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 831 | | Yes | revised | 10.1.1 | RP-170830 | New WI proposal: Enhancements for high capacity stationary wireless link and introduction of 1024 QAM for LTE | Huawei, HiSilicon | WID new | - | - | - | - | .. | Rel-15 | - | RP-170838 | RP-170801 | new WI for LTE only; leading WG: RAN1; | | | - | - | - | - | 3/9/2017 15:12 | 3/9/2017 19:01 | - | | | 1612 | Yes | No | Approval |
| 832 | RAN2 | Yes | approved | 9.1 | RP-170831 | New SI: Study on Integrated access and backhaul for NR | AT&T | SID new | - | - | - | - | .. | Rel-15 | - | | RP-170821 | new SI for NR only; leading WG: RAN2 | | | - | - | - | - | 3/9/2017 15:13 | 3/9/2017 19:01 | - | | | 82101 | Yes | No | discussio n |
| 833 | | Yes | approved | 9.1 | RP-170832 | New SID: Study on Self Evaluation towards IMT-2020 submission | Huawei, Ericsson | SID new | - | - | - | - | .. | Rel-15 | - | | RP-170526 | new SI for NR; leading: ITU-R AH | note: After RAN #75, rapporteur clarified that target date should rather be June 18 than Sep.18, keeping the SI in REL-15. | | - | - | - | - | 3/9/2017 15:14 | 3/9/2017 19:01 | - | | | 1711 | Yes | No | Approval |
| 834 | | Yes | noted | 18 | RP-170833 | TR 21.914 v.0.2.1 on Release 14 Description | ETSI MCC | report | - | - | - | - | .. | Rel-14 | - | | RP-170776 | | | | - | - | - | - | 3/9/2017 15:16 | 3/9/2017 19:01 | - | | | 77601 | Yes | No | discussio n |
| 835 | | Yes | endorsed | 10.1 | RP-170834 | New LTE REL-15 WIDs/SIDs | Nokia | discussion | - | - | - | - | .. | Rel-15 | - | | RP-170819 | | | | - | - | - | - | 3/9/2017 15:28 | 3/9/2017 19:01 | - | | | 81901 | Yes | No | discussio n |
| 836 | | Yes | revised | 10.1.1 | RP-170835 | New WID: Enhancements to LTE operation in unlicensed spectrum | Nokia, Ericsson, Qualcomm, Intel | WID new | - | - | - | - | .. | Rel-15 | - | RP-170848 | RP-170814 | new WI for LTE only; leading WI: RAN1 | Telecom Italia: error for Perf. part needs to be corrected | | - | - | - | - | 3/9/2017 15:29 | 3/9/2017 19:01 | - | | | 1742 | Yes | No | Approval |
| 837 | | Yes | revised | 10.1.1 | RP-170836 | New WI proposal: Further NB-IoT enhancements | Huawei, HiSilicon | WID new | - | - | - | - | .. | Rel-15 | - | RP-170852 | RP-170744 | new WI for LTE only; leading WG: RAN1; WI code to be used: NB_IOTenh2; | | | - | - | - | - | 3/9/2017 15:32 | 3/9/2017 19:01 | - | | | 1041 | Yes | No | Informatio n |
| 838 | | Yes | approved | 9.1 | RP-170837 | New SI proposal: Study on evaluation methodology of new V2X use cases for LTE and NR | LG Electronics | SID new | - | - | - | - | .. | Rel-15 | - | | RP-170797 | | | | - | - | - | - | 3/9/2017 15:34 | 3/9/2017 19:01 | - | | | 79701 | Yes | No | Approval |
| 839 | RAN1 | Yes | approved | 10.1.1 | RP-170838 | New WI proposal: Enhancements for high capacity stationary wireless link and introduction of 1024 QAM for LTE | Huawei, HiSilicon | WID new | - | - | - | - | .. | Rel-15 | - | | RP-170830 | new WI for LTE only; leading WG: RAN1; | note: After RAN #75, rapporteur clarified that target date should rather be June 18 than Dec.18 for the Core part, this means Core and Perf. part are REL-15 WIs. | | - | - | - | - | 3/9/2017 15:35 | 3/9/2017 19:01 | - | | | 1613 | Yes | No | Approval |
| 840 | | No | withdrawn | 10.1.1 | RP-170839 | New WI: Even further enhanced MTC for LTE | Ericsson | WID new | - | - | - | - | .. | Rel-15 | - | | RP-170732 | | note: RP-170732 was supposed to be revised in RP-170839, however at the end RP-170839 was withdrawn and RP-170732 was considered | | - | - | - | - | 3/9/2017 15:36 | | - | | | 1002 | Yes | Yes | Approval |
| 841 | RAN2 | Yes | approved | 10.1.2 | RP-170840 | New WI proposal: LTE connectivity to 5G-CN | Huawei, Ericsson | WID new | - | - | - | - | .. | Rel-15 | - | | RP-170782 | new WI for LTE only; leading WG: RAN2; | | | - | - | - | - | 3/9/2017 15:43 | 3/9/2017 19:01 | - | | | 4860 | Yes | No | Approval |
| 842 | | Yes | approved | 10.1.1 | RP-170841 | LS on the support of Unicast and Groupcast transmission over PC5 for eV2X (to: SA2; cc: SA, SA1, SA3; contact: Huawei) | RAN | LS out | - | - | - | - | .. | Rel-15 | - | | RP-170799 | | attached to this LS: approved WID RP-170798 | | SA2 | SA, SA1, SA3 | - | - | 3/9/2017 15:49 | 3/9/2017 19:01 | - | | | 1711 | Yes | No | Approval |
| 843 | | Yes | approved | 10.3.16 | RP-170842 | WI exception request for Core part: Enhancements of NB-IoT | RAN1 | WI exception request | - | - | - | - | .. | Rel-14 | NB_IOTenh-Core | | RP-170712 | | | | - | - | - | - | 3/9/2017 16:15 | 3/9/2017 19:01 | - | | | 6372 | Yes | No | Approval |
| 844 | | Yes | approved | 10.1.3 | RP-170843 | New SID: Study on Architecture Evolution for E-UTRAN | China Unicom, Orange, Huawei,HiSilicon | SID new | - | - | - | - | .. | Rel-15 | - | | RP-170785 | new SI for LTE only; leading WG: RAN3; | | | - | - | - | - | 3/9/2017 16:15 | 3/9/2017 19:01 | - | | | 2623 | Yes | No | Approval |
| 845 | | Yes | approved | 10.4.2 | RP-170844 | Revision of WI: Enhancements of Base Station (BS) RF and EMC requirements for Active Antenna System (AAS) | Huawei | WID revised | - | - | - | - | .. | Rel-14 | AASenh_BS_ LTE_UTRA | | RP-170769 | | | | - | - | - | - | 3/9/2017 16:17 | 3/9/2017 19:01 | - | | | 2992 | Yes | No | Approval |
| 846 | | Yes | noted | 10.3.4 | RP-170845 | Status report for WI: Signalling reduction to enable light connection for LTE, rapporteur: Huawei | RAN2 | WI status report | - | - | - | - | .. | Rel-14 | LTE_LIGHT_ CON-Core | | RP-170787 | | conclusion: noted; approved: Core: 79%, June 17; the Core part WI is shifted from REL-14 to REL-15. The allocated TUs depend on the approval of an SA WI for light connection. If no SA WI is approved by SA #75, then the WI LTE_LIGHT_CON-Core is considered on hold until June 17 and corresponding TUs can be reused (e.g. for NR).<br>note: SA #75 approved only a SI in SP-170280 and so the WI LTE_LIGHT_CON-Core is on hold until RAN #76 | | - | - | - | - | 3/9/2017 16:19 | 3/9/2017 19:01 | - | | | 2912 | Yes | No | - |
| 847 | | Yes | noted | 20 | RP-170846 | Way forward | Dubrovnik Crowd | other | - | - | - | - | .. | - | - | | | | | | - | - | | | 3/9/2017 16:25 | 3/9/2017 19:01 | - | | | 84600 | Yes | No | discussio n |
| 848 | | Yes | revised | 9.1 | RP-170847 | New WID on New Radio Access Technology | NTT DOCOMO, INC. | WID new | - | - | - | - | .. | Rel-15 | - | RP-170855 | RP-170823 | new WI for NR only; leading WG: RAN1 | | | - | - | - | - | 3/9/2017 16:34 | 3/9/2017 19:01 | - | | | 26 | Yes | No | Approval |
| 849 | RAN1 | Yes | approved | 10.1.1 | RP-170848 | New WID: Enhancements to LTE operation in unlicensed spectrum | Nokia, Ericsson, Qualcomm, Intel | WID new | - | - | - | - | .. | Rel-15 | - | | RP-170835 | new WI for LTE only; leading WI: RAN1 | | | - | - | - | - | 3/9/2017 16:42 | 3/9/2017 19:01 | - | | | 1743 | Yes | No | Approval |
| 850 | | Yes | revised | 7 | RP-170849 | Draft reply LS to IEEE802.11-16_1573r4 = RP-170026 to on Requesting status and technical information on radio-level integration between 3GPP and 802.11 systems (to: IEEE 802.11 WG; cc:-; contact: Intel) | Intel | LS out | - | - | - | - | .. | - | - | RP-170853 | RP-170699 | | | | IEEE 802.11 WG | - | RP-170026 | - | 3/9/2017 16:51 | 3/9/2017 19:01 | - | | | 262 | Yes | No | approval |

| | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z | AA | AB | AC | AD | AE | AF | AG |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 851 | | Yes | agreed | 8.5 | RP-170850 | Draft response LS to ITU-R WP4B/TEMP/17 = RP-161971 and ITU-R 5D/TEMP/218 = RP-161965 on the integration of satellite-based solutions into IMT-2020 networks (to: SA; cc: -; Telecom Italia) | RAN | LS out | - | - | - | - | .. | Rel-15 | - | | RP-170765 | | error in RP-170850: The title shown in the LS is wrong;<br>conclusion: LS is sent to SA for review and from there to PCG for review before it is sent from PCG to ITU-R WP4B (cc: ITU-R WP5A, ITU-R WP5D, ETSI TC/SES, ITU-T SG 13); | | SA | - | ITU-R WP4B/TEMP/17 = RP-161971 ; ITU-R 5D/TEMP/218 = RP-161965 | - | 3/9/2017 16:51 | 3/9/2017 19:01 | - | | | 8002 | Yes | No | Agreement |
| 852 | | Yes | noted | 10.12.1 | RP-170851 | Status report for Shortened TTI and processing time for LTE; rapporteur: Ericsson | RAN1 | WI status report | - | - | - | - | .. | Rel-15 | LTE_sTTIandPT | | RP-170800 | | | | - | - | - | - | 3/9/2017 17:08 | 3/9/2017 19:01 | - | | | 1122 | Yes | No | - |
| 853 | RAN1 | Yes | approved | 10.1.1 | RP-170852 | New WI proposal: Further NB-IoT enhancements | Huawei, HiSilicon | WID new | - | - | - | - | .. | Rel-15 | - | | RP-170836 | new WI for LTE only; leading WG: RAN1; WI code to be used: NB_IOTenh2; | approved with working agreement (see RP-170732)<br><br>note: TU attachment is missing but acc. to Huawei the same as in previous RP-170836 | | - | - | - | - | 3/9/2017 17:27 | 3/9/2017 19:01 | - | | | 1042 | Yes | No | Information |
| 854 | | Yes | approved | 7 | RP-170853 | Reply LS to IEEE802.11-16_1573r4 = RP-170026 on Requesting status and technical information on radio-level integration between 3GPP and 802.11 systems (to: IEEE P802.11; cc: SA, IEEE 802 Executive Committee; contact: Intel) | RAN | LS out | - | - | - | - | .. | Rel-14 | - | | RP-170849 | | | | IEEE P802.11 | SA, IEEE 802 Executive Committee | RP-170026 | - | 3/9/2017 17:37 | 3/9/2017 19:01 | - | | | 263 | Yes | No | approval |
| 855 | RAN | Yes | approved | 9.2.1 | RP-170854 | TR 38.912 v1.0.0 on Study on New Radio (NR) access technology | NTT DOCOMO | draft TR | 38.912 | - | - | - | 1.0.0 | Rel-14 | FS_NR_new RAT | | | RAN TR for 1-step approval | note: TR was handled by email after RAN #75; conclusion: approved as REL-14 TR | | - | - | | | 3/13/2017 14:04 | 3/17/2017 17:35 | - | | | 1050 | Yes | No | Approval |
| 856 | RAN1 | Yes | approved | 9.1 | RP-170855 | New WID on New Radio Access Technology | NTT DOCOMO, INC. | WID new | - | - | - | - | .. | Rel-15 | - | | RP-170847 | new WI for NR only; leading WG: RAN1 | | | - | - | - | - | 3/14/2017 10:41 | 3/17/2017 17:35 | - | | | 27 | Yes | No | Approval |

# Appendix 32

## Archive Search

Search the archives of lists on this server

Search: 38.912

Sort By: Date/Time (Most Recent First)

Substring

Subject Line Contains:

Author's Address:

Since: 160901

Until: 170701

Search

### LIST.ETSI.ORG (13 Matches)

| Subject | From |
|---|---|
| Re: [RAN1#89] CRs from channel coding session<br><br>Then one remark regarding the conclusion on 38.912 - the spec is under the leadership of RAN and RAN1 cannot agree any CR as such.<br>R1-1709729 <file:///C:\Users\merias\Documents\ETSI\RANWG1\TSGR1_89-China\Docs\R1-1709729.zip> Draft CR on LDPC code [38.912] Samsung <file:///C:\Users\merias\Documents\ETSI\RANWG1\TSGR1_89-China\Docs\R1-1709722.zip> 38.912 CRxxxx with latest CR cover sheet.<br><file:///C:\Users\merias\Documents\ETSI\RANWG1\TSGR1_89-China\Docs\R1-1709722.zip> 38.912 CRxxxx with latest CR cover sheet.<br>AND we should inform RAN about the changes covered by this endorsed draft CR to 38.912 | Hongsil Jeong <[log in to unmask]> |
| [RAN1#89] CRs from channel coding session<br><br>Looking through the channel coding session notes, I realized that both R1-1709721/R1-1709722 are missing (I could not find these CRs in the ftp server b<br>Then one remark regarding the conclusion on 38.912 - the spec is under the leadership of RAN and RAN1 cannot agree any CR as such.<br>I will change the decision as follows:<br>R1-1709729<file:///C:\Users\merias\Documents\ETSI\RANWG1\TSGR1_89-China\Docs\R1-1709729.zip> Draft CR on LDPC code [38.912] Samsung<br>Decision: Agreed in R1-1709722<file:///C:\Users\merias\Documents\ETSI\RANWG1\TSGR1_89-China\Docs\R1-1709722.zip> 38.912 CRxxxx with latest CR cov<br>AND we should inform RAN about the changes covered by this endorsed draft CR to 38.912<br>I'll discuss the issue with RAN secretary accordingly | Patrick Merias <[log in to unmask]> |
| Re: [88-11] TR38.912<br><br>>TR 38.912 | Satoshi Nagata <[log in to unmask]> |
| Re: [88-11] TR38.912<br><br>>TR 38.912 | Kazuaki Takeda <[log in to unmask]> |
| Re: [88-11] TR38.912<br><br>>TR 38.912 | Jiang, Jing <[log in to unmask]> |
| Re: [88-11] TR38.912<br><br>>TR 38.912 | Kazuaki Takeda <[log in to unmask]> |
| Re: [88-11] TR38.912<br><br>>TR 38.912 | Kazuaki Takeda <[log in to unmask]> |
| Re: [88-11] TR38.912<br><br>><br>>TR 38.912<br>> | Satoshi Nagata <[log in to unmask]> |
| Re: [88-11] TR38.912<br><br>TR 38.912 | Kazuaki Takeda <[log in to unmask]> |
| Re: [88-11] TR38.912<br><br>[88-11] Kazuaki (NTT DOCOMO)<br>TR 38.912<br>Email approval about it until 24th February | David mazzarese <[log in to unmask]> |



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Ericsson v. Motorola

| Subject | From |
|---|---|
| [88-11] TR38.912<br><br>TR 38.912 | Kazuaki Takeda <[log in to unmask]> |
| [88-04] NB-IoT CR<br><br>TR 38.912 | Yutao Sui <[log in to unmask]> |
| LTE/NR email discussion following RAN1 #88<br><br>TR 38.912 | Satoshi Nagata <[log in to unmask]> |

Check All | Uncheck All

[<<] [<] 1-50 (884) [>] [>>]

| List Name | List Title |
|---|---|
| 3GPP-REVIEW | 3gpp-review : gsmtrans replacement |
| 3GPP_3GPP2_LEADERS_RL | |
| 3GPP_3GPP2_SCM | 3gpp_3gpp2_scm : 3gpp-3gpp2 spatial channel modelling |
| 3GPP_BBF_FMC | 3GPP_BBF_FMC: Coordination of BBF and 3GPP on FMC |
| 3GPP_COMMON_IMS_XFER | 3GPP_common_ims_xfer: IMS work transfer list closed |
| 3GPP_CT88_E_MEETING | 3GPP_CT88_E_Meeting Closed 16/07/2020 #2020-103216 by TGV requested by Kimmo |
| 3GPP_CT89_E_MEETING | 3GPP_CT89_E_Meeting Closed 30/09/2020 by JMS requested by Kimmo 2020-104023 |
| 3GPP_CT90_E_MEETING | 3GPP_CT90_E_Meeting Closed 15/12/20, done by JMS by request Kimmo ticket n 202 |
| 3GPP_CT91_E_MEETING | 3GPP_CT91_E_MEETING closed by TGV 08/04/2021 #2021-101493 |
| 3GPP_FFG | 3gpp_ffg :3gpp list |
| 3GPP_GUP | 3gpp_gup Closed 21/05/2021, done by JMS by request Anna Riondet ticket n2021-1021 |
| 3GPP_HODS | 3gpp_hods : 3gpp_hods list |
| 3GPP_HODS_LEGAL | 3gpp_hods : 3gpp_hods_legal list |
| 3GPP_HODS_MEMBERSHIP | 3GPP_HODS_MEMBERSHIP |
| 3GPP_IT | 3GPP_IT |
| 3GPP_L123_HOOK_EXT | |
| 3GPP_MARCOM | 3GPP_Marcom |
| 3GPP_MARCOM_BRAND_ADHOC | 3GPP_MARCOM_brand_adhoc |
| 3GPP_MARCOM_OP | 3gpp_Marcom_OP |
| 3GPP_MEETING_HOSTING_COORD | 3GPP_Meeting_Hosting_Coordination |
| 3GPP_MENTORING | 3GPP_MENTORING |
| 3GPP_MRP | |
| 3GPP_OBS | |
| 3GPP_ORGANIZATION | 3gpp_organization: 3gpp discussion group |
| 3GPP_PCG_SPG | 3GPP_PCG_SPG |
| 3GPP_RAN_LEADERS | 3GPP_RAN_LEADERS |
| 3GPP_RUN4RAN | 3GPP_RUN4RAN |
| 3GPP_SA2_SA5_ENERGYSYS_DISCUSS | 3GPP_SA2_SA5_EnergySys_DISCUSSION |
| 3GPP_STAGE1_IMT2030_UC_WS | 3GPP_Stage1_IMT2030_UC_WS |
| 3GPP_TSG_CN | 3GPP_TSG_CN: THIS LIST HAS NOW BEEN CLOSED 18.03.05 |
| 3GPP_TSG_CN_AH_ITUT | 3GPP_TSG_CN_AH_ITUT: THIS LIST HAS NOW BEEN CLOSED |
| 3GPP_TSG_CN_WG1 | 3GPP_TSG_CN_wg1: THIS LIST HAS NOW BEEN CLOSED 18.03.05 |
| 3GPP_TSG_CN_WG2 | 3GPP_TSG_CN_wg2: THIS LIST HAS BEEN CLOSED 18.03.05 |
| 3GPP_TSG_CN_WG3 | 3GPP_TSG_CN_wg3: THIS LIST HAS NOW BEEN CLOSED |
| 3GPP_TSG_CN_WG4 | 3GPP_TSG_CN_WG4: THIS LIST HAS NOW BEEN CLOSED 18.03.05 |
| 3GPP_TSG_CN_WG5 | 3GPP_TSG_CN_WG5: THIS LIST HAS NOW BEEN CLOSED |

| List Name | List Title |
|---|---|
| 3GPP_TSG_CN_WG5_JOINTAPIWORK | 3gpp_tsg_cn_wg5_jointapiwork : THIS LIST HAS NOW BEEN CLOSED 18.03.05 |
| 3GPP_TSG_CT | 3GPP_TSG_CT - Core Network and Terminals |
| 3GPP_TSG_CT_IETF-COORD | 3GPP_TSG_CT_IETF-Coord |
| 3GPP_TSG_CT_WG1 | 3GPP_TSG_CT_WG1 - Core Network and Terminals WG 1 |
| 3GPP_TSG_CT_WG1_122E_5G | 3GPP_TSG_CT_WG1_122e_5G Closed 15/06/2020 done by TGV by request #2020-102749 |
| 3GPP_TSG_CT_WG1_122E_GENERAL | 3GPP_TSG_CT_WG1_122e_general Closed 15/06/2020 done by TGV by requestt #2020-10 |
| 3GPP_TSG_CT_WG1_122E_IMS | 3GPP_TSG_CT_WG1_122e_IMS Closed 15/06/2020 done by TGV by requestt #2020-10274 |
| 3GPP_TSG_CT_WG1_122E_MC | 3GPP_TSG_CT_WG1_122e_MC Closed 15/06/2020 done by TGV by requestt #2020-10274 |
| 3GPP_TSG_CT_WG1_122E_SERVICES | 3GPP_TSG_CT_WG1_122e_services Closed 15/06/2020 done by TGV by requestt #2020-10 |
| 3GPP_TSG_CT_WG1_E_IMS | 3GPP_TSG_CT_WG1_E_IMS |
| 3GPP_TSG_CT_WG1_E_MAIN | 3GPP_TSG_CT_WG1_E_main |
| 3GPP_TSG_CT_WG1_E_MC | 3GPP_TSG_CT_WG1_E_MC |
| 3GPP_TSG_CT_WG1_E_SERVICES | 3GPP_TSG_CT_WG1_E_services |
| 3GPP_TSG_CT_WG1_MMS_SMS_CBS_AT | 3GPP_TSG_CT_WG1_MMS_SMS_CBS_AT:Commands closed 01/07/2015 |

Lists per Page:
50 Update

# Appendix 33

## Archive Search

Search the archives of lists on this server

Search: 38.912

Sort By: Date/Time (Most Recent First)

Substring

Subject Line Contains:

Author's Address:

Since: 170101

Until: 170831

Search

## LIST.ETSI.ORG (13 Matches)

| Subject | From |
|---|---|
| [RAN#76] Revision of RP-170955 | Kazuaki Takeda <[log in to unmask]> |
| CR to TR 38.912 on architecture and LDPC terminology<br>company CR to RAN TR 38.912 | |
| Re: updated Tdoc list for RAN #76 | Joern Krause <[log in to unmask]> |
| 6. draftCR to TR 38.912 (RP-171104), Huawei: without a real CR we cannot modify the TR<br>=> withdrawn as covered in CR RP-170955 already | |
| Re: updated Tdoc list for RAN #76 | Joern Krause <[log in to unmask]> |
| 6. draftCR to TR 38.912 (RP-171104), Huawei: without a real CR we cannot modify the TR | |
| updated Tdoc list for RAN #76 | Joern Krause <[log in to unmask]> |
| 6. draftCR to TR 38.912 (RP-171104), Huawei: without a real CR we cannot modify the TR | |
| Re: Question regarding TR 38.912 | Joern Krause <[log in to unmask]> |

From: Joern Krause <[log in to unmask]>
Subject: Re: Question regarding TR 38.912
Comments: To: Kazuaki Takeda <[log in to unmask]>
Dear all,
I have now uploaded the cleaned up TR 38.912:
ftp://ftp.3gpp.org/tsg_ran/TSG_RAN/TSGR_75/Docs/RP-170854.zip
To: 3GPP_TSG_RAN
Subject: Re: Question regarding TR 38.912
Dear all,
Please find attached a draft version of the TR 38.912.
It turned out to be a little bit more difficult than I thought because:
will wonder what is the difference to NGC (so either it is identical, then we better only use NGC;
or it is not identical but then we should have a CR to 38.912 to RAN #76 to explain this)
- TR 36.842 "Study on Small Cell enhancements for E-UTRA and E-UTRAN; Higher layer aspects":
To: Joern Krause; 3GPP_TSG_RAN
Subject: RE: Question regarding TR 38.912
To: [log in to unmask]
Subject: Re: Question regarding TR 38.912
Well, as we cannot declare a SI 100% complete without having an approved TR 38.912
and as we seem to have just one pCR for this TR which was approved,
I suggest I provide TR 38.912 v1.0.0 later today and if noone objects to this version
within the next 2 days, we call TR 38.912 v1.0.0 approved as REL-14 TR.
Note: For corrections of things that are not implementation errors you will have to
To: 3GPP_TSG_RAN
Subject: Re: Question regarding TR 38.912
To: 3GPP_TSG_RAN <[log in to unmask]<mailto:[log in to unmask]>>
Subject: Re: Question regarding TR 38.912
Then can we all assume that RP-170735 as the final version of TR 38.912?
Cc: [log in to unmask]<mailto:[log in to unmask]>
Subject: 答复: Question regarding TR 38.912
RP-170433 TP for TR 38.912: Radio transmission/reception NTT DOCOMO INC.
Replaces TR 38.912 v0.0.2 was agreed by RAN #73; text proposal on UE/BS RF feasibility
Replaced by RP-170736
RP-170736 TP for TR 38.912: Radio transmission/reception NTT DOCOMO INC.
Replaces RP-
日期: 2017-03-13 08:06
主题: Question regarding TR 38.912
In RAN#75 we had pCR for TR 38.912 (RP-170433 which contains updates on Spectrum and RF requirements) which was approved.
Should we now consider RP-170735 as approved version (v1.0.0) for TR 38.912 (instead of v0.0.2)? or will there be another e-mail approval for the final ver

| Subject | From |
|---|---|
| Re: Question regarding TR 38.912 | Joern Krause <[log in to unmask]> |

From: Joern Krause <[log in to unmask]>
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Comments: To: Kazuaki Takeda <[log in to unmask]>
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- TR 36.842 "Study on Small Cell enhancements for E-UTRA and E-UTRAN; Higher layer aspects":
To: Joern Krause; 3GPP_TSG_RAN
Subject: RE: Question regarding TR 38.912
To: [log in to unmask]
Subject: Re: Question regarding TR 38.912
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within the next 2 days, we call TR 38.912 v1.0.0 approved as REL-14 TR.
Note: For corrections of things that are not implementation errors you will have to
To: 3GPP_TSG_RAN
Subject: Re: Question regarding TR 38.912
To: 3GPP_TSG_RAN <[log in to unmask]<mailto:[log in to unmask]>>
Subject: Re: Question regarding TR 38.912
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Should we now consider RP-170735 as approved version (v1.0.0) for TR 38.912 (instead of v0.0.2)? or will there be another e-mail approval for the final ver

| Re: Question regarding TR 38.912 | 황정우(기술전략팀) <[log in to unmask]> |
|---|---|

From: 황정우(기술전략팀) <[log in to unmask]>
Subject: Re: Question regarding TR 38.912
Comments: To: John M Meredith <[log in to unmask]>
Thank you very much for the clear explanations. Yes, I was confused as we have SI completed without TR 38.912 V1.0.0 approved.
To: 황정우(기술전략팀); 3GPP_TSG_RAN
Subject: RE: Question regarding TR 38.912
To: 3GPP_TSG_RAN <[log in to unmask]<mailto:[log in to unmask]>>
Subject: Re: Question regarding TR 38.912
Then can we all assume that RP-170735 as the final version of TR 38.912?
Cc: [log in to unmask]<mailto:[log in to unmask]>
Subject: 答复: Question regarding TR 38.912
RP-170433 TP for TR 38.912: Radio transmission/reception NTT DOCOMO INC.
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Should we now consider RP-170735 as approved version (v1.0.0) for TR 38.912 (instead of v0.0.2)? or will there be another e-mail approval for the final ver

| Re: Question regarding TR 38.912 | Kazuaki Takeda <[log in to unmask]> |
|---|---|

From: Kazuaki Takeda <[log in to unmask]>
Subject: Re: Question regarding TR 38.912
Comments: To: Joern Krause <[log in to unmask]>
To: [log in to unmask]
Subject: Re: Question regarding TR 38.912
Well, as we cannot declare a SI 100% complete without having an approved TR 38.912
I suggest I provide TR 38.912 v1.0.0 later today and if noone objects to this version
within the next 2 days, we call TR 38.912 v1.0.0 approved as REL-14 TR.
To: 3GPP_TSG_RAN
Subject: Re: Question regarding TR 38.912
To: 3GPP_TSG_RAN <[log in to unmask]>
Subject: Re: Question regarding TR 38.912
Then can we all assume that RP-170735 as the final version of TR 38.912?
Cc: [log in to unmask]
Subject: 答复: Question regarding TR 38.912
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Replaces RP-
日期: 2017-03-13 08:06

| Subject | From |
|---|---|
| 主題: Question regarding TR 38.912<br>In RAN#75 we had pCR for TR 38.912 (RP-170433 which contains updates on Spectrum and RF requirements) which was approved.<br>Should we now consider RP-170735 as approved version (v1.0.0) for TR 38.912 (instead of v0.0.2)? or will there be another e-mail approval for the final ver | |
| Re: Question regarding TR 38.912 | Joern Krause <[log in to unmask]> |

From: Joern Krause <[log in to unmask]>
Subject: Re: Question regarding TR 38.912
Comments: To: John M Meredith <[log in to unmask]>,
Well, as we cannot declare a SI 100% complete without having an approved TR 38.912
and as we seem to have just one pCR for this TR which was approved,
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within the next 2 days, we call TR 38.912 v1.0.0 approved as REL-14 TR.
Note: For corrections of things that are not implementation errors you will have to
To: 3GPP_TSG_RAN
Subject: Re: Question regarding TR 38.912
To: 3GPP_TSG_RAN <[log in to unmask]>
Subject: Re: Question regarding TR 38.912
Then can we all assume that RP-170735 as the final version of TR 38.912?
Cc: [log in to unmask]
Subject: 答复: Question regarding TR 38.912
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RP-170736 TP for TR 38.912: Radio transmission/reception NTT DOCOMO INC.
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日期: 2017-03-13 08:06
主題: Question regarding TR 38.912
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Should we now consider RP-170735 as approved version (v1.0.0) for TR 38.912 (instead of v0.0.2)? or will there be another e-mail approval for the final ver

| Re: Question regarding TR 38.912 | John M Meredith <[log in to unmask]> |
|---|---|

From: John M Meredith <[log in to unmask]>
Subject: Re: Question regarding TR 38.912
Comments: To: 황정우(기술전략팀) <[log in to unmask]>
To: 3GPP_TSG_RAN <[log in to unmask]>
Subject: Re: Question regarding TR 38.912
Then can we all assume that RP-170735 as the final version of TR 38.912?
Cc: [log in to unmask]
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| Re: Question regarding TR 38.912 | 황정우(기술전략팀) <[log in to unmask]> |
|---|---|

From: 황정우(기술전략팀) <[log in to unmask]>
Subject: Re: Question regarding TR 38.912
Comments: To: "[log in to unmask]" <[log in to unmask]>
Then can we all assume that RP-170735 as the final version of TR 38.912?
Cc: [log in to unmask]
Subject: 答复: Question regarding TR 38.912
RP-170433 TP for TR 38.912: Radio transmission/reception NTT DOCOMO INC.
Replaces TR 38.912 v0.0.2 was agreed by RAN #73; text proposal on UE/BS RF feasibility
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RP-170736 TP for TR 38.912: Radio transmission/reception NTT DOCOMO INC.
Replaces RP-
日期: 2017-03-13 08:06
主題: Question regarding TR 38.912
In RAN#75 we had pCR for TR 38.912 (RP-170433 which contains updates on Spectrum and RF requirements) which was approved.
Should we now consider RP-170735 as approved version (v1.0.0) for TR 38.912 (instead of v0.0.2)? or will there be another e-mail approval for the final ver

| 答复: Question regarding TR 38.912 | Yonghong Gao <[log in to unmask]> |
|---|---|

From: Yonghong Gao <[log in to unmask]>
Subject: 答复: Question regarding TR 38.912
Comments: To: [log in to unmask]
The document was approved.
RP-170433 TP for TR 38.912: Radio transmission/reception NTT DOCOMO
INC.
Replaces TR 38.912 v0.0.2 was agreed by RAN #73; text proposal on
UE/BS RF feasibility
Replaced by RP-170736
RP-170736 TP for TR 38.912: Radio transmission/reception NTT DOCOMO
INC.
日期: 2017-03-13 08:06
主題: Question regarding TR 38.912

| Subject | From |
|---|---|
| In RAN#75 we had pCR for TR 38.912 (RP-170433 which contains updates on Spectrum and RF requirements) which was approved. Should we now consider RP-170735 as approved version (v1.0.0) for TR 38.912 (instead of v0.0.2)? or will there be another e-mail approval for the final version (with cover page). | |
| Question regarding TR 38.912 | 황정우(기술전략팀) <[log in to unmask]> |

From: 황정우(기술전략팀) <[log in to unmask]>
Subject: Question regarding TR 38.912
Content-Type: multipart/alternative;
In RAN#75 we had pCR for TR 38.912 (RP-170433 which contains updates on Spectrum and RF requirements) which was approved.
Should we now consider RP-170735 as approved version (v1.0.0) for TR 38.912 (instead of v0.0.2)? or will there be another e-mail approval for the final ver

Check All | Uncheck All

[<<] [<] 1-50 (884) [>] [>>]

| List Name | List Title |
|---|---|
| 3GPP-REVIEW | 3gpp-review : gsmtrans replacement |
| 3GPP_3GPP2_LEADERS_RL | |
| 3GPP_3GPP2_SCM | 3gpp_3gpp2_scm : 3gpp-3gpp2 spatial channel modelling |
| 3GPP_BBF_FMC | 3GPP_BBF_FMC: Coordination of BBF and 3GPP on FMC |
| 3GPP_COMMON_IMS_XFER | 3GPP_common_ims_xfer: IMS work transfer list closed |
| 3GPP_CT88_E_MEETING | 3GPP_CT88_E_Meeting Closed 16/07/2020 #2020-103216 by TGV requested by Kimmo |
| 3GPP_CT89_E_MEETING | 3GPP_CT89_E_Meeting Closed 30/09/2020 by JMS requested by Kimmo 2020-104023 |
| 3GPP_CT90_E_MEETING | 3GPP_CT90_E_Meeting Closed 15/12/20, done by JMS by request Kimmo ticket n 2020 |
| 3GPP_CT91_E_MEETING | 3GPP_CT91_E_MEETING closed by TGV 08/04/2021 #2021-101493 |
| 3GPP_FFG | 3gpp_ffg :3gpp list |
| 3GPP_GUP | 3gpp_gup Closed 21/05/2021, done by JMS by request Anna Riondet ticket n2021-1021 |
| 3GPP_HODS | 3gpp_hods : 3gpp_hods list |
| 3GPP_HODS_LEGAL | 3gpp_hods : 3gpp_hods_legal list |
| 3GPP_HODS_MEMBERSHIP | 3GPP_HODS_MEMBERSHIP |
| 3GPP_IT | 3GPP_IT |
| 3GPP_L123_HOOK_EXT | |
| 3GPP_MARCOM | 3GPP_Marcom |
| 3GPP_MARCOM_BRAND_ADHOC | 3GPP_MARCOM_brand_adhoc |
| 3GPP_MARCOM_OP | 3gpp_Marcom_OP |
| 3GPP_MEETING_HOSTING_COORD | 3GPP_Meeting_Hosting_Coordination |
| 3GPP_MENTORING | 3GPP_MENTORING |
| 3GPP_MRP | |
| 3GPP_OBS | |
| 3GPP_ORGANIZATION | 3gpp_organization: 3gpp discussion group |
| 3GPP_PCG_SPG | 3GPP_PCG_SPG |
| 3GPP_RAN_LEADERS | 3GPP_RAN_LEADERS |
| 3GPP_RUN4RAN | 3GPP_RUN4RAN |
| 3GPP_SA2_SA5_ENERGYSYS_DISCUSS | 3GPP_SA2_SA5_EnergySys_DISCUSSION |
| 3GPP_STAGE1_IMT2030_UC_WS | 3GPP_Stage1_IMT2030_UC_WS |
| 3GPP_TSG_CN | 3GPP_TSG_CN: THIS LIST HAS NOW BEEN CLOSED 18.03.05 |
| 3GPP_TSG_CN_AH_ITUT | 3GPP_TSG_CN_AH_ITUT: THIS LIST HAS NOW BEEN CLOSED |
| 3GPP_TSG_CN_WG1 | 3GPP_TSG_CN_wg1: THIS LIST HAS NOW BEEN CLOSED 18.03.05 |
| 3GPP_TSG_CN_WG2 | 3GPP_TSG_CN_wg2: THIS LIST HAS BEEN CLOSED 18.03.05 |
| 3GPP_TSG_CN_WG3 | 3GPP_TSG_CN_wg3: THIS LIST HAS NOW BEEN CLOSED |
| 3GPP_TSG_CN_WG4 | 3GPP_TSG_CN_WG4: THIS LIST HAS NOW BEEN CLOSED 18.03.05 |
| 3GPP_TSG_CN_WG5 | 3GPP_TSG_CN_WG5: THIS LIST HAS NOW BEEN CLOSED |

| List Name | List Title |
|---|---|
| 3GPP_TSG_CN_WG5_JOINTAPIWORK | 3gpp_tsg_cn_wg5_jointapiwork : THIS LIST HAS NOW BEEN CLOSED 18.03.05 |
| 3GPP_TSG_CT | 3GPP_TSG_CT - Core Network and Terminals |
| 3GPP_TSG_CT_IETF-COORD | 3GPP_TSG_CT_IETF-Coord |
| 3GPP_TSG_CT_WG1 | 3GPP_TSG_CT_WG1 - Core Network and Terminals WG 1 |
| 3GPP_TSG_CT_WG1_122E_5G | 3GPP_TSG_CT_WG1_122e_5G Closed 15/06/2020 done by TGV by request #2020-102749 |
| 3GPP_TSG_CT_WG1_122E_GENERAL | 3GPP_TSG_CT_WG1_122e_general Closed 15/06/2020 done by TGV by requestt #2020-10 |
| 3GPP_TSG_CT_WG1_122E_IMS | 3GPP_TSG_CT_WG1_122e_IMS Closed 15/06/2020 done by TGV by requestt #2020-10274 |
| 3GPP_TSG_CT_WG1_122E_MC | 3GPP_TSG_CT_WG1_122e_MC Closed 15/06/2020 done by TGV by requestt #2020-10274 |
| 3GPP_TSG_CT_WG1_122E_SERVICES | 3GPP_TSG_CT_WG1_122e_services Closed 15/06/2020 done by TGV by requestt #2020-10 |
| 3GPP_TSG_CT_WG1_E_IMS | 3GPP_TSG_CT_WG1_E_IMS |
| 3GPP_TSG_CT_WG1_E_MAIN | 3GPP_TSG_CT_WG1_E_main |
| 3GPP_TSG_CT_WG1_E_MC | 3GPP_TSG_CT_WG1_E_MC |
| 3GPP_TSG_CT_WG1_E_SERVICES | 3GPP_TSG_CT_WG1_E_services |
| 3GPP_TSG_CT_WG1_MMS_SMS_CBS_AT | 3GPP_TSG_CT_WG1_MMS_SMS_CBS_AT:Commands closed 01/07/2015 |

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