UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

AT&T SERVICES INC., T-MOBILE USA, INC.,
CELLCO PARTNERSHIP D/B/A VERIZON WIRELESS,
ERICSSON, INC., AND
NOKIA OF AMERICA CORPORATION

Petitioners

v.

ASUSTEK COMPUTER INC.

Patent Owner.

Patent No. 10,951,359

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 AT&T Services Inc., T-Mobile USA, Inc., Cellco Partnership d/b/a Verizon Wireless, Ericsson, Inc., and Nokia of America Corp. ("Petitioners"), related to the IPR of U.S. Patent 10,951,359 ("'359 patent").

2. I am being compensated for my work in this matter at my normal consulting 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.

3. I have no financial interest in the '359 patent and have had no contact with the named inventors of said patent. Neither have I reviewed the '359 patent in detail, nor do I have any personal interest in the outcome of this IPR.

4. 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.

5. 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.

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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.

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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 have been involved with 3GPP since its inception. 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

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other Working Groups and covering similar technical aspects as in my previous work in ETSI. As an example, RAN WG1 was, and is, a Working Group responsible for the specification of the physical layer of the radio Interfaces for UE including physical layer procedures. 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

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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.

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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

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independent standardisation consultant.

18. For purposes of my analysis in this declaration, I have been informed that a person of ordinary skill in the art ("POSITA") in the field of the '359 patent at the time of the alleged invention of the '359 patent would have had the equivalent of an undergraduate degree in Electrical Engineering, Computer Science, or Computer Engineering, familiarity with the relevant 3GPP standards as of this time, and at least two years of experience in design, development, and/or testing of cellular networks. This definition is approximate, and more education may substitute for industry experience or vice versa.

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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 regular business 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 business 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.

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21. 3GPP is a global initiative partnership made up of Organizational Partners, Market Representation Partners, and Individual Members. **Appendix 5** at 8, 9; **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 9 (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 in a 3GPP Organizational Partner. **Appendix 5** at 9 (3GPP Working Procedures, "Individual Membership"); **Appendix 6** at 5 (textbook including a chart showing 3GPP structure at the time of publication); **Appendix 8** at

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9, 10. As an example of how prominent 3GPP was and remains in the industry, there were 567 participating Individual Members in 2018. **Appendix 7** at 9 (3GPP Project Coordination Group document showing 3GPP membership numbers to 2018). There were 781 individual members as of February 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 standardize 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

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the substantive contents of 3GPP technical specifications, an engineer could not develop products that were interoperable with the worldwide 3G, 4G, and 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

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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 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

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discussion have ever been placed on 3GPP documents. **Appendix 10** at 7 ("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

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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

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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. 3GPP 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"), 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

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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. 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 2018 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.

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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 1. The Numbering Scheme webpage included a table showing the subject matter corresponding to each series. **Appendix 12** at 1. For example, the "36 series" focused on Evolved UTRA (LTE) aspects. **Appendix 12** at 1. An interested POSITA could narrow down the relevant specifications based on whether the specification applied to only 5G NR, evolved UTRA (aka 4G or LTE), to 3G, to GSM, or to GSM, 3G and evolved UTRA (GSM only specifications were transferred from ETSI to 3GPP in July 2000). For a specification in the 21–35 series, this could be determined based on the third digit of the specification number, where a "0" would indicate that the specification applied to both systems. **Appendix 12** at 1. Specifications outside the 21–38 series in 2018 applied only to GSM systems. **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 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-

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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 3. 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 had been moved to 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 '359 patent relates to cellular telecommunications networks, and more particularly to methods, systems, and computer program products for providing control resource set configuration in

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a wireless communication system. Any POSITA interested in methods, systems, and computer program products for providing control resource set configuration 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 also mentioned in paragraph 29, and 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. The agreement of proposals submitted as TDocs results in the production of technical specifications.

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

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information regarding the 3GPP specifications.

39. Each TDoc was assigned a TDoc number, according to a standard format set by 3GPP.[1] As described in the 3GPP Working Procedures, the numbering system followed the format xminnzzzz. **Appendix 5** at 20. 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 20. A document for RAN WG1 would therefore begin with "R1". The two digits "nn" represented the year (*e.g.*, 16), 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, although some TDocs including those created at meetings, were uploaded during or after the meeting. **Appendix 10** at 8. The documents were uploaded to the public file repository in an area allocated to the particular Working Group. **Appendix 22** at 2 (RAN WG1 homepage with link to WG1's "Documents area"). Immediately upon upload, any member of the public could download and

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

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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.

42. It is my recollection that, during the 2017 - 2018 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 documents 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. POSITAs would have known which Working Groups focused on particular subject matter.

43. An interested member of the public could locate specifications of interest by first navigating a web browser to the 3GPP website (www.3gpp.org). In

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the 2018 timeframe, to locate documents from the 3GPP home page, a user could have clicked "Specifications" **Appendix 14**. The corresponding webpages contained links to the 3GPP's public file repository (*e.g.*, directly via the "file server area" link, or via the "numbering page" and subsequent links). **Appendix 11**. 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 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 on subject matter, as reflected by directory "Specs" containing Technical Specifications and Reports for each TSG meeting cycle and an archive of all specifications organised by series number, as well as the division of subject matter among the various TSGs and Working Groups. Specifically, a POSITA could select the Specs directory and follow subsequent links to access specifications covering the subject matter of interest. **Appendix 15**, **Appendix 16**.

45. If the individual were interested in the latest version of a 5G NR specification, they would click "latest". From there, the individual would click on

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the particular release they want, e.g. "Rel-15" and the specification "38_series" covering the subject matter of interest. **Appendix 17, Appendix 18**.

46. For example, if the individual were interested in Physical Layer procedures for control, the individual would know to choose the link for 38213-f20.zip to download that specification.

47. Alternatively, to access TDocs, an individual would select the relevant TSG covering the subject matter of interest. **Appendix 15**.

48. 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 23**.

49. For example, if the individual were interested in the Radio Interface physical layer, the individual would know to choose the folder for WG1. 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. **Appendix 24**.

50. As shown, a folder existed for each meeting. For example, "TSGR1_90b" corresponded to TSG RAN WG1 Meeting #90bis, and the timestamp associated with the meeting #90b directory indicates that, as of October 2017, the TSGR1_90b directory had most recently been updated on November 17, 2016. **Appendix 24** at 3.

51. A POSITA would know which meeting(s) would have covered

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particular subject matter based on the working groups area of responsibility (*e.g.* for RAN WG1 - **Appendix 14)**, and from publicly available meeting agendas. *E.g.*, **Appendix 25** (see link to agenda for RAN WG1 Meeting #90b). Further, an individual could ascertain what subject matter was addressed at each meeting by reviewing the report issued after each meeting, stored in the Report directory **Appendix 25**.

52. 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.

53. 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 (3GPP FAQs). This has always been the practice regarding uploading documents to the 3GPP file repository, and my personal experience confirms that the time stamps

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have always been a reliable way to determine when a file was uploaded to the 3GPP website and immediately available for public download.

F. Ex. 1006: 3GPP TS 38.213 V15.2.0 (2014-06) 3rd Generation Partnership Project; Technical Specification Group Radio Access Network; NR; Physical layer procedures for control (Release 15)

54. 3GPP TS 38.213 v15.2.0 is a Technical Specification titled "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; NR; Physical layer procedures for control (Release 15)".

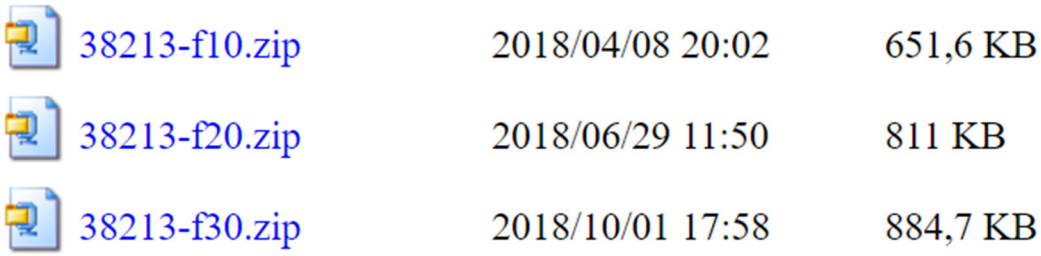
55. The date on the face of the specification ("2018-06") corresponds to the year (2018) and month (June) that this version of the specification was approved by 3GPP TSG RAN and subsequently made publicly available.

56. 3GPP TS 38.213 v15.2.0 being an approved version of the Release 15 specification on 5G NR physical layer procedures for control was approved by TSG RAN #80 held June 13 – 15, 2018. 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 the TS 38.213 v15.2.0 is confirmed by the approval of the Change Requests to TS 38.213 v15.2 documented in the TDoc list of the meeting report from TSG RAN #80 (**Appendix 20**, CRs_RAN_80 tab**,** index 1312).

57. The 3GPP file server is and always has been open to all and free from

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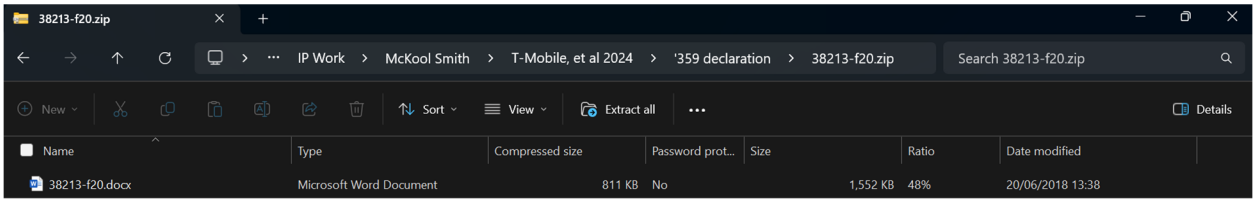
restriction such as username or password. By way of different example to that in paragraphs 41 and 42 above, of how an interested member of the public could access the TS 38.213 v15.2.0 technical specification from the 3GPP website, I accessed the file server by going to the 3GPP website at http://www.3gpp.org/, selected "Specifications & Technologies" from the menu bar, and then selected "Specifications by series" from the dropdown menu. I then selected the "38 Series" link to access the public file server where the specifications are stored. I then searched for "38.213" in the specification number search bar, and for the TS 38.213 specification selected the eyeglasses icon that says "See details" when a cursor is placed on it. From there, I selected "Click to see all versions of this specification," which took me to the archive housing all versions of TS 38.213 found at the following URL: https://www.3gpp.org/ftp/Specs/archive/38_series/38.213. A true and correct copy of the relevant portion of the directory listing produced by the file server website is provided below and in **Appendix 21** at 1.



58. The archive directory index stated that TS 38.213 v15.2.0 was uploaded on "2018/06/29". Selecting the link for "38213-f20.zip", I downloaded a zip file of

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the same name. The zip file contained a Microsoft Word document titled "38213-f20.doc" with a date stamp of "20/06/2018" (European date format). An excerpt of the zip file directory is provided below.



59. I have confirmed that the document "38213-f20.doc" is TS 38.213 v15.2.0. A true and correct copy of the Microsoft Word document titled "38213f20.doc" is the TS 38.213 v15.2.0 that is provided in EX. 1006.

60. Based on my experience, I understand these date stamps to mean that 38213f20.zip was uploaded to 3GPP's publicly available website on June 29, 2018, and that an interested member of the public could have downloaded the zip file, extracted the Word document enclosed, viewed the contents of the Word document, and further disseminated said document without restriction on June 29, 2018 and thereafter.

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G. Ex. 1019: 3GPP R1-1718834, A.I 7.1.3.2, "Summary of key aspects for search space"

61. R1-1718834 is a technical contribution submitted to 3GPP TSG RAN WG1, meeting #90b, which was held between October 9 – 13, 2017. It follows the general naming format ("xminnzzzz") described in paragraph 39[2]. Accordingly, "R1" indicates that the contribution was submitted to RAN WG1, "17" indicates the year (2017) that this technical contribution was submitted, and "18834" is the unique number that was assigned to this contribution document. It is titled "Summary of key aspects for search space".

62. As I mention in paragraph 41 above, 3GPP meeting documents have always been, and were in the 2017 timeframe, made publicly available on the 3GPP public file server from where an interested member of the public exercising reasonable diligence could freely access them. To confirm the availability of R1-1718834 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 drop down menu, and then selected the "RAN1 – Radio Layer 1 (Physical Layer)" from the 3GPP Groups page, and 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 RAN WG1 #90b. A true and correct copy of the

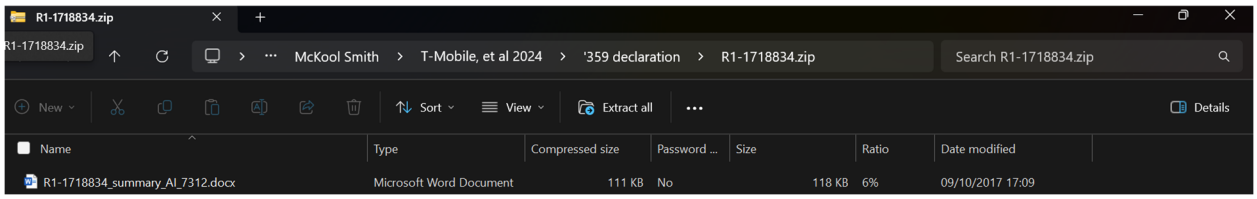
[2] Note that from 2016, RAN1 added another digit to the unique identifier "z" field to cater for the increasing number of Tdocs being submitted.

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relevant portion of the Documents directory listing produced by the file server website is provided below and in **Appendix 26** at 56.

R1-1718833.zip	2017/10/09 18:41	92,2 KB
R1-1718834.zip	2017/10/09 18:41	110,9 KB
R1-1718835.zip	2017/10/11 5:32	33,6 KB

63. The Docs directory index stated that R1-1718834 was uploaded on "2017/10/09". I selected the link for "R1-1718834.zip" and downloaded a zip file of the same name. The zip file contained a Microsoft Word document, "R1-1718834_summary_AI_7132.docx", with a date stamp of "09/10/2017" (European date format) the same date that the zip file was uploaded.



64. A true and correct copy of the document within the zip file (R1-1718834_summary_AI_7132.docx) is provided as Ex. 1019. Based on my experience, I understand that these date stamps mean that R1-1718834.zip was uploaded to 3GPP's publicly available website on October 9, 2017, at the beginning of the RAN WG1 #90b meeting, 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 October 9, 2017 and thereafter. The

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draft report from RAN WG1 #90b confirms the availability of R1-1718834 at the meeting (**Appendix 27** at 110). I have no reason to believe that either the date stamp or the report from RAN WG1 #90b are inaccurate. I have therefore determined that R1-1718834 was publicly available on the file server no later than October 9, 2017.

65. Based on the information above, it is my opinion that R1-1718834 titled "Summary of key aspects for search space" and provided as Ex. 1019 was publicly available to download from the 3GPP file server no later than October 9, 2017 and could have been distributed thereafter without restriction. Further, it was publicly available at the 3GPP TSG RAN WG1 #90b meeting held from October 9 - 13, 2017.

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IV. CONCLUSION

66. 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.

May 31, 2024



Printed Name: Craig Bishop

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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

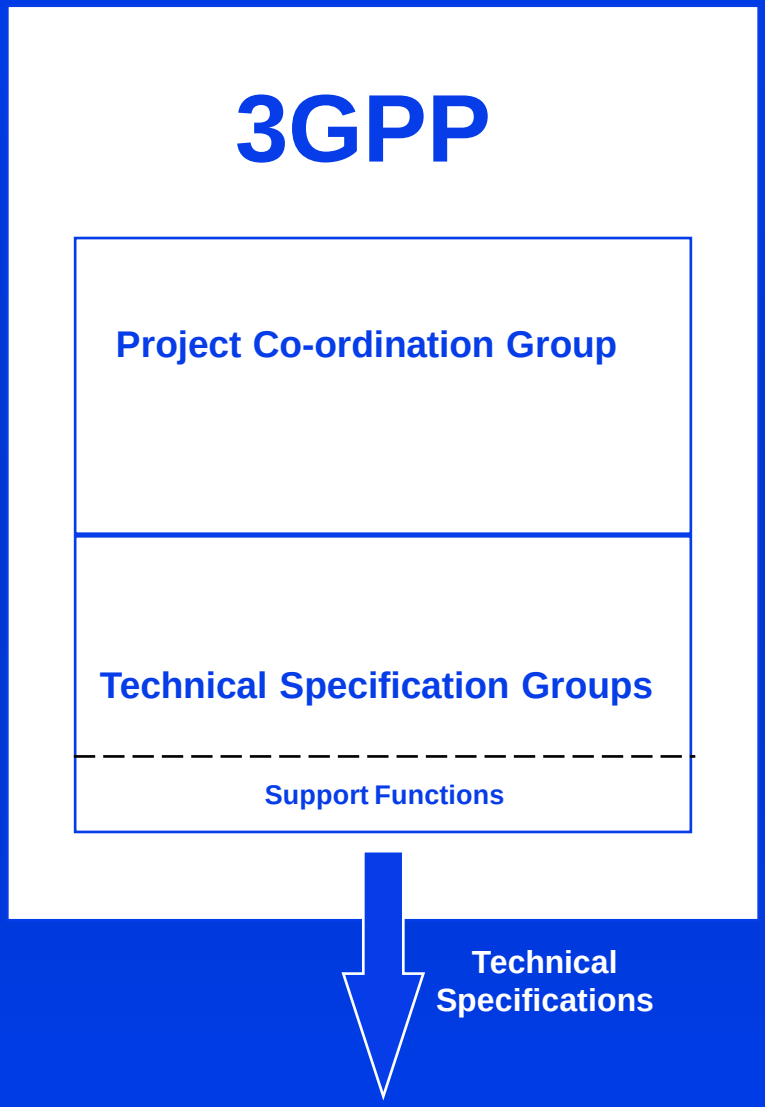
Standards organizations and other related bodies have agreed to co-operate for the production of a complete set of globally applicable Technical Specifications for a 3rd Generation Mobile System based on the evolved GSM core networks and the radio access technologies supported by 3GPP partners (i.e.,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

Petitioners' Exhibit 1007, p. 47
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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)**

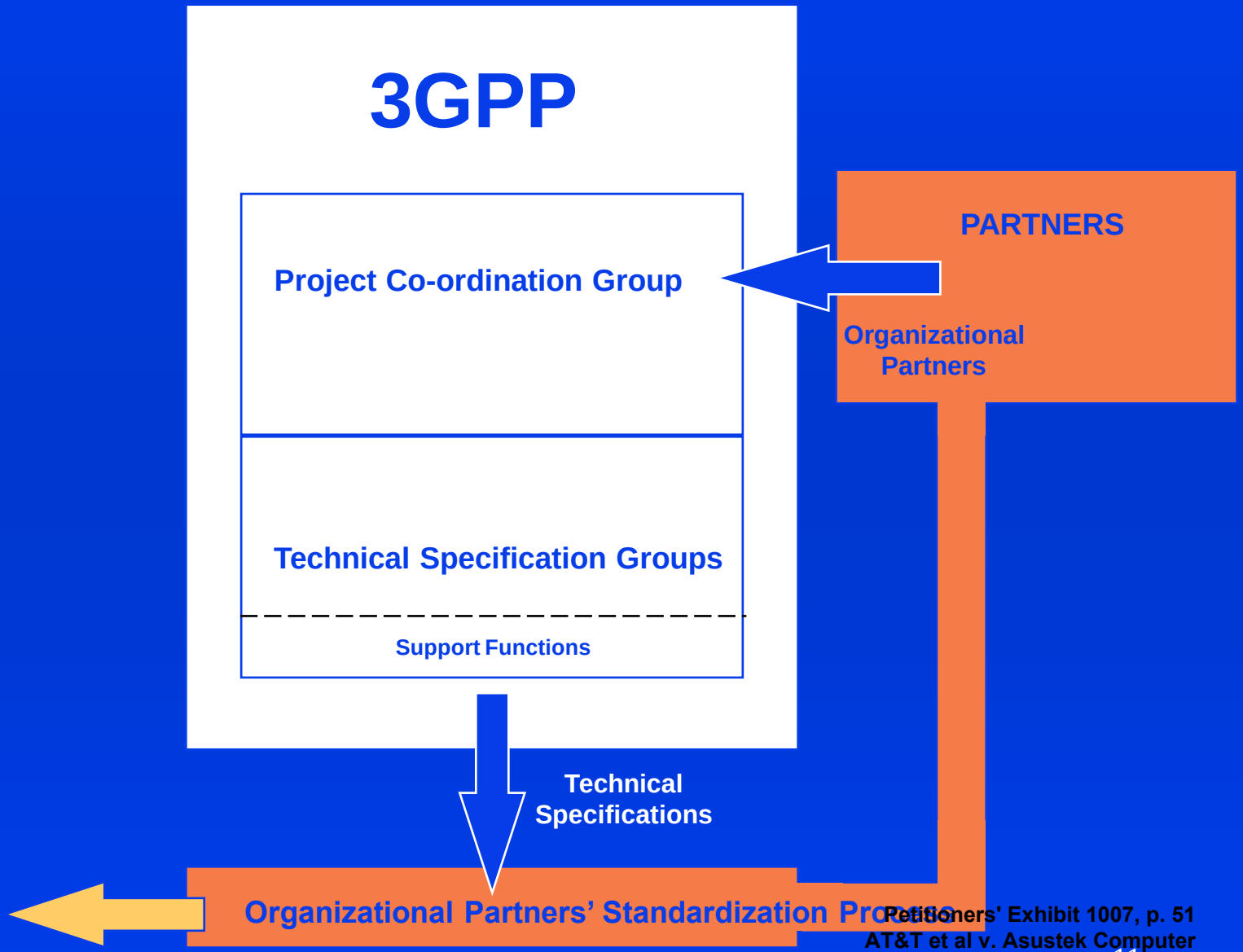
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Partnership and Membership

3GPP comprises of:

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

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)

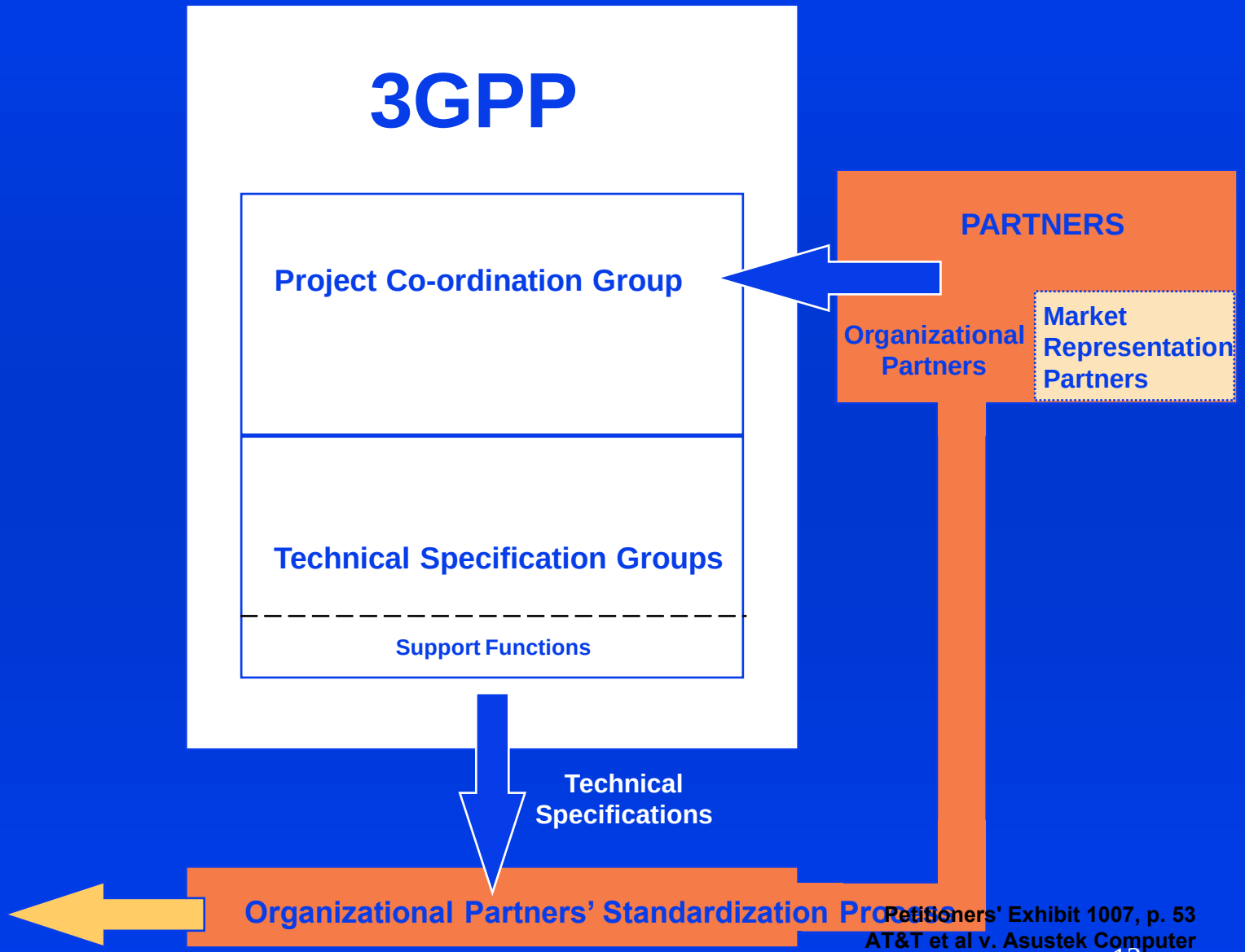
that:

- **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.

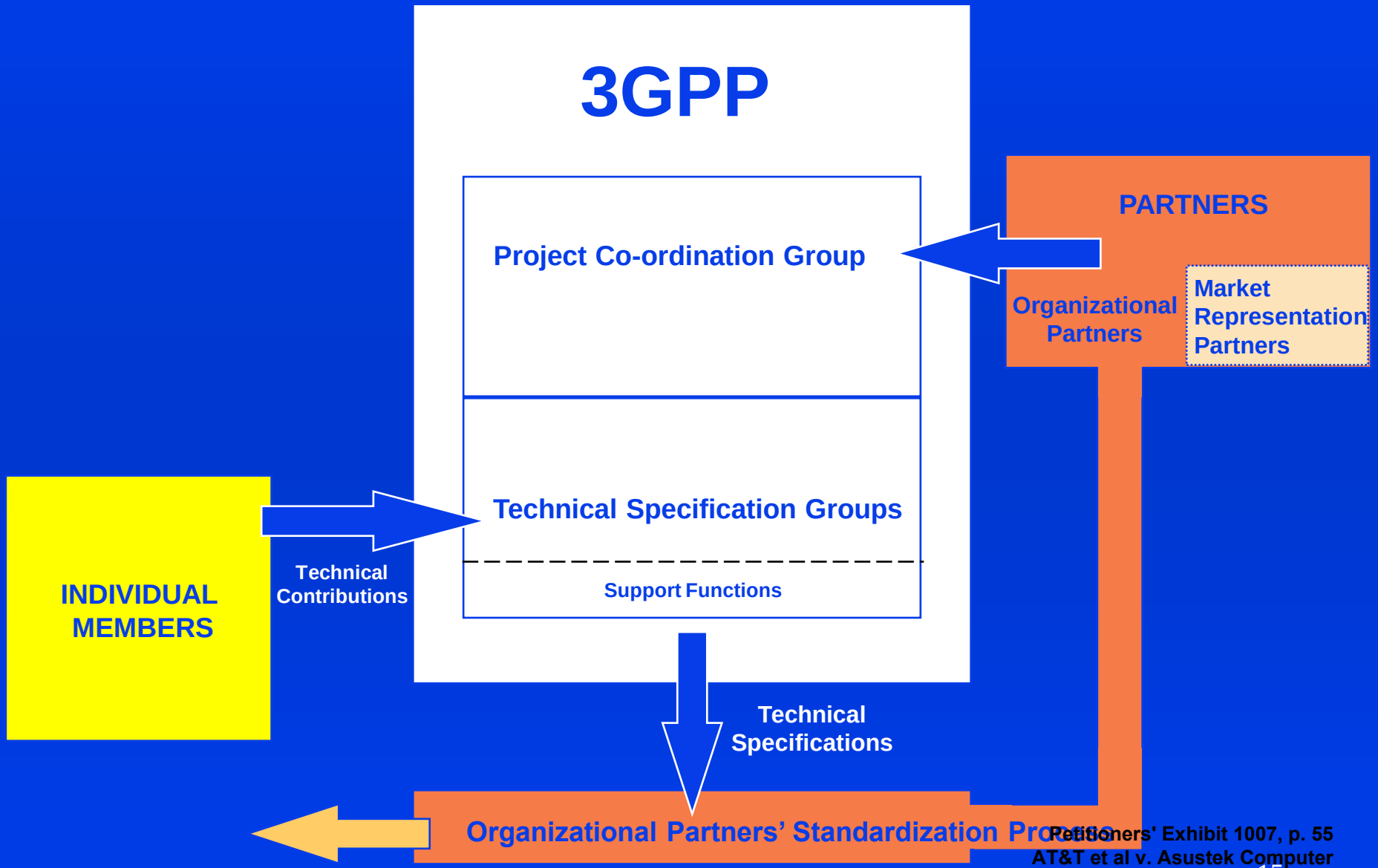
A Market Representation Partner is an organization invited to participate by the Organizational Partners to offer market advice to 3GPP and to bring into 3GPP a consensus view of market requirements (e.g. services, features and functionality) falling within the 3GPP scope.

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**

Petitioners' Exhibit 1007, p. 54
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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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The following 3 documents describe 3GPP:

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

Petitioners' Exhibit 1007, p. 59
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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.

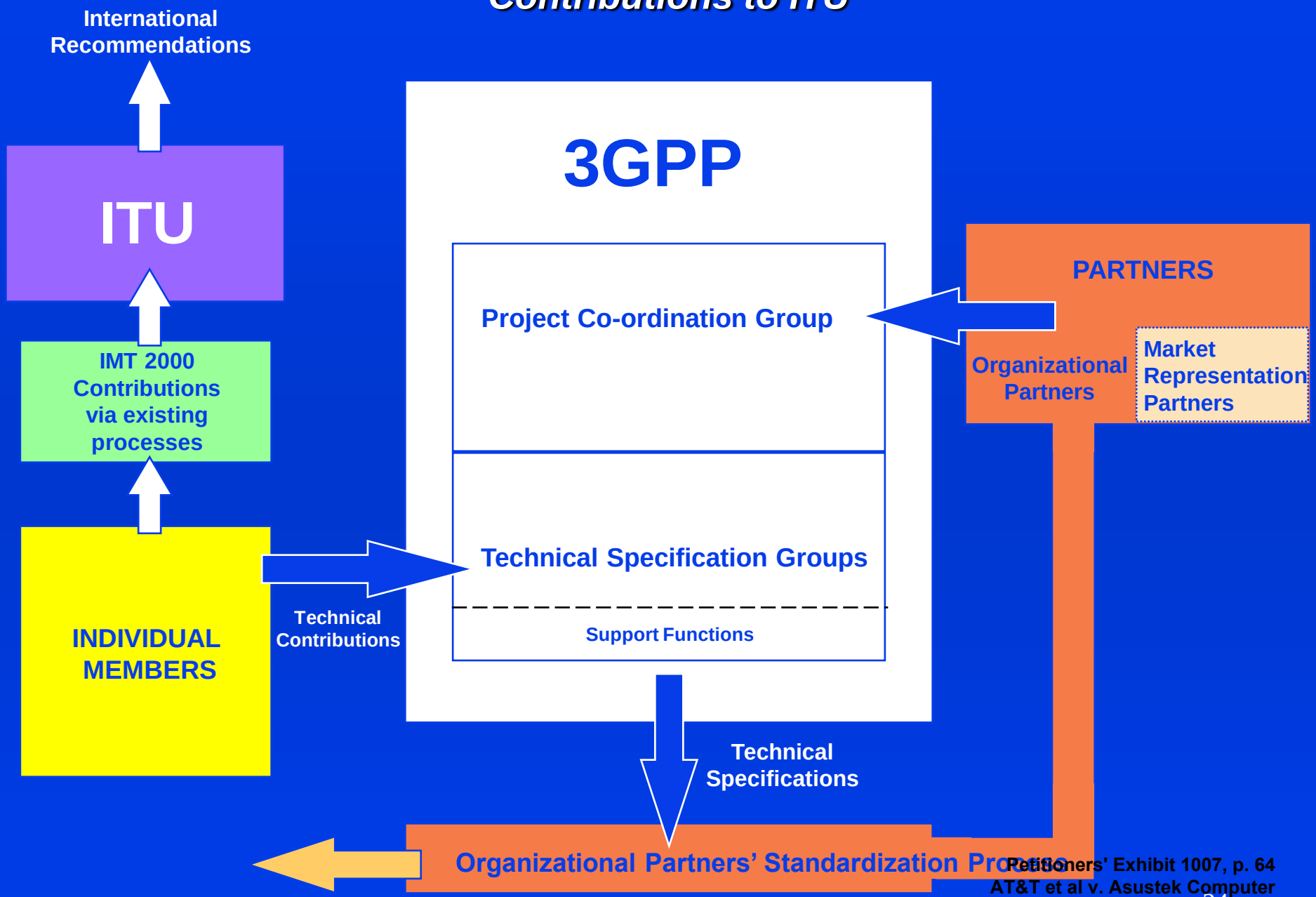
Petitioners' Exhibit 1007, p. 62
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Ownership of the Partnership Project results

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

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Contributions to ITU



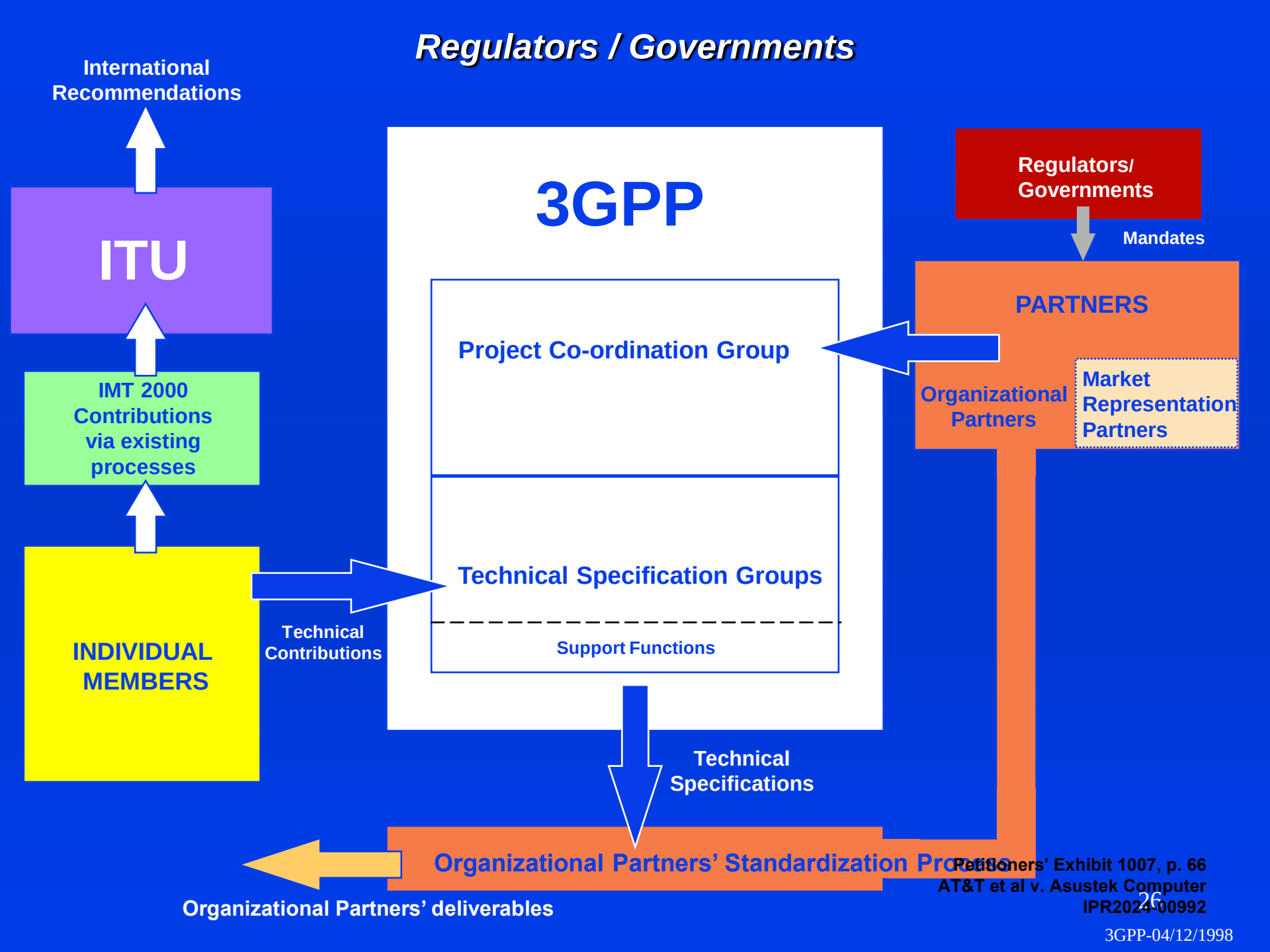
Petitioners' Exhibit 1007, p. 64
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Submission of 3GPP results to ITU

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.

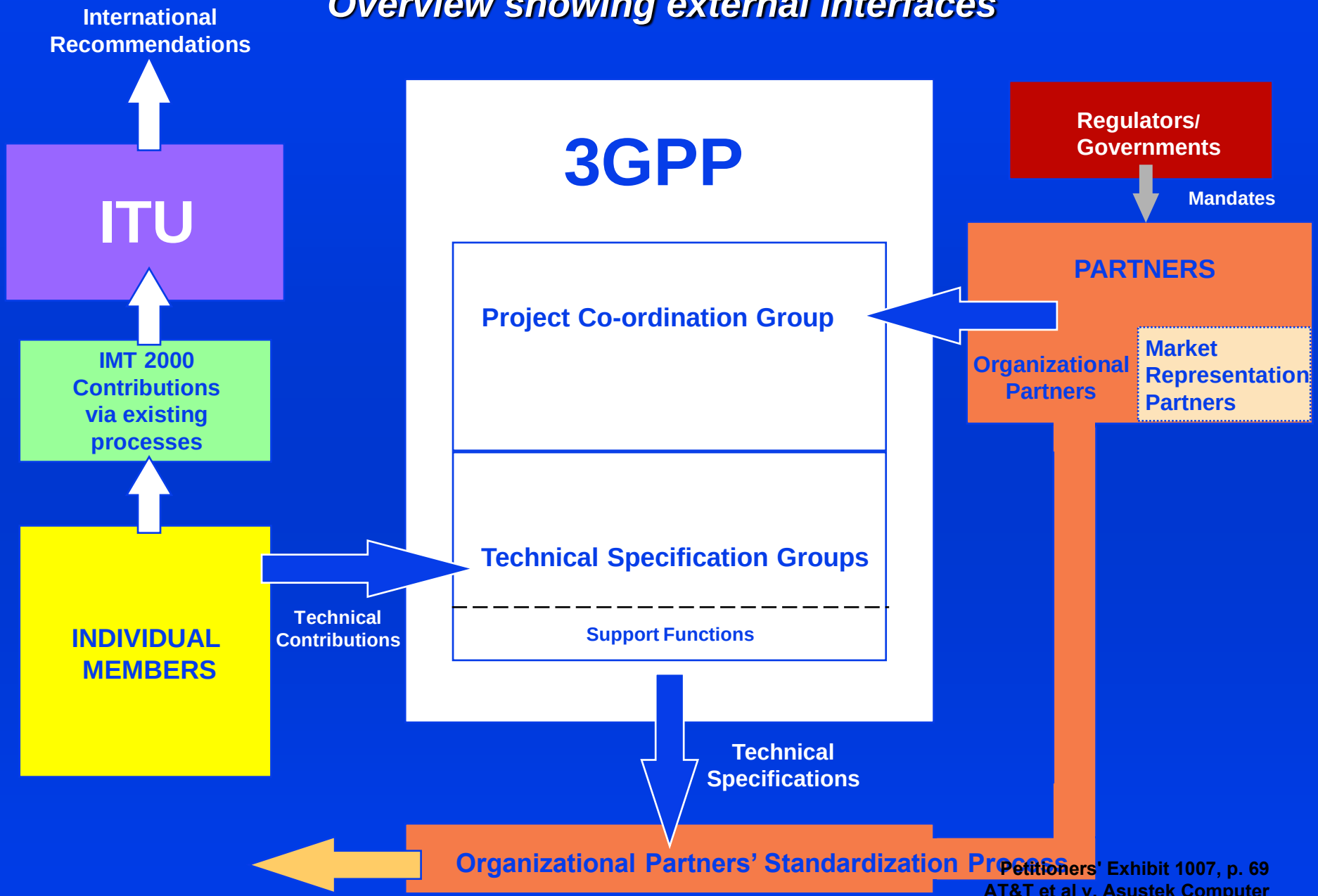
Thereafter, the costs will be shared by the Organizational Partners. There will be no direct 3GPP membership fee for Individual Members.

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



Petitioners' Exhibit 1007, p. 69
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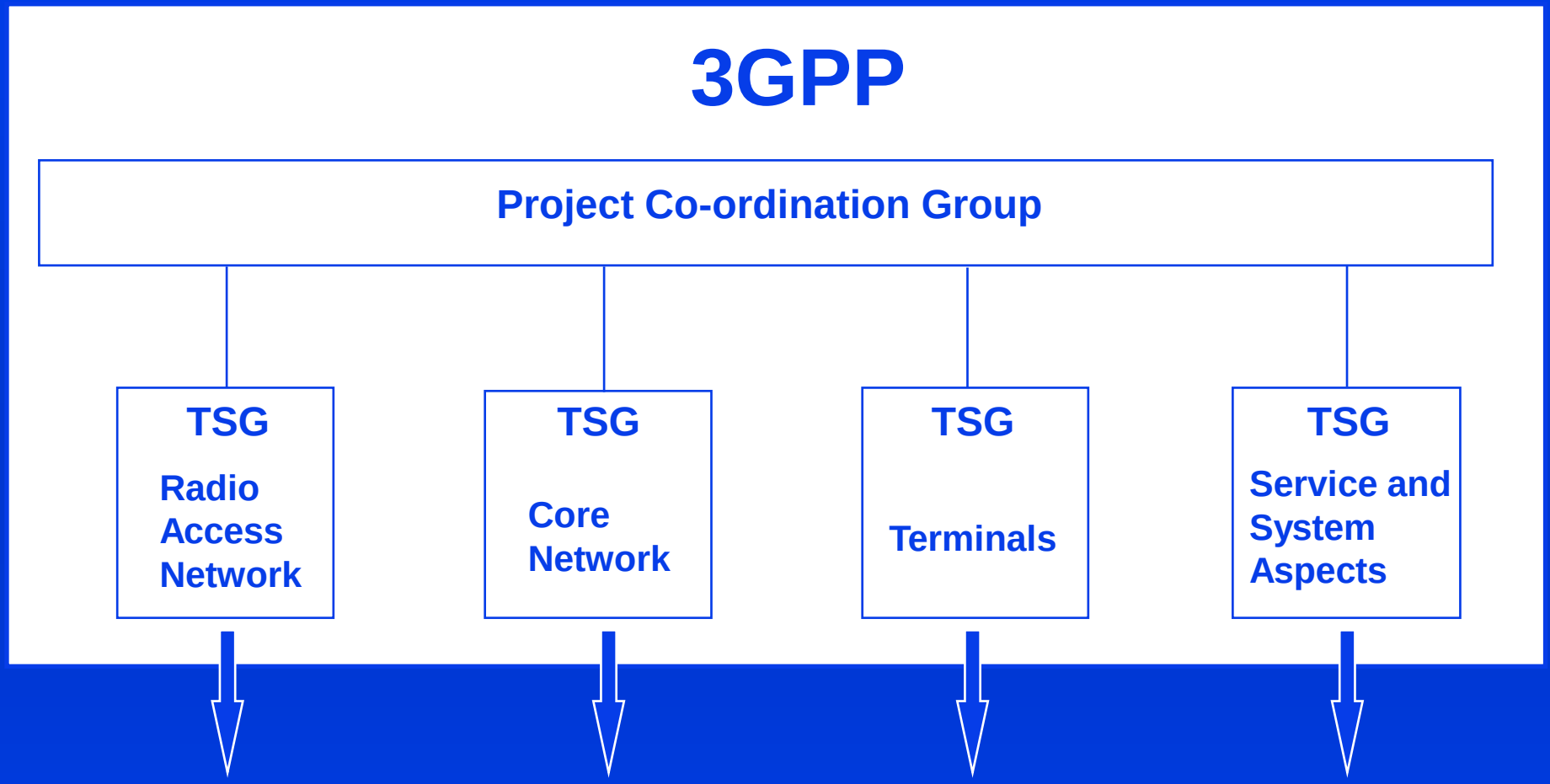
Internal structure of 3GPP (1)

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

Petitioners' Exhibit 1007, p. 72
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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

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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.

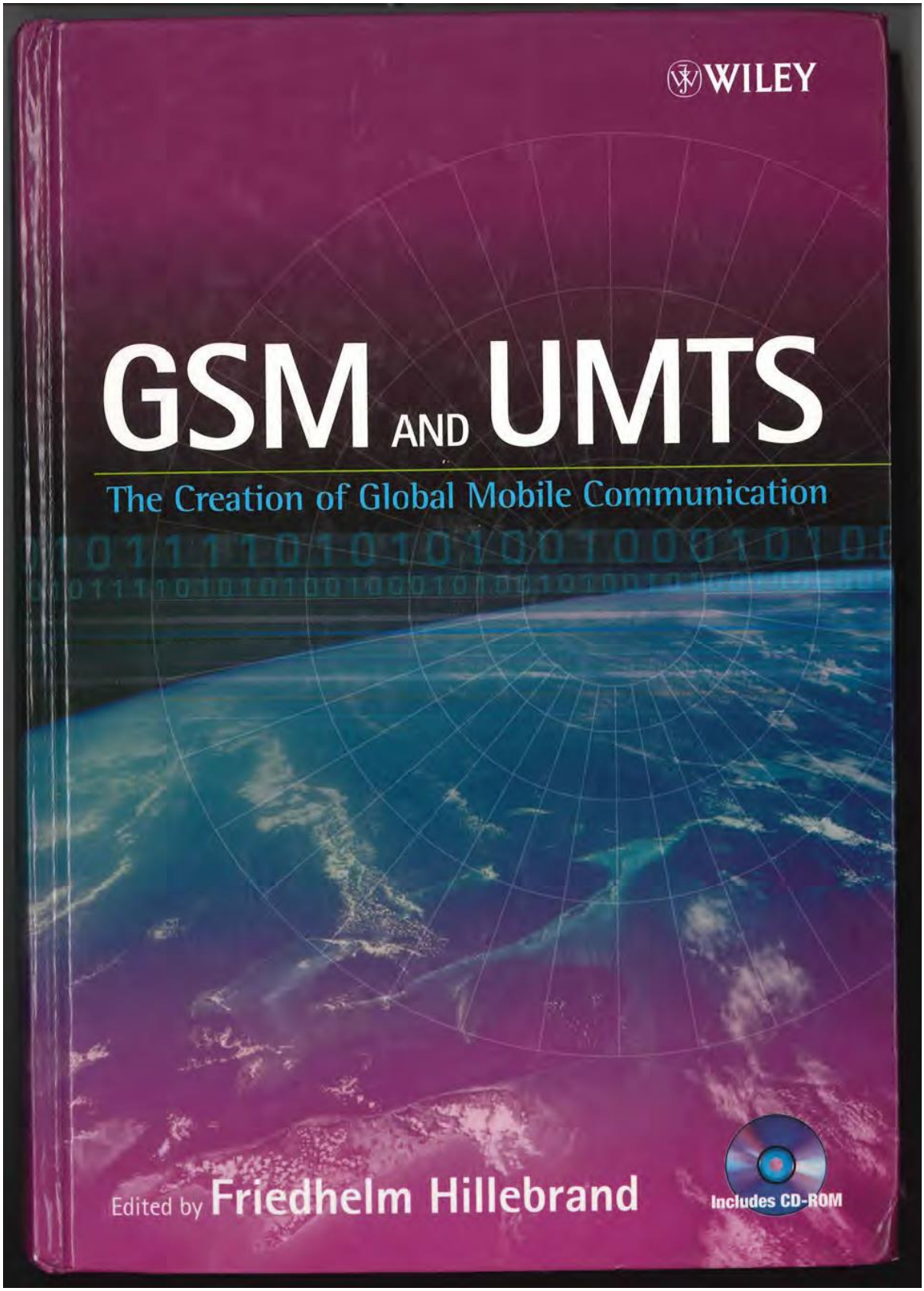
For details of the contents of each Release, see the appropriate 'Release Description' document or go to our dedicated Release page.

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'.

Previous Next

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APPENDIX 4



Petitioners' Exhibit 1007, p. 93
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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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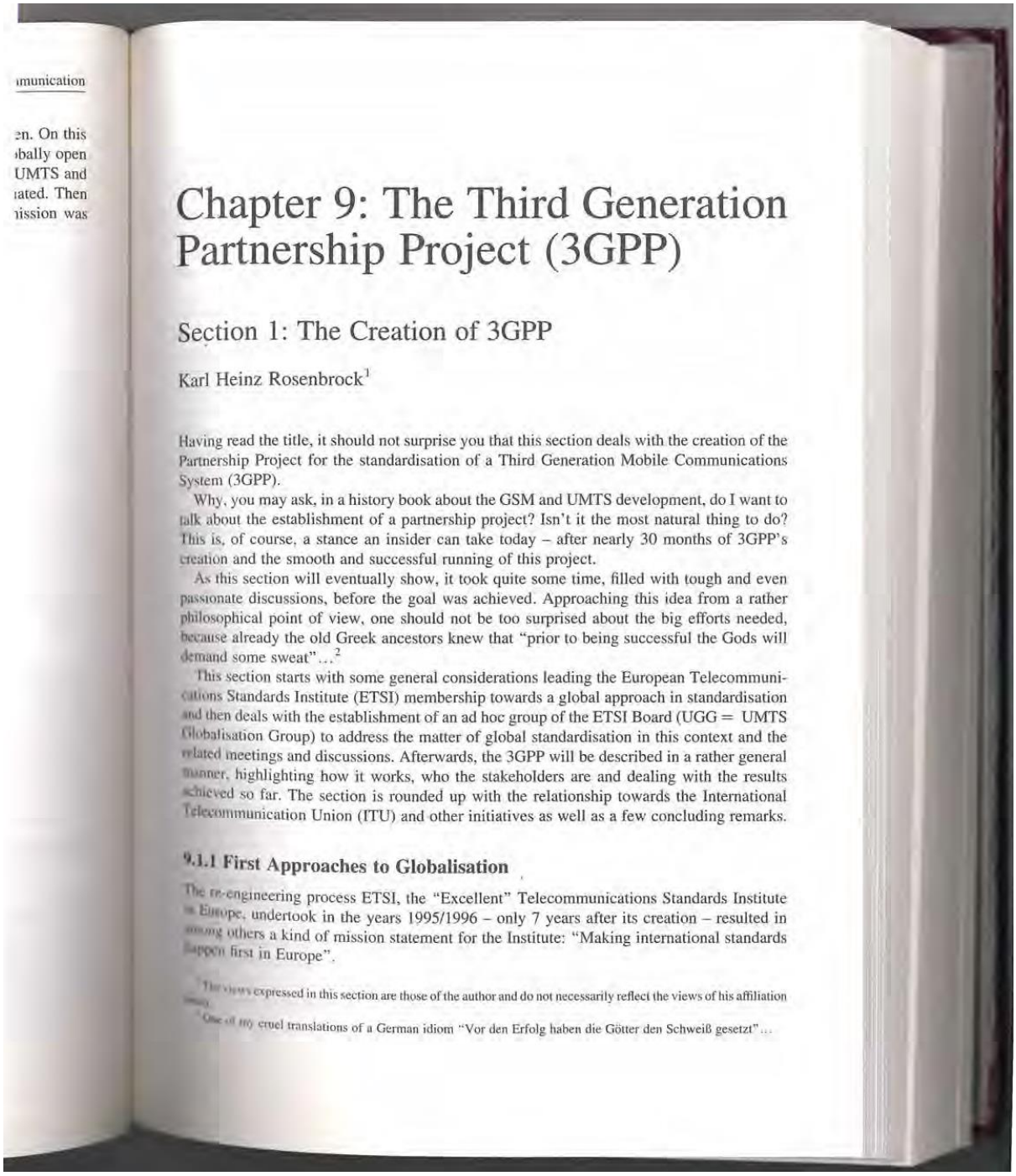
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Chapter 9: The Third Generation Partnership Project (3GPP)

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 [illegible].

[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

01 September 2022

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Foreword

These Working Procedures of the Third Generation Partnership Project (3GPP) are effective from 01 September 2022.

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.

top

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.

top

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.

top

Article 9: Termination of Individual Membership

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

top

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.

top

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 of 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 the leadership/support role with impartiality and in the interests of 3GPP.

top

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.

top

SECTION E: PROJECT CO-ORDINATION GROUP (PCG)

Article 14: PCG tasks

The PCG shall perform the following tasks:

- appointment of PCG Chair and Vice Chairs;
- 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 Chairs and Vice Chairs, 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 Chair and Vice-Chairs);
- A maximum of three representatives of each Market Representation Partner. (MRPs are however urged to limit their participation to one representative wherever possible.);
- The Chairs and Vice Chairs of the TSGs as ex-officio members;
- A maximum of three ITU representatives;
- One representative of each Observer.

top

Article 16: PCG appointment of Chair and Vice Chairs

The PCG shall appoint their Chair and Vice Chairs from amongst the Organizational Partner representatives.

The Chair and Vice Chairs shall be appointed for a one year term of office.

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

Successive Chairs and Vice Chairs 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 Chair and Vice Chair Responsibilities

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

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

The Chair may nominate officials to assist in the work.

The Chair may be assisted by the Support Team.

The Chair may delegate tasks to the Vice Chairs.

In performing their leadership role, the Chair and Vice Chairs 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.

top

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.

top

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 Chairs and Vice Chairs of the TSGs shall be taken into account during the consensus building process. If consensus cannot be achieved, the PCG Chair 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.

top

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 Chair and Vice Chairs 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 Chair and Vice Chairs

22.1 TSG elections

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

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

A candidate for election to a TSG Chair or Vice Chair position shall provide a letter of support from the Individual Member that they represent. 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 the capacity of TSG Chair or Vice Chair.

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

The Chair and the Vice Chairs shall be elected for a two year term of office. The Chair and Vice Chairs 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 Chair 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 Chair is not permitted to stand for another consecutive term until after this deadline.

- A Vice Chair is not permitted to stand for another consecutive term in a Vice Chair 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 Chair 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 Chair positions, then any incumbent Vice Chair may put forward their candidature.

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

Should the office of Chair or Vice Chair 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 Chair, and one or more of the Vice Chairs 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 Chair in the event that a Vice Chair be elected to the office of Chair. If at the special election the Vice Chair is elected to the office of Chair, that individual shall become Chair immediately, and, the position of Vice Chair thus being vacant, an election shall be held for the office of Vice Chair.

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

If a Chair or Vice Chair changes the Individual Member that they represent (e.g., job change, merger or acquisition) during their term of office, a new letter of support shall be provided. In order to provide a new letter of support, a Chair or Vice Chair 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 Chair or Vice Chair 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 Chair or Vice Chair 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 Chair or Vice Chair elected at a special election is a partial term lasting until the end of the current term. If a new Chair or Vice Chair is elected at a special election then the partial term of office does not count towards the two consecutive term limit. If the previous Chair or Vice Chair 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.

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

Successive Chairs 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 Chair and Vice Chairs 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 Chair and Vice Chairs 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 Chair and Vice Chairs 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 Chairs and Vice Chairs shall be as for TSG Chairs and Vice Chairs 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 Chairs.

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

WG Chairs and Vice Chairs 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 Chair or Vice Chair is re-elected in the special election. In this case the Chair or Vice Chair continues for the unexpired period of the present term of office.

Note: For this reason, elections for WG Chairs and Vice Chairs 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 Chair and Vice Chairs hold office immediately, without need of appointment by TSG or PCG.

If a WG does not meet physically with enough frequency to maintain an up to date voting list, the working group may elect to escalate the voting for officers to the parent TSG.

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Article 23: TSG and WG Chair and Vice Chair responsibilities

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

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

The Chair may nominate officials to assist in the work.

The Chair may delegate tasks to the Vice Chairs.

The Chair may be assisted by the Support Team.

The Chair shall form a Management Team, including the Vice Chairs and Support Team, in order to assist in discharging the Chair’s duties.

Recognizing the need to balance the requirement of rapid specification development with the limited resources of delegates, the Chair 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 Chair and Vice Chairs 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.

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Article 24: TSG and WG Chair and Vice Chair dismissal

A secret ballot shall be taken for the proposal to dismiss a TSG or WG Chair or Vice Chair 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 Chair or Vice Chair on the proposal of the TSG.

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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 Chair 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 Chair 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 Chair 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.

If a WG does not meet physically with enough frequency to maintain an up to date voting list, the working group may elect to escalate the voting to the parent TSG.

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.

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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 Chair;
- 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.

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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 Chair 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.

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

In the case where there is more than one candidate for TSG or WG Chair or Vice Chair, 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 Chair shall be responsible for the voting process and shall ensure that confidentiality is maintained.

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Article 29: TSG or WG appeal process

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

When a TSG or WG Chair has made a ruling, their 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 Chair or Vice Chair 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 their objection to the PCG for consideration. In such cases the Individual Member shall also inform the relevant TSG or WG Chair.

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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 30A: TSG and WG participation

IMs wishing to progress work on topics in 3GPP are expected to participate physically in the meetings.

If a 3GPP IM is materially interested in a specific topic but is unable to participate in a meeting by sending a delegate, the IM is urged to engage the support of other IMs whose delegates will be present at the meeting to present its views. If this is not possible for any reason, the IM may advise the Chair of the situation and may provide documents supporting their position. The Chair may facilitate the introduction of these documents during the meeting and the record of the meeting can include the discussion and outcome. Note that physical participation in meetings is considered the norm and the option to engage the Chair is intended for exceptional situations. The Chair has the right to decline the request.

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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.

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Article 32: TSG and WG meeting agenda

The draft agenda for a TSG or WG meeting shall be disseminated by the responsible Chair 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). The draft agenda shall indicate the deadlines (dates and times) for registration and meeting document submission to the TSG/WG meeting. Other deadlines may also be indicated (whenever required).

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Article 33: TSG and WG meeting registration

Delegates and officials must register before participating in any 3GPP meeting. Each delegate or official who represents an Individual Member shall declare the precise name of that Individual Member. A delegate or official may only register to represent one Individual Member.

The deadline for registration for all delegates and officials is one week in advance of the start of the meeting. Registrations after this deadline will still be processed, but timely receipt of meeting related information is not guaranteed for late registrants.

To aid in communication, delegates or officials at co-located meetings may briefly visit a meeting they have not registered for. However, any extensive involvement such as presenting a contribution or formally objecting requires prior registration to the meeting.

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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**.

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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.

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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.

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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.

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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.

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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.

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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 Chair. 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.

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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.

- top

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.

top

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 Chair. 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 Chair. 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: Chair’s reporting obligations

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

top

Article 49: Changes to structure and officials

The Chair 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 Chair and the appropriate ITU sector convener (if one exists for the given ITU sector). The working group's TSG Chair 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 Chair 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.

top

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 Chair, 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.

top

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.

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.

top

Article 60: Amendments to 3GPP Working Procedures

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

top

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 Chair, Vice-Chair, 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. 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
IM	Individual Member
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.

top

Annex D: (Void)

top

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.

top

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.

top

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 Chair or, if unavailable, a Vice Chair. 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 Chair 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 their 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 their represented organization 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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Petitioners' Exhibit 1007, p. 141
AT&T et al v. Asustek Computer
IPR2024-00992

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. If the draft agenda for the designated meeting has already been issued, then it will be updated to include the potential for voting on the working agreement. Voting is as described in articles 25, 26 and 32 of the working procedures with the exception that the requirement for quorum is waived.
- 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: Special procedures for exceptional situations restricting travel

3GPP working procedures are designed around the concept of periodic face to face meetings. This is not always possible. This annex implements modifications to the working procedures intended to allow 3GPP to function in the absence of face to face meetings. The PCG has the responsibility of activating and deactivating this annex.

The following changes in the working procedures are in effect when this annex is activated:

Article 14: PCG tasks

The following item shall be added to the list of PCG tasks:

- *maintenance of the voting and voting rights process integrity, to include disciplinary action if required.*

Article 22: TSG and WG election of Chair and Vice Chairs

The following paragraph is removed from section 22.2

If a WG does not meet physically with enough frequency to maintain an up to date voting list, the working group may elect to escalate the voting for officers to the parent TSG.

Article 26: TSG and WG voting during a meeting

The following additions to article 26 are in effect:

If voting occurs in the context of an Electronic Meeting, then:

- *Proxies are not allowed.*
- *Quorum does not apply.*
- *The voting period shall be a minimum of 18 consecutive hours excluding the period 12:00 UTC Friday to 11:59 UTC Monday which excludes Saturday and Sunday in every time zone. The use of 18:00 UTC to 12:00 UTC the next day is recommended for the voting period.*
- *The voting period shall commence no earlier than the start of the Electronic meeting and complete before the closure of the meeting. Voting for elections may exceptionally extend past the scheduled end of the meeting if additional rounds are required to complete the election of all open positions. Such elections are considered to be part of the meeting in which the elections started.*
- *The starting and closing times of the vote shall be clearly announced and disseminated to all on the principal TSG or WG membership mail exploder lists.*
- *The list of Voting Members (IMs that are eligible to vote) is as defined in article 35. Delegates vote on behalf of the IM under which they have registered, and only delegates checked in to the meeting may vote.*
- *If, in accordance with Article 25, the TSG or WG decides that a secret ballot is required, voting shall preserve the secrecy of the votes cast.*
- *A secure voting tool provided by the MCC shall be used for elections, and is also encouraged for other matters where voting is required.*

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

The following new paragraph is added to the end of article 28:

If an election is held during an electronic meeting, the voting shall use the voting procedures described in Article 26 as amended by this Annex.

Article 30: TSG and WG meetings

The following new paragraph is added after the 2nd paragraph of this article:

Electronic meetings are encouraged where appropriate.

Article 30A: TSG and WG participation

The text in article 30A shall be replaced with:

IMs wishing to progress work on topics in 3GPP are expected to participate in both face to face meetings and electronic meetings.

If a 3GPP IM is materially interested in a specific topic but is unable to participate in a meeting by sending a delegate, the IM is urged to engage the support of other IMs whose delegates will be present at the meeting to present its views. If this is not possible for any reason, the IM may advise the Chair of the situation and may provide documents supporting their position. The Chair may facilitate the introduction of these documents during the meeting and the record of the meeting can include the discussion and outcome. The option to engage the Chair is intended for exceptional situations. The Chair has the right to decline the request.

Article 32: TSG and WG meeting agenda

The following paragraph is added:

The draft agenda shall indicate the start and end dates and times of the meeting. The draft agenda shall indicate if the meeting counts toward maintenance of voting rights.

Article 35: TSG and WG Voting Membership List

35.3 Established TSGs and WGs

The text in section 35.3 shall be replaced with:

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

An individual member having attained voting rights according to clause 35.4 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 attained voting rights as described in clause 35.4.

35.4 Removal from and instatement to voting list

The word *reinstatement* in the title of section 35.4 shall be replaced by *instatement*

The text in section 35.4 shall be replaced with:

An Individual Member shall be removed from the voting list when either of the following happens:

1. *The Individual Member is not represented at three consecutive face to face ordinary meetings of the group (TSG or WG),*
2. *The Individual Member is not represented in two consecutive ordinary meetings of the group (TSG or WG) of which at least one is electronic*

The right to vote shall be instated or reinstated for an Individual Member at either of the following events:

1. *the second face to face ordinary meeting which a delegate of the Individual Member attends without missing the number of consecutive face to face ordinary meetings mentioned in the previous paragraph,*
2. *the third consecutive ordinary meeting which a delegate of the Individual Member attends*

Note: See article 35.3 for eligibility to cast a proxy vote.

EXAMPLE 1: *If Individual Member Z is represented at face to face ordinary meeting K and K+3 (and is thus eligible to vote) but is not represented at face to face ordinary 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 an face to face ordinary meeting of the group, is represented at face to face ordinary meetings N and N+3, it may cast a vote at face to face ordinary meeting N+3.*

NOTE: *Individual Member X might choose to cast a vote by proxy at face to face ordinary 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 ordinary meeting N only, it may not cast a vote by proxy at ordinary meeting N+2.*

EXAMPLE 4: *If Individual Member A is represented at electronic ordinary meetings N, N+1, and N+2 (and is thus eligible to vote) but is not represented at electronic ordinary meetings N+3 and N+4, it is removed from the voting list.*

EXAMPLE 5: *If Individual Member B, not previously having been represented at an ordinary meetings of the group, is represented at electronic ordinary meetings N, N+1, and N+2, it may cast a vote at electronic ordinary meeting N+2.*

35.5 (Void)

The contents of this section shall be struck and the heading replaced with VOID.

The following subclause is added to Article 35:

35.6 OP Voting Rights Hardship Exemption

For an IM belonging to an OP that has a voting rights hardship exemption for a given meeting, then missing the meeting is not counted in the voting rights algorithm. (In other words, for that IM, it is treated as though the meeting did not occur). If an IM covered by a voting rights hardship exemption for voting rights does attend the meeting, then it is counted as normal attendance.

If an IM covered by voting rights hardship exemption misses a meeting, there will be a permanent record (e.g., in the relevant meeting report) to note the list of IMs who have the voting rights hardship exemption for that meeting, and the voting rights list will also indicate the voting rights hardship exemption for the relevant meeting.

Voting rights hardship exemptions are granted on a per OP, per meeting basis.

Annex A: Definitions

The following 4 definitions are added:

Ad hoc Meeting	*A meeting called to address one or more particular topics that is not an ordinary meeting (see F.3)*
Electronic meeting:	*A electronic meeting is one where all the participants connect to the meeting using electronic means such as audio/video conference, email, etc.*
Face to face meeting:	*A face to face meeting, also referred to as a physical meeting, is one held at a designated physical location where participants are invited to attend in person.*
Ordinary Meeting	*A meeting where the ordinary business of a group is conducted (see F.2).*

Annex F: Guidance on meeting organization

The title of Annex F shall be changed to Guidance on TSG and WG meeting Organization

F.2 Ordinary meetings

The contents of clause F.2 shall be replaced with the following:

Ordinary meetings are ones where the regular business of the TSG or WG is conducted. Such meetings are normally chaired by the Group's Chair or, if unavailable, a Vice Chair. Ordinary meetings should be announced at least six months prior to the opening day of the meeting. An ordinary meeting may be held as a face to face meeting or as an electronic 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. Ordinary meetings that are held electronically shall be designated with an 'e' suffix.

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.

If a meeting is designated as face to face, provisions to support remote participation (e.g. by using additional audio/video capabilities) would be at the discretion of the host and leadership. In a meeting designated as face to face, those participating remotely are not to be counted toward quorum or attendance, and are not allowed to vote.

Following each ordinary meeting, the Support Team shall publish a list of IMs that have gained or lost voting rights at that meeting.

F.3 Ad hoc meetings

The contents of clause F.3 shall be replaced with the following:

An ad hoc meeting of a WG or a TSG is one called to address one or more particular topics. An ad hoc meeting may be held as a face to face or as an electronic meeting. 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 Chair 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.

F.4 Attendance Register

The contents of clause F.4 (and subclauses) shall be replaced with the following:

A delegate is deemed to have attended a given meeting if the individual confirms their participation by checking in. If a delegate does not check in during the meeting, the secretary shall assume that the individual did not attend. Checking in must be performed between the start and end of the meeting. In addition, the check in process shall clearly inform the delegate that 'Checking in carries the responsibility for participating in relevant parts of the meeting'.

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

F.4.1 (void)

F.4.2 (void)

Annex G: Working agreements

The following changes to Annex G are in effect:

Challenge votes may be conducted at Electronic meetings provided they are Ordinary meetings.

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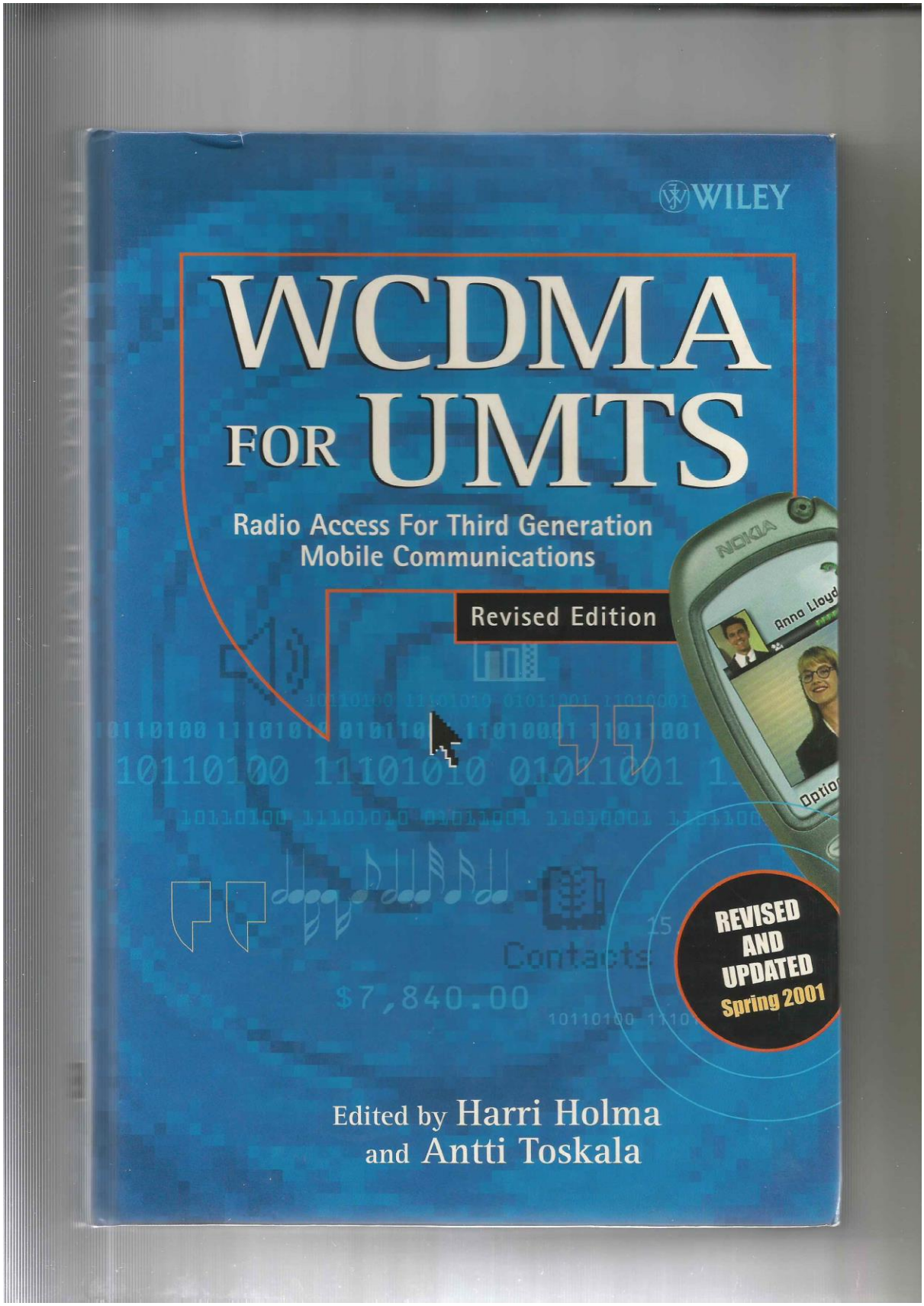
Annex J: Change history

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 Clarify the rights of observers and guests
			3		ETSI proposal: Article 15 To allow leeway in the number of delegates representing each OP at PCG (To reflect the decision already taken by PCG#14 on PCG participation)
			9		ETSI proposal: Article 34 To cater for current TSG structure and to reflect common practice of Tdoc numbering
			1	1	Article 3 Reflect decision on regional options (To incorporate PCG#7 decision)
			4	1	Article 22 Clarification and codification of the rights to stand for elected positions in TSGs and WGs
			8		Article 30 & annex F Inclusion of an annex giving guidance on meeting organization
2006-10-27	17	PCG17_15 r1	10		Article 35 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. Articles affected: 22 23 31 35 41 52 Annex D 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 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 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. Minor formatting and spelling corrections, consistent capitalization.

2016-11-15	35	PCG37_14	23		Article 22.1 Modification to clarify obligation on elected officials regarding antitrust/competition law training.
2019-08-22	42	(none)	24		Article 55 Correction of text to reflect actual practice. Note: Decision taken by email in response to Action PCG42/7.
2019-08-23	42	PCG42_18	25		Article 22.2 Adds text allowing WGs which meet infrequently to escalate elections of their officials to the parent TSG. Article 25 Adds text allowing WGs which meet infrequently to escalate technical votes to the parent TSG. Article 30A (new) Introduces procedures for situations where an IM is unable to send a delegate in person to a meeting but nevertheless wishes to contribute to the proceedings. Secretary's note 1: Annex B Added abbreviation 'IM', though this was not included in PCG42_18. Secretary's note 2: Corrected the CR numbers in the previous two change history entries.
2020-02-07	43	PCG43_14			Annex G: Removal of the statement that voting on working agreements was to be a standard element of every meeting agenda. Addition of a reference to article 32. Removal of the requirement for a quorum during voting on working agreements.
2020-05-15	44				Addition of "crisis annex"
2020-09-30	45	PCG45_11			Update to 3GPP Working Procedures Annex I ("crisis annex")
2021-04-29	46	PCG46_20			Decision PCG46/09: Gender Neutrality Changes Annex I Change minimum voting window from 24 to 18 hours
2022-03-07	48	PCG48_12			Voting Rights pCR to Annex I
2022-03-07	48	PCG48_13			Hardship Exemption pCR to Annex I
2022-09-01	49	-			Working Procedures P-CR for Registration

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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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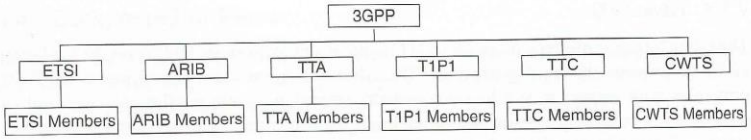


Figure 4.2. 3GPP organisational partners

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.

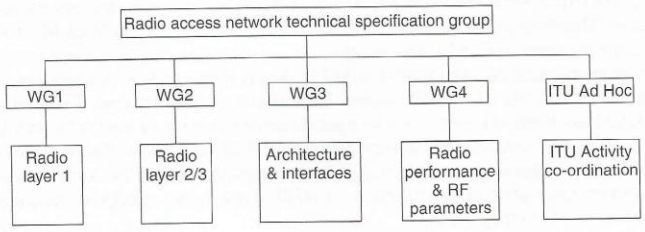


Figure 4.3. 3GPP RAN TSG working groups

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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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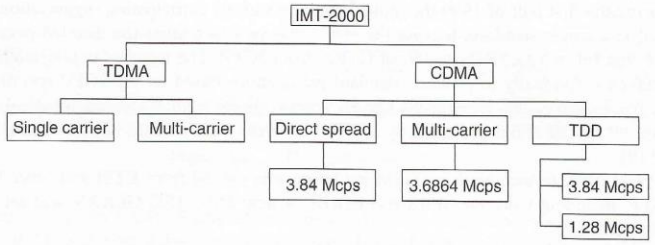


Figure 4.4. ITU-R IMT-2000 grouping

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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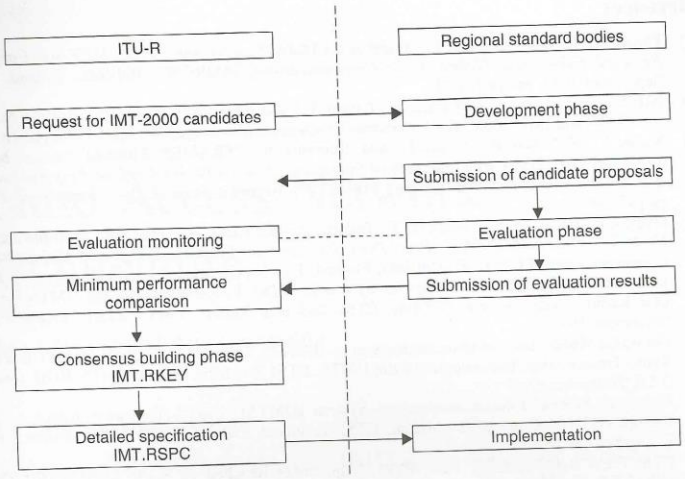


Figure 4.5. Relationship of ITU-R to the regional standards bodies

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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[9] http://www.3GPP.org

[10] http://www.itu.int/imt/

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

[12] http://www.ietf.org

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APPENDIX 7

MCC Activity Report

Source

Adrian Scrase

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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.

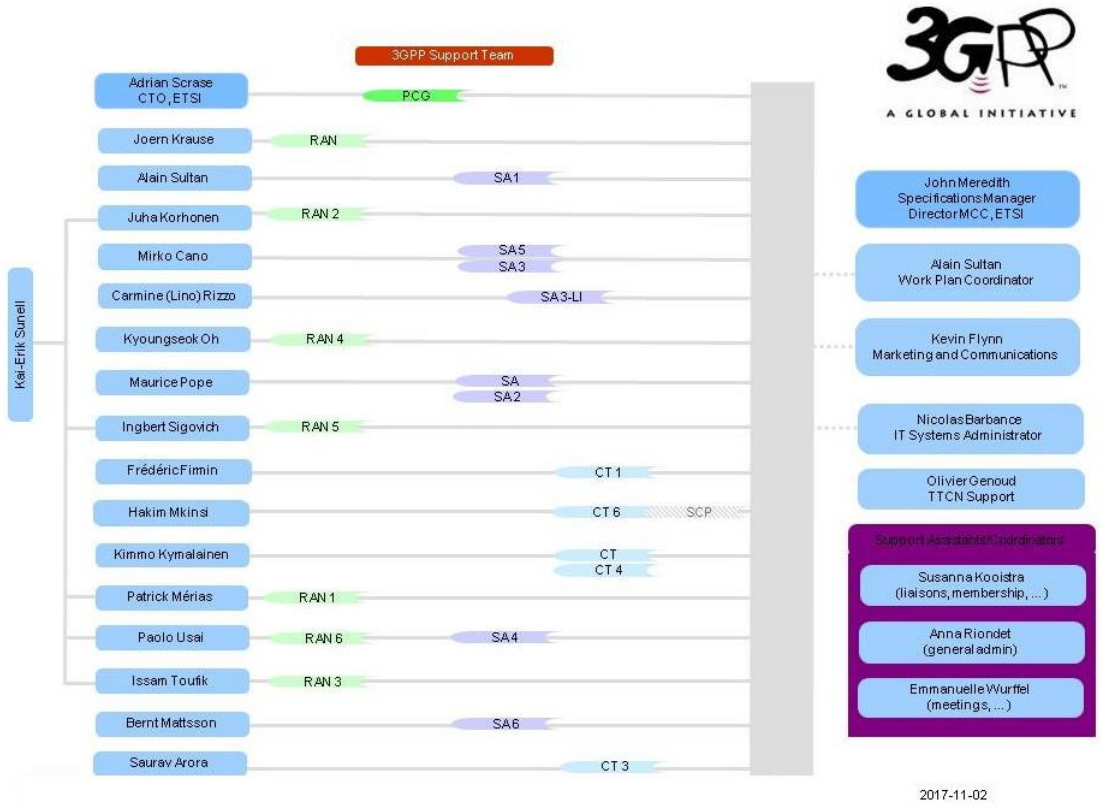
Kai-Erik acts as secretary to some parallel streams during meetings, moving from group to group as the need demands, and assists in implementing Change Requests after TSG plenaries. Kai-Erik will also be available to replace the regular MCC secretary of any 3GPP group in case of indisposition of the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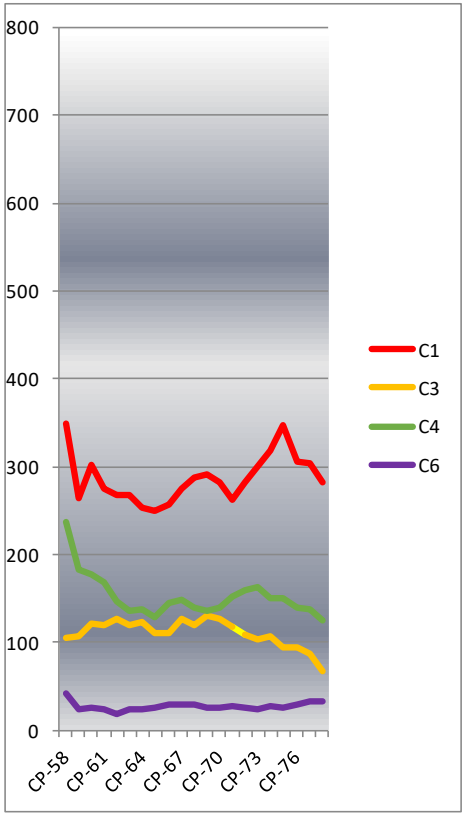
Workload: Change Requests

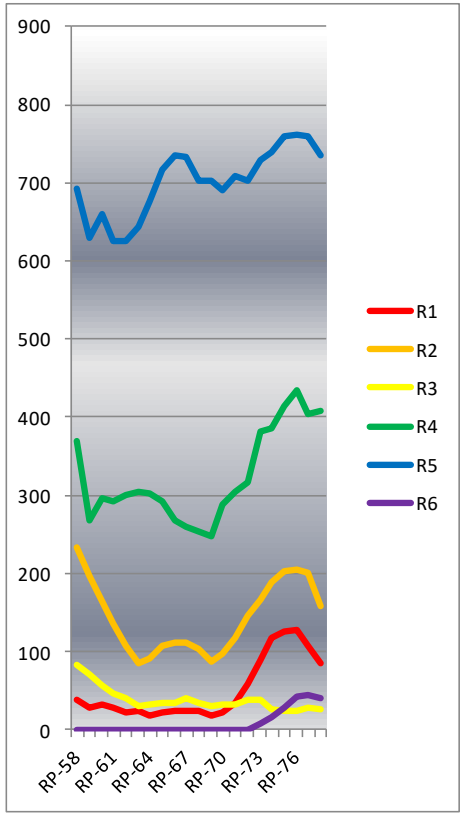
Approved CRs per Release per Year

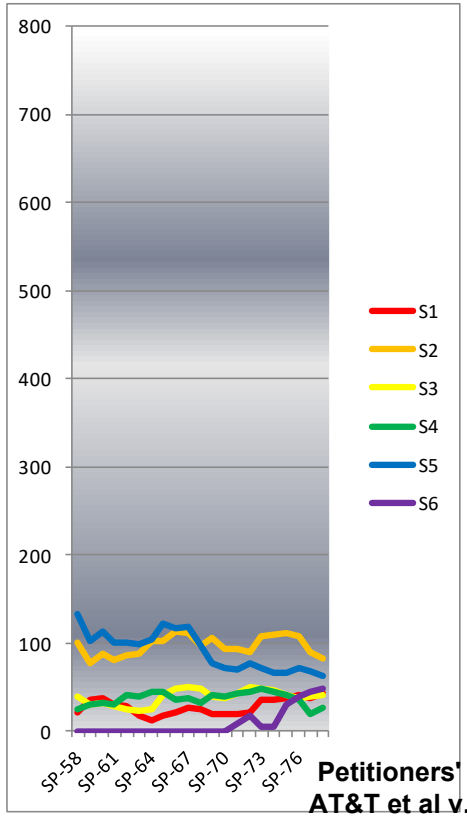
Release	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Total
R99	1408	4398	2266	1004	581	512	111	42	23	5	5	1	0							**10356**
Rel-4		376	2828	1900	690	257	122	63	48	22	20	13	11	8	7	2				**6367**
Rel-5		27	644	3274	2842	2162	1357	509	94	25	22	7	7	5	3	2				**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



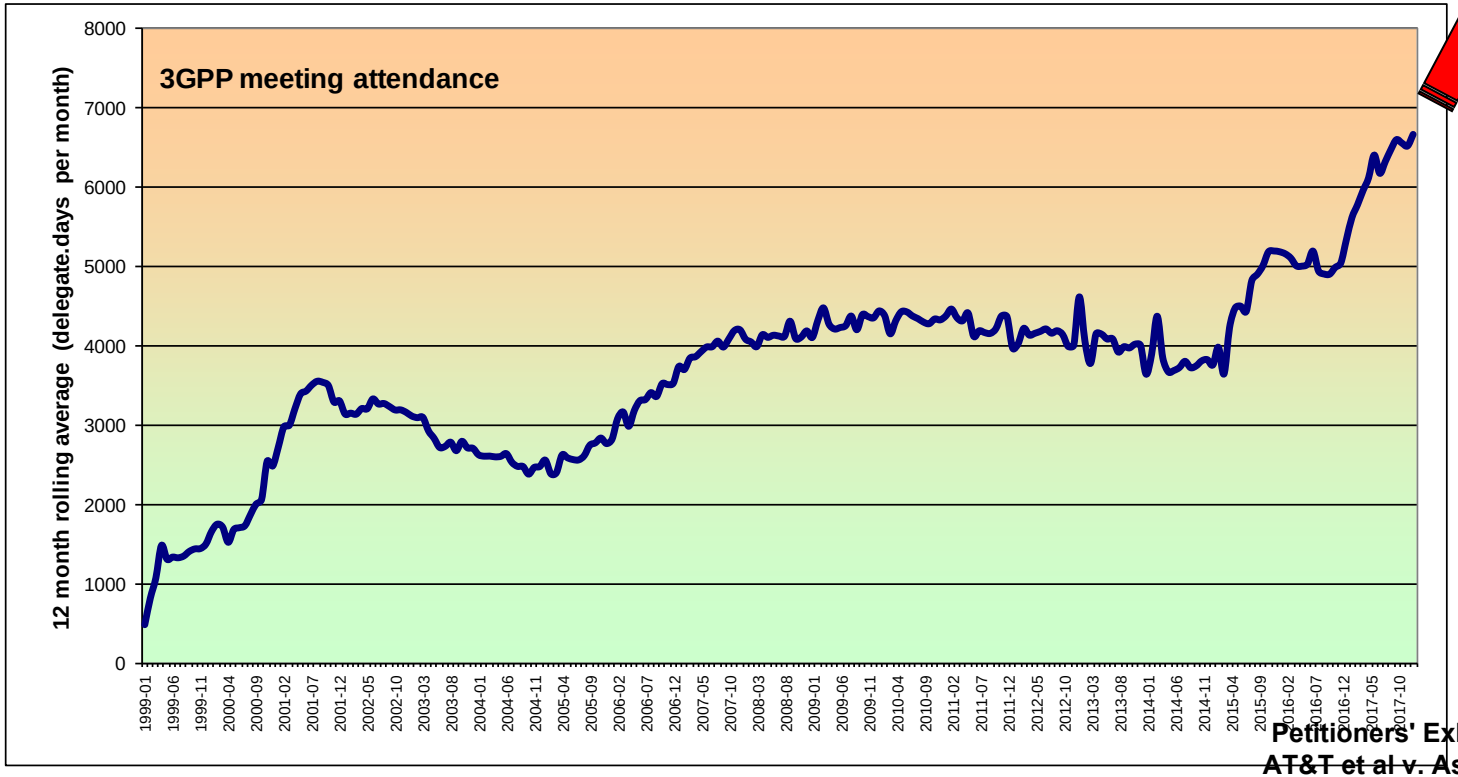




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Workload: meeting attendance over time



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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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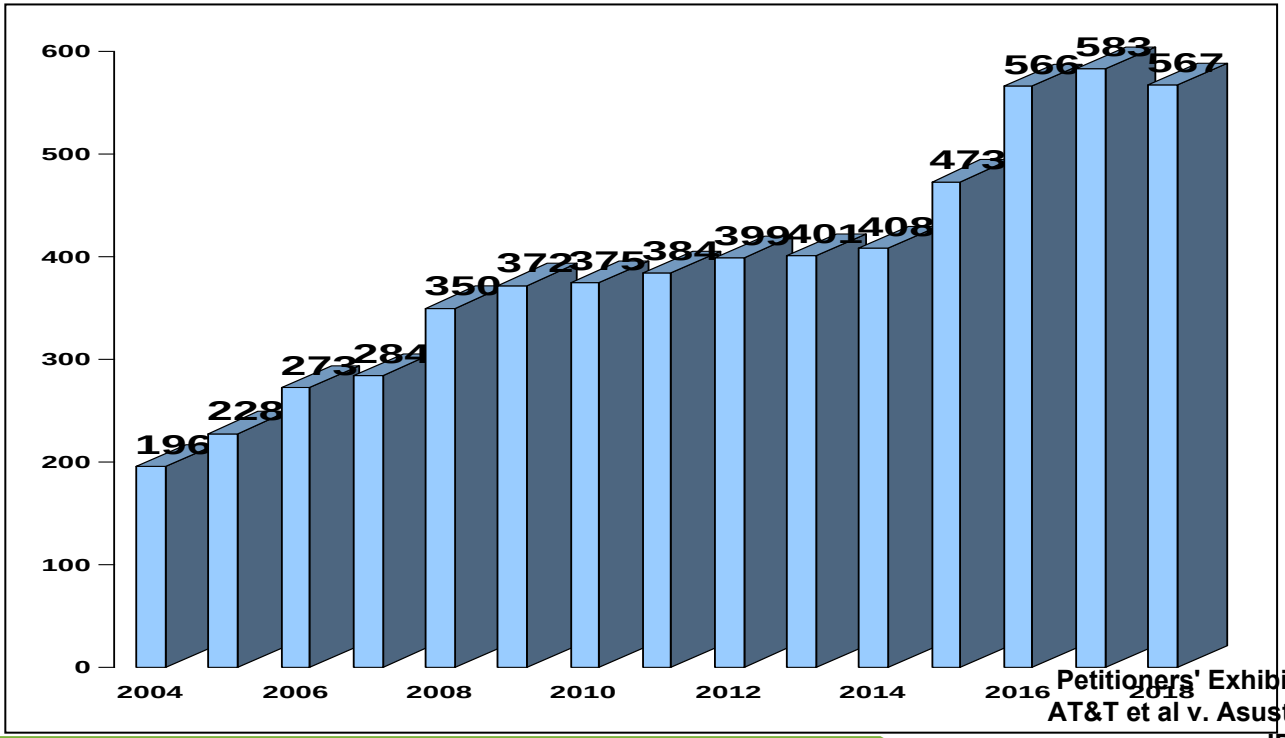
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3GPP Membership

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

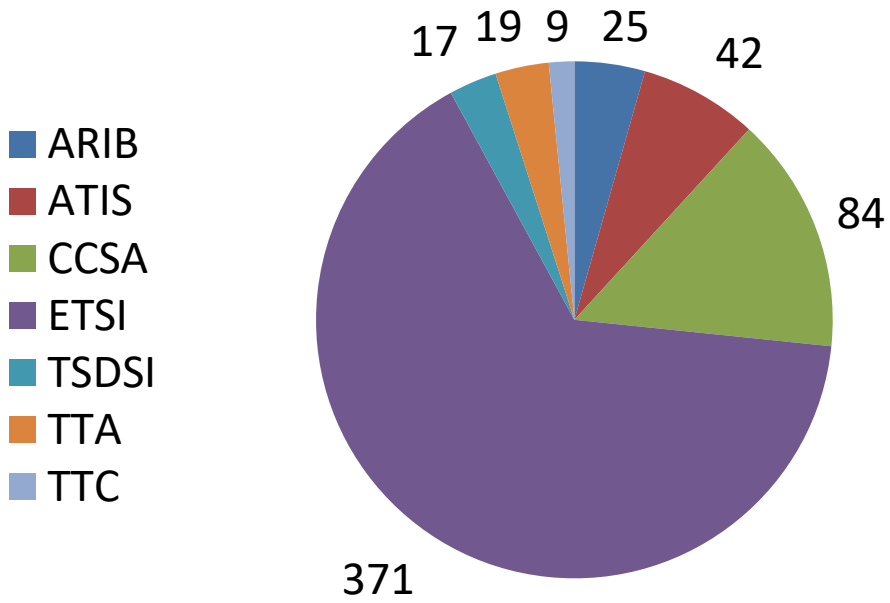
AUSTRALIA
AUSTRIA
BELGIUM
BOTSWANA
BRAZIL
CANADA
CHINA
CZECH REPUBLIC
DENMARK
FINLAND
FRANCE
GERMANY
HONG KONG
INDIA
INDONESIA
IRELAND
ISRAEL
ITALY
JAPAN
KOREA (REPUBLIC OF)
LEBANON
LUXEMBOURG
MALAYSIA
MEXICO
NETHERLANDS
NORWAY
POLAND
PORTUGAL
QATAR
ROMANIA
RUSSIAN FEDERATION
SERBIA
SINGAPORE
SLOVAKIA
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



John Wiley & Sons, Ltd

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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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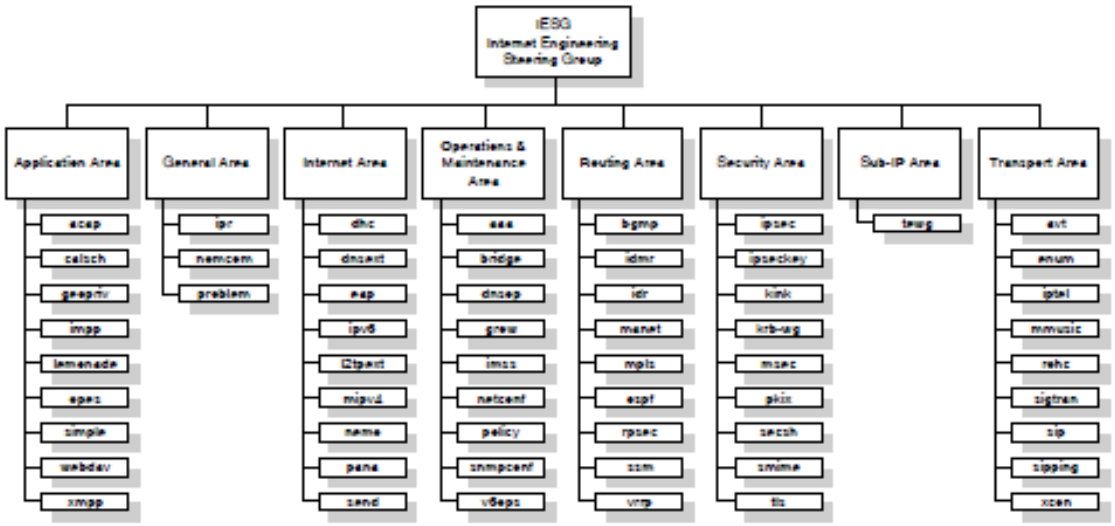


Figure 2.1: The structure of the IETF

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`

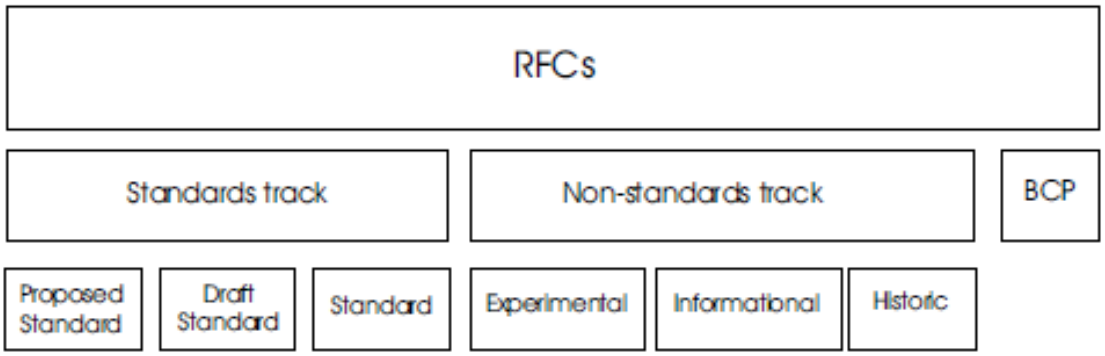


Figure 2.2: RFC types

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.

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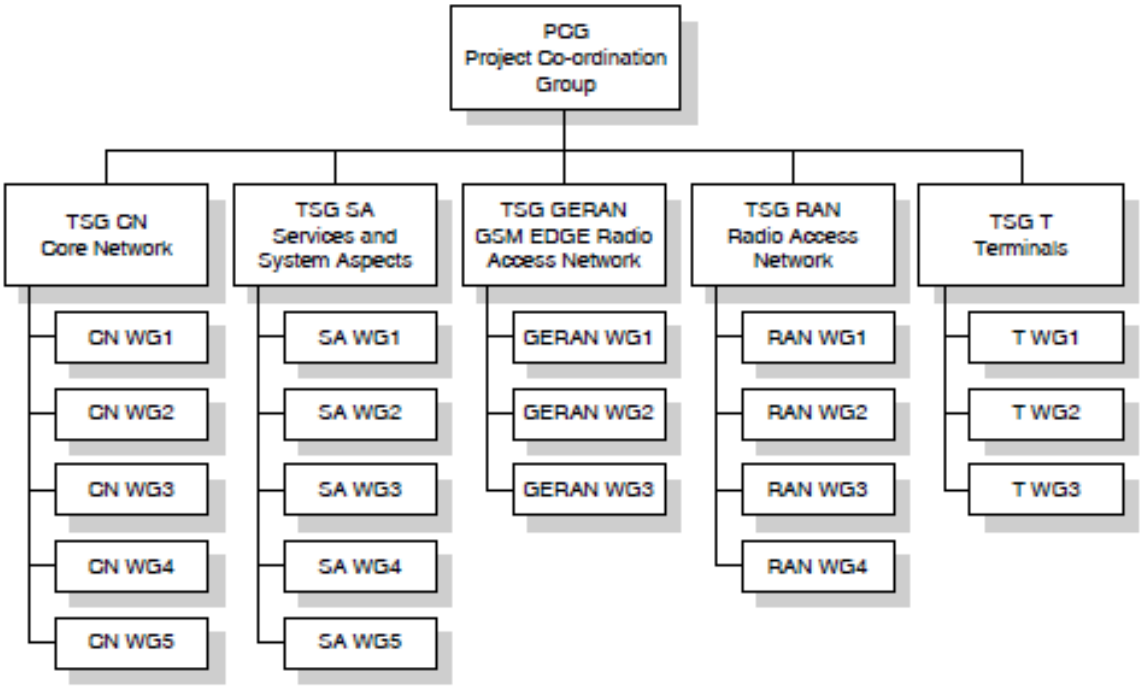


Figure 2.3: The structure of 3GPP

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

2024-02-19 Version 1.1

New Query

Selected categories:

- **Individual Members (all partners)**

Choose csv separator : , export to csv file

INDIVIDUAL MEMBERS

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

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

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

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

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

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

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

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

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(Fraunhofer Institut für Integrierte Schaltungen IIS)		
Frequentis AG **(Frequentis AG)**	AUSTRIA	ETSI
Fujitsu Limited **(Fujitsu Limited)**	JAPAN	ETSI
Fujitsu Limited. **(Fujitsu Limited.)**	JAPAN	TTC
Fujitsu Limited.. **(Fujitsu Limited..)**	JAPAN	ARIB
Futurewei **(Futurewei Technologies Inc.)**	UNITED STATES	ETSI
Futurewei Technologies **(Futurewei Technologies)**	UNITED STATES	ATIS
G+D MS **(Giesecke+Devrient Mobile Security Germany GmbH)**	GERMANY	ETSI
Gatehouse Satcom A/S **(Gatehouse Satcom A/S)**	DENMARK	ETSI
GDCNI **(Guangdong Communications and Networks Institute)**	CHINA	CCSA
GE Network Technologies, LLC **(GE Network Technologies, LLC)**	UNITED STATES	ATIS
GEESPACE **(ZHE JIANG GEESPACE TECHNOLOGY CO., LTD.)**	CHINA	CCSA
Gigaset Communications GmbH **(Gigaset Communications GmbH)**	GERMANY	ETSI
Gilat **(Gilat Satellite Networks Ltd)**	ISRAEL	ETSI
GLOBALSTAR Inc. **(GLOBALSTAR Inc.)**	UNITED STATES	ETSI
GM - ATCI **(General Motors - ATCI)**	ISRAEL	ETSI
Google Inc. **(Google Inc.)**	UNITED STATES	ATIS
Group 2000 **(Group 2000 Nederland B.V.)**	NETHERLANDS	ETSI
GTRC **(Georgia Tech Research Corporation)**	UNITED STATES	ETSI
GUANGDONG GENIUS TECHNOLOGY CO **(GUANGDONG GENIUS TECHNOLOGY CO., LTD.)**	CHINA	CCSA
Guangdong OPPO Mobile Telecom. **(Guangdong OPPO Mobile Telecommunications Corp., Ltd)**	CHINA	CCSA
GW **(Greenerwave)**	FRANCE	ETSI
HA/ST **(HARTING Stiftung & Co. KG)**	GERMANY	ETSI
Hangzhou Douku **(Hangzhou Douku Software Technologies Co., Ltd.)**	CHINA	CCSA
Hangzhou Mengyuxiang **(Hangzhou Mengyuxiang Network Technology Corp., Ltd.)**	CHINA	CCSA
Harman GmbH **(Harman Becker Automotive Systems GmbH)**	GERMANY	ETSI
HEAD acoustics GmbH **(HEAD acoustics GmbH)**	GERMANY	ETSI
Hewlett-Packard Enterprise **(Hewlett-Packard Enterprise)**	FRANCE	ETSI
HiSilicon Technologies Co. Ltd **(HiSilicon Technologies Co.Ltd)**	CHINA	CCSA
HISPASAT SA **(HISPASAT SA)**	SPAIN	ETSI
HOME OFFICE **(HOME OFFICE)**	UNITED KINGDOM	ETSI
Honda Motor Co., Ltd **(Honda Motor Co., Ltd)**	JAPAN	ARIB
Honor **(Honor Device Co., Ltd)**	CHINA	ETSI

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Honor **(Honor Device Co., Ltd.)**	CHINA	CCSA
Huawei Device Co., Ltd **(Huawei Device Co., Ltd)**	CHINA	CCSA
HUAWEI TECH. GmbH **(HUAWEI TECHNOLOGIES Duesseldorf GmbH)**	GERMANY	ETSI
Huawei Tech.(UK) Co.. Ltd **(Huawei Technologies (UK) Co., Ltd.)**	UNITED KINGDOM	ETSI
Huawei Technologies (Korea) **(Huawei Technologies (Korea))**	KOREA (REPUBLIC OF)	TTA
HUAWEI TECHNOLOGIES Co. Ltd. **(Huawei Technologies Co. Ltd.)**	CHINA	ETSI
HuaWei Technologies Co., Ltd **(HuaWei Technologies Co., Ltd)**	CHINA	CCSA
Huawei Technologies France **(Huawei Technologies France)**	FRANCE	ETSI
Huawei Technologies Japan K.K. **(Huawei Technologies Japan K.K.)**	JAPAN	TTC
HUAWEI Technologies Japan K.K. **(HUAWEI Technologies Japan K.K.)**	JAPAN	ARIB
Huawei Technologies R&D UK **(Huawei Technologies Research & Development (UK) Limited)**	UNITED KINGDOM	ETSI
Huawei Technologies Sweden AB **(Huawei Technologies Sweden AB)**	SWEDEN	ETSI
Huawei Telecommunication India **(Huawei Telecommunication (India) Co. Pvt. Ltd.)**	INDIA	TSDSI
HUGHES Network Systems Ltd **(HUGHES Network Systems Ltd)**	UNITED KINGDOM	ETSI
Husqvarna AB **(Husqvarna AB (publ))**	SWEDEN	ETSI
Hytera Communications Corp. **(Hytera Communications Corporation Limited)**	CHINA	CCSA
Hyundai Motor Company **(Hyundai Motor Company)**	KOREA (REPUBLIC OF)	TTA
IBM Europe **(IBM Europe)**	GERMANY	ETSI
ICS **(Institute for Communication Systems - University of Surrey)**	UNITED KINGDOM	ETSI
IDEMIA **(IDEMIA)**	FRANCE	ETSI
IDRBT **(Institute for Development and Research in Banking Technology)**	INDIA	TSDSI
III **(Institute for Information Industry)**	TAIWAN, PROVINCE OF CHINA	ETSI
IIIT Bangalore **(International Institute of Information Technology - Bangalore)**	INDIA	TSDSI
IIIT Naya Raipur **(International Institute of Information Technology, Naya Raipur)**	INDIA	TSDSI
IISc, Bangalore **(Indian Institute of Science, Bangalor)**	INDIA	TSDSI
IIT Bhilai **(Indian Institute of Technology Bhilai)**	INDIA	TSDSI
IIT Bombay **(Indian Institute of Technology Bombay)**	INDIA	TSDSI
IIT Delhi **(Indian Institute of Technology Delhi)**	INDIA	TSDSI
IIT Gandhinagar **(Indian Institute of Technology Gandhinagar)**	INDIA	TSDSI
IIT JODHPUR **(Indian Institute of Technology Jodhpur)**	INDIA	TSDSI
IIT Kanpur **(Indidan Institute of Technology Kanpur)**	INDIA	TSDSI
IIT Mandi **(Indian Institute of Technology Mandi)**	INDIA	TSDSI
IIT Patna	INDIA	TSDSI

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(Indian Institute of Technology Patna)		
IIT, Kharagpur **(IIT, Kharagpur)**	INDIA	TSDSI
IMDA **(Infocomm Media Development Authority)**	SINGAPORE	ETSI
IMU **(Istanbul Medipol University)**	TÜRKIYE	ETSI
Indian Institute of Tech (H) **(Indian Institute of Technology Hyderabad)**	INDIA	TSDSI
Indian Institute of Tech (M) **(Indian Institute of Technology Madras)**	INDIA	TSDSI
INFINEON TECHNOLOGIES **(Infineon Technologies)**	GERMANY	ETSI
Inmarsat **(Inmarsat)**	UNITED KINGDOM	ETSI
Institut Mines-Telecom **(Institut Mines-Telecom)**	FRANCE	ETSI
Institute VEDECOM **(Institute VEDECOM)**	FRANCE	ETSI
Intel **(Intel)**	UNITED STATES	ATIS
Intel Belgium SA/NV **(Intel Belgium SA/NV)**	BELGIUM	ETSI
Intel China Ltd. **(Intel China Ltd.)**	CHINA	CCSA
Intel Corporation (UK) Ltd **(Intel Corporation (UK) Ltd)**	UNITED KINGDOM	ETSI
Intel Corporation Italia SpA **(Intel Corporation Italia SpA)**	ITALY	ETSI
Intel Corporation SAS **(Intel Corporation SAS)**	FRANCE	ETSI
Intel Deutschland GmbH **(Intel Deutschland GmbH)**	GERMANY	ETSI
Intel Ireland **(Intel Ireland Ltd)**	IRELAND	ETSI
Intel K.K. **(Intel K.K.)**	JAPAN	ARIB
Intel Sweden AB **(Intel Sweden AB)**	SWEDEN	ETSI
Intel Technology India Pvt Ltd **(Intel Technology India Pvt. Ltd.)**	INDIA	TSDSI
Intel Technology Poland SP Zoo **(Intel Technology Poland SP Zoo)**	POLAND	ETSI
Intelsat **(Intelsat)**	UNITED STATES	ATIS
InterDigital Belgium. LLC **(InterDigital Belgium, LLC)**	BELGIUM	ETSI
InterDigital Canada **(InterDigital Canada)**	CANADA	ATIS
InterDigital Communications **(InterDigital Communications Corporation)**	UNITED STATES	ATIS
InterDigital Finland Oy **(InterDigital Finland Oy)**	FINLAND	ETSI
InterDigital France R&D, SAS **(InterDigital France R&D, SAS)**	FRANCE	ETSI
InterDigital New York **(InterDigital New York)**	UNITED STATES	ATIS
InterDigital Pennsylvania **(InterDigital Pennsylvania)**	UNITED STATES	ATIS
InterDigital, Europe, Ltd. **(InterDigital, Europe, Ltd.)**	UNITED KINGDOM	ETSI
InterDigital, Inc. **(InterDigital, Inc.)**	UNITED STATES	ETSI
Intersec **(Intersec SA)**	FRANCE	ETSI

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Intertek **(Intertek)**	UNITED KINGDOM	ETSI
IPCom GmbH & Co.KG **(IPCom GmbH & Co.KG)**	GERMANY	ETSI
IPLOOK **(IPLOOK Networks Co., Ltd.)**	CHINA	CCSA
iQoo **(iQoo Software Technology (Shanghai) Co., Ltd.)**	CHINA	CCSA
Iridium Satellite LLC **(Iridium Satellite LLC)**	UNITED STATES	ATIS
IRT Saint Exupery **(Institut de recherche technologique Saint Exupery)**	FRANCE	ETSI
ISED **(Innovation, Science and Economic Development Canada)**	CANADA	ETSI
ISRO **(Indian Space Research Organisation)**	INDIA	TSDSI
ISSDU **(Information Security Service Digital United Inc.)**	TAIWAN, PROVINCE OF CHINA	ETSI
ITL **(Innovative Technology Lab Co., Ltd)**	KOREA (REPUBLIC OF)	TTA
ITOCHU Techno-Solutions Corp **(ITOCHU Techno-Solutions Corporation)**	JAPAN	TTC
ITRI **(Industrial Technology Research Institute)**	TAIWAN, PROVINCE OF CHINA	ETSI
ITRON SAS **(ITRON SAS)**	FRANCE	ETSI
Ittiam System Pvt Ltd **(Ittiam System Pvt Ltd)**	INDIA	TSDSI
Japan Radio Co., Ltd **(Japan Radio Co., Ltd)**	JAPAN	ARIB
Jetflow **(Jetflow Technologies Co., Ltd)**	CHINA	CCSA
Jio **(Jio Estonia OÜ)**	ESTONIA	ETSI
JMA Wireless **(JMA Wireless)**	UNITED STATES	ATIS
John Deere GmbH & Co. KG **(John Deere GmbH & Co. KG)**	GERMANY	ETSI
Johns Hopkins University APL **(Johns Hopkins University Applied Physics Laboratory)**	UNITED STATES	ATIS
JSI GmbH **(JSI GmbH)**	GERMANY	ETSI
Juniper Networks **(Juniper Networks)**	UNITED STATES	ETSI
Kapsch TrafficCom AG **(Kapsch TrafficCom AG)**	AUSTRIA	ETSI
KDDI Corporation **(KDDI Corporation)**	JAPAN	TTC
KDDI Corporation **(KDDI Corporation)**	JAPAN	ARIB
Kepler **(Kepler Communications GmbH)**	GERMANY	ETSI
Keysight Technologies UK Ltd **(Keysight Technologies UK Ltd)**	UNITED KINGDOM	ETSI
KIPO **(Korean Intellectual Property Office)**	KOREA (REPUBLIC OF)	TTA
Kontron Transportation France **(Kontron Transportation France S.A.S)**	FRANCE	ETSI
Korea Testing Laboratory **(Korea Testing Laboratory)**	KOREA (REPUBLIC OF)	TTA
KPN N.V. **(Koninklijke KPN N.V.)**	NETHERLANDS	ETSI
KRRI **(Korea Railroad Research Institute)**	KOREA (REPUBLIC OF)	TTA
KT Corp.	KOREA (REPUBLIC OF)	TTA

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(KT Corporation)		
Kymeta Corporation **(Kymeta Corporation)**	UNITED STATES	ETSI
Kyocera Corporation **(Kyocera Corporation)**	JAPAN	ARIB
Kyonggi University **(Kyonggi University)**	KOREA (REPUBLIC OF)	TTA
Kyoto University **(Kyoto University)**	JAPAN	ETSI
L.M. Ericsson Limited **(L.M. Ericsson Limited)**	IRELAND	ETSI
L3Harris Technologies **(L3Harris Technologies)**	UNITED STATES	ATIS
Langbo **(Shanghai Langbo Communication Technology Co., Ltd.)**	CHINA	CCSA
Lansus **(Lansus Technologies Inc.)**	CHINA	CCSA
LEGRAND FRANCE **(LEGRAND FRANCE ISERE)**	FRANCE	ETSI
Lekha Wireless Solutions **(Lekha Wireless Solutions Pvt Ltd)**	INDIA	TSDSI
Lenovo (Beijing) Ltd **(Lenovo (Beijing) Ltd)**	CHINA	CCSA
Lenovo Future Communications **(Lenovo Future Communications Technology (Chongqing) Co., Ltd.)**	CHINA	CCSA
Lenovo Information Technology **(Lenovo (Beijing) Information Technology Co., Ltd.)**	CHINA	CCSA
Leonardo SpA **(Leonardo SpA)**	ITALY	ETSI
LG Electronics Deutschland **(LG Electronics Deutschland GmbH)**	GERMANY	ETSI
LG Electronics Finland **(LG Electronics Finland Lab Oy)**	FINLAND	ETSI
LG Electronics France **(LG Electronics France)**	FRANCE	ETSI
LG Electronics Inc. **(LG Electronics Inc.)**	KOREA (REPUBLIC OF)	TTA
LG Electronics Polska **(LG Electronics Polska Sp. z.o.o.)**	POLAND	ETSI
LG Electronics UK **(LG Electronics UK Ltd)**	UNITED KINGDOM	ETSI
LG Uplus **(LG Uplus)**	KOREA (REPUBLIC OF)	TTA
Ligado Networks **(Ligado Networks)**	UNITED STATES	ETSI
LKA Niedersachsen **(Landeskriminalamt Niedersachsen)**	GERMANY	ETSI
Locaila **(Locaila)**	UNITED STATES	ATIS
Lockheed Martin **(Lockheed Martin)**	UNITED STATES	ATIS
Lynk Global **(Lynk Global)**	UNITED STATES	ATIS
Magister Solutions Ltd **(Magister Solutions Ltd)**	FINLAND	ETSI
Maketh Secure Limited **(Maketh Secure Limited)**	UNITED KINGDOM	ETSI
MATRIXX Software **(MATRIXX Software, Inc.)**	UNITED STATES	ETSI
Mavenir **(Mavenir Systems, Inc)**	UNITED STATES	ETSI
MaxWave Micro **(MaxWave Microelectronics Ltd.)**	CHINA	CCSA
MediaTek (Chengdu) Inc. **(MediaTek (Chengdu) Inc.)**	CHINA	CCSA

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MediaTek (Hefei) Inc. **(MediaTek (Hefei) Inc.)**	CHINA	CCSA
MediaTek (Shenzhen) Inc. **(MediaTek (Shenzhen) Inc.)**	CHINA	CCSA
MediaTek (Wuhan) Inc. **(MediaTek (Wuhan) Inc.)**	CHINA	CCSA
MediaTek Beijing Inc. **(MediaTek Beijing Inc.)**	CHINA	CCSA
MediaTek Inc. **(MediaTek Incorporated)**	TAIWAN, PROVINCE OF CHINA	ETSI
Mediatek India Technology Pvt. **(Mediatek India Technology Pvt. Ltd.)**	INDIA	TSDSI
MediaTek Korea Inc. **(MediaTek Korea Inc.)**	KOREA (REPUBLIC OF)	TTA
MediaTek UK **(MTK Wireless Ltd)**	UNITED KINGDOM	ETSI
MeitY **(Ministry of Electronics & Information Technology)**	INDIA	TSDSI
Meizu Technology **(Meizu Technology)**	CHINA	CCSA
Mercedes-Benz AG **(Mercedes-Benz AG)**	GERMANY	ETSI
Mesaqin.com s.r.o (Ltd.) **(Mesaqin.com s.r.o (Ltd.))**	CZECH REPUBLIC	ETSI
Meta India **(Meta India Online Services Pvt Ltd)**	INDIA	TSDSI
Meta Ireland **(Meta Platforms Ireland Ltd.)**	IRELAND	ETSI
Meta USA **(Meta USA)**	UNITED STATES	ATIS
Microchip Technology, Inc. **(Microchip Technology, Inc.)**	UNITED STATES	ATIS
Microsoft Europe SARL **(Microsoft Europe SARL)**	FRANCE	ETSI
MidWave Wireless **(MidWave Wireless)**	UNITED STATES	ATIS
MIMIT **(Ministry of Enterprises and Made in Italy)**	ITALY	ETSI
MinEA **(Ministry of Economic Affairs and Climate Policy)**	NETHERLANDS	ETSI
MINECO **(MINISTRY OF ECONOMIC AFFAIRS AND DIGITAL TRANSFORMATION)**	SPAIN	ETSI
MINISTERE DE L'INTERIEUR **(MINISTERE DE L'INTERIEUR)**	FRANCE	ETSI
Ministère Economie et Finances **(Ministère de l'Economie et des Finances)**	FRANCE	ETSI
Ministry of Transport SR **(Ministry of Transport of the Slovak Republic)**	SLOVAKIA	ETSI
MITRE Corporation **(MITRE Corporation)**	UNITED STATES	ETSI
Mitsubishi Electric Co. **(Mitsubishi Electric Co.)**	JAPAN	ARIB
Mitsubishi Electric Corp **(Mitsubishi Electric Corporation)**	JAPAN	TTC
Mitsubishi Electric RCE **(Mitsubishi Electric R&D Centre Europe)**	FRANCE	ETSI
Motorola Mobile Com Technology **(MOTOROLA MOBILE COMMUNICATION TECHNOLOGY LTD.)**	CHINA	CCSA
Motorola Mobility España SA **(Motorola Mobility España SA)**	SPAIN	ETSI
Motorola Mobility France S.A.S **(Motorola Mobility France S.A.S)**	FRANCE	ETSI
Motorola Mobility Germany GmbH **(Motorola Mobility Germany GmbH)**	GERMANY	ETSI
Motorola Mobility UK Ltd.	UNITED KINGDOM	ETSI

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(Motorola Mobility UK Ltd.)		
Motorola Solutions Germany **(Motorola Solutions Germany GmbH)**	GERMANY	ETSI
Motorola Solutions UK Ltd. **(Motorola Solutions UK Ltd.)**	UNITED KINGDOM	ETSI
MTCC **(Mobile Technology Convergence Center)**	KOREA (REPUBLIC OF)	TTA
Murata Manufacturing Co Ltd. **(Murata Manufacturing Co Ltd.)**	JAPAN	ARIB
MVG Industries **(MVG Industries)**	FRANCE	ETSI
Nanjing Ericsson Panda Com Ltd **(NANJING ERICSSON PANDA COMMUNICATIONS LTD)**	CHINA	CCSA
Nanjing Weibo **(Nanjing Weibo Software Technology Co., Ltd.)**	CHINA	CCSA
National Instruments Corp. **(National Instruments Corporation)**	UNITED STATES	ETSI
National Radio Research Agency **(National Radio Research Agency)**	KOREA (REPUBLIC OF)	TTA
National Spectrum Consortium **(National Spectrum Consortium)**	UNITED STATES	ATIS
National Technical Assistance **(National Technical Assistance Centre)**	UNITED KINGDOM	ETSI
nbn co Limited **(nbn co Limited (ABN 86 136 533 741))**	AUSTRALIA	ETSI
NCI Agency **(NATO Communication and Information Agency)**	NETHERLANDS	ETSI
NCIS **(National Criminal Investigation Service)**	NORWAY	ETSI
NCSC **(National Cyber Security Centre)**	UNITED KINGDOM	ETSI
NDRE **(National Defence Radio Establishment)**	SWEDEN	ETSI
NEC Corporation **(NEC Corporation)**	JAPAN	ARIB
NEC Corporation **(NEC Corporation)**	JAPAN	ETSI
NEC Corporation. **(NEC Corporation)**	JAPAN	TTC
NEC Europe Ltd **(NEC Europe Ltd)**	UNITED KINGDOM	ETSI
NEC Telecom MODUS Ltd. **(NEC Telecom MODUS Ltd.)**	UNITED KINGDOM	ETSI
NEMERGENT **(NEMERGENT SOLUTIONS SL)**	SPAIN	ETSI
NERCDTV **(Shanghai National Engineering Research Center of Digital Television Co.,Ltd.)**	CHINA	CCSA
Netherlands Police **(Netherlands Police, Division MDC)**	NETHERLANDS	ETSI
Netscout Systems Inc. **(Netscout Systems Inc.)**	UNITED STATES	ETSI
Network Rail **(Network Rail infrastructure limited)**	UNITED KINGDOM	ETSI
New H3C Technologies Co., Ltd. **(New H3C Technologies Co., Ltd.)**	CHINA	CCSA
NextNav **(NextNav)**	UNITED STATES	ATIS
NHK **(NHK (Japan Broadcasting Corporation))**	JAPAN	ARIB
NICT **(National Institute of Information and Communications Technology)**	JAPAN	ARIB
Niral **(Niral Networks Private Limited)**	INDIA	TSDSI
NIST **(National Institute of Standards and Technology)**	UNITED STATES	ATIS

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Nkom **(Norwegian Communications Authority)**	NORWAY	ETSI
Nokia **(Nokia)**	UNITED STATES	ATIS
Nokia Belgium **(Nokia Bell N.V.)**	BELGIUM	ETSI
Nokia Corporation **(Nokia Corporation)**	FINLAND	ETSI
Nokia Denmark **(Nokia Denmark A/S)**	DENMARK	ETSI
Nokia France **(Nokia Networks France)**	FRANCE	ETSI
Nokia Germany **(Nokia Solutions and Networks GmbH & Co. KG)**	GERMANY	ETSI
Nokia Hungary **(Nokia Solutions and Networks Kft.)**	HUNGARY	ETSI
Nokia Japan **(Nokia Japan)**	JAPAN	ARIB
Nokia Korea **(Nokia Korea)**	KOREA (REPUBLIC OF)	TTA
Nokia Poland **(Nokia Solutions and Networks Sp. z.o.o.)**	POLAND	ETSI
Nokia Shanghai Bell **(Nokia Shanghai Bell Co., Ltd)**	CHINA	CCSA
Nokia Solutions & Networks (I) **(Nokia Solutions and Networks India Pvt. Ltd.)**	INDIA	TSDSI
Nokia UK **(Nokia UK Ltd.)**	UNITED KINGDOM	ETSI
Nordic Semiconductor ASA **(Nordic Semiconductor ASA)**	NORWAY	ETSI
NOVAMINT **(NOVAMINT)**	UNITED KINGDOM	ETSI
NTIA **(National Telecommunications and Information Administration)**	UNITED STATES	ATIS
NTPU **(National Taipei University)**	TAIWAN, PROVINCE OF CHINA	ETSI
NTT **(Nippon Telegraph and Telephone Corporation (NTT))**	JAPAN	TTC
NTT corporation **(Nippon Telegraph and Telephone Corporation)**	JAPAN	ETSI
NTT DOCOMO INC. **(NTT DOCOMO INC.)**	JAPAN	TTC
NTT DOCOMO INC.. **(NTT DOCOMO INC.)**	JAPAN	ARIB
NTT-AT Corp. **(NTT Advanced Technology Corporation)**	JAPAN	TTC
NTU **(National Taiwan University)**	TAIWAN, PROVINCE OF CHINA	ETSI
Nubia Technology Co.,Ltd **(Nubia Technology Co.,Ltd)**	CHINA	CCSA
NUFRONT **(Nufront (Beijing) Technology Co., Ltd.)**	CHINA	CCSA
NVIDIA **(NVIDIA Corporation)**	UNITED STATES	ATIS
NXP Semiconductors Netherlands **(NXP Semiconductors Netherlands B.V.)**	NETHERLANDS	ETSI
NYCU **(National Yang Ming Chiao Tung University)**	TAIWAN, PROVINCE OF CHINA	ETSI
Odido **(Odido Netherlands B.V.)**	NETHERLANDS	ETSI
Ofcom (CH) **(Ofcom (CH))**	SWITZERLAND	ETSI
Ofcom (U.K.) **(Ofcom - Office of Communications (U.K.))**	UNITED KINGDOM	ETSI
Oki Electric Industry Co. Ltd.	JAPAN	TTC

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(OKi Electric Industry Co., Ltd)		
Omnispace **(Omnispace)**	UNITED STATES	ATIS
ONE Media 3.0 LLC **(ONE Media 3.0 LLC)**	UNITED STATES	ATIS
one2many B.V. **(one2many B.V.)**	NETHERLANDS	ETSI
OnePlus **(OnePlus (Shenzhen) Technology Co., LTD)**	CHINA	CCSA
OPPO **(Guangdong OPPO Mobile Telecommunications Corp.,Ltd.)**	CHINA	ETSI
OPPO (chongqing) Intelligence **(OPPO (chongqing) Intelligence Technology Limited)**	CHINA	CCSA
OPPO Beijing **(Beijing OPPO Telecommunications Corp., ltd.)**	CHINA	CCSA
OptM Media **(OptM Media Solutions Private Limited)**	INDIA	TSDSI
OQTEC **(OQ TECHNOLOGY)**	LUXEMBOURG	ETSI
Oracle Corporation **(Oracle Corporation)**	UNITED STATES	ETSI
Orange **(Orange)**	FRANCE	ETSI
Orange Romania **(Orange Romania)**	ROMANIA	ETSI
Orange Spain **(France Telecom España S.A.U.)**	SPAIN	ETSI
Orange UK **(Orange Brand Services Ltd)**	UNITED KINGDOM	ETSI
ORS **(Österreichische Rundfunksender GmbH & Co KG)**	AUSTRIA	ETSI
OTD_US **(OTD_US)**	UNITED STATES	ATIS
OTECH **(OTECH Germany GmbH)**	GERMANY	ETSI
P.I. WORKS **(P.I. WORKS TR BILISIM HIZMETLERI A.S.)**	TÜRKIYE	ETSI
Panasonic Holdings Corporation **(Panasonic Holdings Corporation)**	JAPAN	ARIB
PANASONIC R&D Center Germany **(PANASONIC R&D Center Germany GmbH)**	GERMANY	ETSI
PCCW Global B.V. **(PCCW Global B.V.)**	FRANCE	ETSI
Peking University **(Peking University)**	CHINA	CCSA
Pengcheng laboratory **(Pengcheng laboratory)**	CHINA	CCSA
Peraton Labs **(Peraton Labs)**	UNITED STATES	ATIS
Philips International B.V. **(Philips International B.V.)**	NETHERLANDS	ETSI
PHY Wireless **(PHY Wireless)**	UNITED STATES	ATIS
PIDS **(PIDS)**	NETHERLANDS	ETSI
Pivotal Commware **(Pivotal Commware)**	UNITED STATES	ATIS
Plan-S **(Plan S Uydu ve Uzay Teknolojileri A.S)**	TÜRKIYE	ETSI
PML **(Purple Mountain Laboratories: Networking, Communications and Security)**	CHINA	CCSA
Polaris Wireless **(Polaris Wireless)**	UNITED STATES	ATIS
Polisen **(Polismyndigheten)**	SWEDEN	ETSI

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POST Luxembourg **(POST Luxembourg)**	LUXEMBOURG	ETSI
Prasar Bharati **(Prasar Bharati)**	INDIA	TSDSI
Proximus Plc **(Proximus Plc)**	BELGIUM	ETSI
PSCE **(Public Safety Communication Europe Forum)**	BELGIUM	ETSI
PT PORTUGAL SGPS SA **(PT Portugal SGPS SA)**	PORTUGAL	ETSI
PTS **(Swedish Post and Telecom Authority)**	SWEDEN	ETSI
Public Safety Canada **(Public Safety Canada)**	CANADA	ETSI
Qihoo 360 **(Qihoo 360 Technology Co., Ltd.)**	CHINA	CCSA
Qorvo **(Qorvo)**	UNITED STATES	ETSI
Qualcomm Austria RFFE GmbH **(Qualcomm Austria RFFE GmbH)**	AUSTRIA	ETSI
QUALCOMM Europe Inc. - Italy **(QUALCOMM Europe Inc. - Italy Branch Office)**	ITALY	ETSI
QUALCOMM Europe Inc. - Spain **(QUALCOMM Europe Inc. - Spain Branch Office)**	SPAIN	ETSI
Qualcomm Finland RFFE Oy **(Qualcomm Finland RFFE Oy)**	FINLAND	ETSI
Qualcomm France **(Qualcomm France SARL)**	FRANCE	ETSI
Qualcomm Germany **(Qualcomm Germany GmbH)**	GERMANY	ETSI
Qualcomm Incorporated **(Qualcomm Incorporated)**	UNITED STATES	ATIS
Qualcomm India Pvt Ltd **(Qualcomm India Pvt Ltd)**	INDIA	TSDSI
QUALCOMM JAPAN LLC. **(QUALCOMM JAPAN LLC.)**	JAPAN	ARIB
Qualcomm Korea **(Qualcomm Korea)**	KOREA (REPUBLIC OF)	TTA
Qualcomm Tech. Netherlands B.V **(Qualcomm Technologies Netherlands B.V.)**	NETHERLANDS	ETSI
Qualcomm Technologies Int **(Qualcomm Technologies International, Ltd)**	UNITED KINGDOM	ETSI
Qualcomm Technologies Ireland **(QT Technologies Ireland Limited)**	IRELAND	ETSI
Quanray **(Shanghai Quanray Electronics Co., Ltd.)**	CHINA	CCSA
Quectel **(Quectel Wireless Solutions Co., Ltd.)**	CHINA	CCSA
RadiSys **(RadiSys Inc.)**	CANADA	ETSI
Rakuten Mobile, Inc **(Rakuten Mobile, Inc)**	JAPAN	ARIB
RATEL **(Regulatory Authority For Electronic Communications and Postal Services)**	SERBIA	ETSI
Reliance Jio **(Reliance Jio)**	INDIA	TSDSI
RICHTEK KOREA **(RICHTEK KOREA)**	KOREA (REPUBLIC OF)	TTA
RISE **(RISE Research Institutes of Sweden)**	SWEDEN	ETSI
ROBERT BOSCH GmbH **(ROBERT BOSCH GmbH)**	GERMANY	ETSI
Rogers Communications Canada **(Rogers Communications Canada Inc.)**	CANADA	ETSI
ROHDE & SCHWARZ	GERMANY	ETSI

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(ROHDE & SCHWARZ GmbH & Co.KG)		
Ruijie Network Co. Ltd **(Ruijie Network Co. Ltd)**	CHINA	CCSA
SAICT **(Shenzhen Academy of Information and Communication Technology)**	CHINA	CCSA
Samsung Electronics Co., Ltd **(Samsung Electronics Co., Ltd.)**	KOREA (REPUBLIC OF)	TTA
Samsung Electronics Czech **(Samsung Electronics Czech)**	CZECH REPUBLIC	ETSI
Samsung Electronics France SA **(Samsung Electronics France SA)**	FRANCE	ETSI
Samsung Electronics GmbH **(Samsung Electronics GmbH)**	GERMANY	ETSI
Samsung Electronics Iberia SA **(Samsung Electronics Iberia SA)**	SPAIN	ETSI
Samsung Electronics Nordic AB **(Samsung Electronics Nordic AB)**	SWEDEN	ETSI
Samsung Electronics Polska **(Samsung Electronics Polska)**	POLAND	ETSI
Samsung Guangzhou Mobile R&D **(Samsung Guangzhou Mobile R&D Center)**	CHINA	CCSA
Samsung Nanjing **(Samsung Electronic (China) R&D Center)**	CHINA	CCSA
Samsung R&D Institute India **(Samsung R&D Institute India - Bangalore Pvt. Ltd)**	INDIA	TSDSI
SAMSUNG R&D INSTITUTE JAPAN **(SAMSUNG R&D INSTITUTE JAPAN)**	JAPAN	ARIB
Samsung R&D Institute UK **(Samsung R&D Institute UK)**	UNITED KINGDOM	ETSI
Samsung Research America **(Samsung Research America)**	UNITED STATES	ATIS
Samsung Shenzhen **(Samsung Network R&D Center-Shenzhen)**	CHINA	CCSA
Sandvine Incorporated **(Sandvine Incorporated)**	CANADA	ETSI
Sanechips **(Sanechips Technology Co. , Ltd.)**	CHINA	CCSA
Sateliot **(Satelio IoT Services)**	SPAIN	ETSI
Schindler **(Schindler Elevator Ltd)**	SWITZERLAND	ETSI
SDI Squared **(SDI Squared LLC)**	UNITED STATES	ETSI
Sectra Communications AB **(Sectra Communications AB)**	SWEDEN	ETSI
Security Service **(Swedish Security Service)**	SWEDEN	ETSI
Semtech Neuchatel SA **(Semtech Neuchatel SA)**	SWITZERLAND	ETSI
Sennheiser Electronic GmbH **(Sennheiser Electronic GmbH & Co. KG)**	GERMANY	ETSI
Sensus UK **(Sensus UK Systems Limited)**	UNITED KINGDOM	ETSI
Sepura Ltd **(Sepura Limited)**	UNITED KINGDOM	ETSI
Sequans Communications **(Sequans Communications)**	FRANCE	ETSI
SES S.A. **(SES S.A.)**	LUXEMBOURG	ETSI
SETS **(Society for Electronic Transactions and Security)**	INDIA	TSDSI
SEU **(Southeast University)**	CHINA	CCSA
SGDSN **(Secrétariat Général de la Défense et de la Sécurité Nationale (SGDSN))**	FRANCE	ETSI

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SGITG **(State Grid Information & Telecommunication Group Co., Ltd.)**	CHINA	CCSA
SGS Wireless **(SGS Wireless)**	UNITED KINGDOM	ETSI
Shanghai Chen Si Electronics **(Shanghai Chen Si Electronics Technology Co., Ltd)**	CHINA	CCSA
Shanghai Jiao Tong University **(Shanghai Jiao Tong University)**	CHINA	CCSA
Shanghai Tejet Com Technology **(Shanghai Tejet Communications Technology Co., Ltd.)**	CHINA	CCSA
SHARP Corporation **(SHARP Corporation)**	JAPAN	ARIB
Shenzhen Heytap **(Shenzhen Heytap Technology Corp.,Ltd.)**	CHINA	CCSA
ShenZhen Zhongxing Shitong **(ShenZhen Zhongxing Shitong Tech. Co.,Ltd.)**	CHINA	CCSA
SIA **(Shenyang Institute of Automation, Chinese Academy of Sciences)**	CHINA	CCSA
Siemens AG **(Siemens AG)**	GERMANY	ETSI
Signalchip Innovations Pvt. **(Signalchip Innovations Pvt. Ltd.)**	INDIA	TSDSI
SIST **(Slovenian Institute for Standardisation)**	SLOVENIA	ETSI
Sisvel **(Sisvel International S.A.)**	LUXEMBOURG	ETSI
SK Telecom **(SK TELECOM)**	KOREA (REPUBLIC OF)	TTA
SKY Perfect JSAT Corporation **(SKY Perfect JSAT Corporation)**	JAPAN	ARIB
Skylo Technologies **(Skylo Technologies)**	UNITED STATES	ATIS
Skyworks Solutions Inc. **(Skyworks Solutions Inc.)**	UNITED STATES	ETSI
SmarterMicro Inc. **(Smarter Microelectronics(Guangzhou) Co.,Ltd)**	CHINA	CCSA
SnT - University of Luxembourg **(Interdisciplinary Centre for Security, Reliability and Trust/University of Luxembourg)**	LUXEMBOURG	ETSI
SoftBank Corp. **(SoftBank Corp.)**	JAPAN	ARIB
Softel Systems **(Softel Systems Pty Ltd)**	AUSTRALIA	ETSI
Softil Ltd **(Softil Ltd)**	ISRAEL	ETSI
Sony Corporation **(Sony Corporation)**	JAPAN	ARIB
Sony Europe B.V. **(Sony Europe B.V.)**	UNITED KINGDOM	ETSI
Sony Group Corporation **(Sony Group Corporation)**	JAPAN	ARIB
Sooktha Consulting Pvt Ltd **(Sooktha Consulting Pvt Ltd)**	INDIA	TSDSI
Southern Linc. **(Southern Linc.)**	UNITED STATES	ATIS
Southwest Jiaotong university **(Southwest Jiaotong university)**	CHINA	CCSA
SpaceX **(SpaceX Netherlands B.V)**	NETHERLANDS	ETSI
Spark NZ Ltd **(Spark NZ Ltd)**	NEW ZEALAND	ATIS
Spirent Communications **(Spirent Communications)**	UNITED STATES	ETSI
Sporton International Inc **(Sporton International Inc.)**	TAIWAN, PROVINCE OF CHINA	ETSI
Spreadtrum Communications	CHINA	CCSA

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(Spreadtrum Communications (Shanghai) Co., Ltd.)		
SRTC **(The State Radio_monitoring_center Testing Center)**	CHINA	CCSA
SS8 **(SS8 Networks Inc.)**	UNITED STATES	ETSI
SSNS **(Special Service for the National Security of Hungary)**	HUNGARY	ETSI
Starpoint **(Beijing Starpoint Technology Company Limited)**	CHINA	CCSA
STE IDIRECT IRELAND LTD **(ST ENGINEERING IDIRECT (IRELAND) LIMITED)**	IRELAND	ETSI
Stellar **(Stellar telecommunications)**	FRANCE	ETSI
STMicroelectronics **(STMicroelectronics International NV)**	SWITZERLAND	ETSI
Sumitomo Elec. Industries, Ltd **(Sumitomo Electric Industries, Ltd.)**	JAPAN	ARIB
SUTD **(Singapore University of Technology and Design)**	SINGAPORE	ETSI
Swift Navigation **(Swift Navigation)**	UNITED STATES	ATIS
SWISSCOM **(SWISSCOM SA)**	SWITZERLAND	ETSI
SWR **(Südwestrundfunk)**	GERMANY	ETSI
SyncTechno Inc. **(SyncTechno Inc.)**	KOREA (REPUBLIC OF)	TTA
Syniverse **(M/s Syniverse Technologies Services India Pvt. Ltd.)**	INDIA	TSDSI
TA **(Tantra Analyst)**	UNITED STATES	ETSI
Tait Europe Limited **(Tait Europe Limited)**	AUSTRIA	ETSI
Tata Elxsi Limited. **(Tata Elxsi Limited.)**	INDIA	TSDSI
TCL **(Shenzhen TCL New Technology Company Ltd.)**	CHINA	CCSA
TCS **(TATA Consultancy Services)**	INDIA	TSDSI
TD Tech Ltd **(TD Tech Ltd)**	CHINA	CCSA
TDF **(TDF SAS)**	FRANCE	ETSI
Tech Mahindra Limited **(Tech Mahindra Limited)**	INDIA	TSDSI
Tejas Network Limited **(Tejas Network Limited)**	INDIA	TSDSI
Tektronix GmbH **(Tektronix GmbH)**	GERMANY	ETSI
TELECOM ITALIA S.p.A. **(Telecom Italia S.p.A.)**	ITALY	ETSI
Telefonica Germany GmbH **(Telefónica Germany GmbH & Co OHG)**	GERMANY	ETSI
TELEFONICA S.A. **(TELEFONICA S.A.)**	SPAIN	ETSI
Telekom Deutschland GmbH **(Telekom Deutschland GmbH)**	GERMANY	ETSI
TELENOR ASA **(Telenor ASA)**	NORWAY	ETSI
Telesat International Limited **(Telesat International Limited)**	UNITED KINGDOM	ETSI
Telia Company AB **(Telia Company AB)**	SWEDEN	ETSI
Telit Communications S.p.A. **(Telit Communications S.p.A.)**	ITALY	ETSI

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Telstra Limited **(Telstra Limited)**	AUSTRALIA	ETSI
TELUS **(TELUS)**	CANADA	ATIS
Tencent **(Shenzhen city Tencent computer system Co. Ltd.)**	CHINA	CCSA
Tencent Cloud **(Tencent cloud computing Beijing Co., Ltd)**	CHINA	CCSA
Teradyne **(Teradyne)**	UNITED STATES	ATIS
TerreStar Solutions Inc. **(TerreStar Solutions Inc.)**	CANADA	ATIS
Texas A&M University **(Texas A&M University)**	UNITED STATES	ETSI
TEXAS Instruments **(Texas Instruments France)**	FRANCE	ETSI
THALES **(THALES)**	FRANCE	ETSI
THURAYA TELECOM CO. **(THURAYA TELECOMMUNICATIONS COMPANY)**	UNITED ARAB EMIRATES	ETSI
Tiami Networks **(Tiami Networks)**	UNITED STATES	ATIS
TII **(Technology Innovation Institute)**	UNITED ARAB EMIRATES	ETSI
T-Mobile Austria GmbH **(T-Mobile AUSTRIA GmbH)**	AUSTRIA	ETSI
T-Mobile Polska S.A. **(T-Mobile Polska Spolka Akcyjna)**	POLAND	ETSI
T-Mobile USA **(T-Mobile USA, Inc.)**	UNITED STATES	ETSI
T-Mobile USA Inc. **(T-Mobile USA Inc.)**	UNITED STATES	ATIS
TNO **(TNO)**	NETHERLANDS	ETSI
Tongji University **(Tongji University)**	CHINA	CCSA
Toshiba **(Toshiba)**	UNITED KINGDOM	ETSI
TOWE Wireless **(Sushi TOWE Wireless Testing (Shenzhen) Co.,Ltd.)**	CHINA	ETSI
TOYOTA Info Technology Center **(TOYOTA Info Technology Center USA, Inc.)**	UNITED STATES	ETSI
TOYOTA MOTOR CORPORATION **(TOYOTA MOTOR CORPORATION)**	JAPAN	TTC
TRAFICOM **(The Finnish Transport and Communications Agency)**	FINLAND	ETSI
Trafikverket **(Trafikverket)**	SWEDEN	ETSI
Transsion Holdings **(Transsion Holdings)**	CHINA	CCSA
TransUnion **(TransUnion)**	UNITED STATES	ATIS
Trimble **(Trimble)**	UNITED STATES	ATIS
Tron Future Tech Inc. **(Tron Future Tech Inc.)**	TAIWAN, PROVINCE OF CHINA	ETSI
TTP plc **(TTP plc)**	UNITED KINGDOM	ETSI
Turk Telekomunikasyon A.S. **(Turk Telekomunikasyon A.S.)**	TÜRKIYE	ETSI
TURKCELL **(Turkcell Iletisim Hizmetleri A.S.)**	TÜRKIYE	ETSI
U.S. Department of Defense **(U.S. Department of Defense)**	UNITED STATES	ATIS
U.S. Department of Transport.	UNITED STATES	ATIS

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(U.S. Department of Transportation)		
U.S. National Security Agency **(US National Security Agency)**	UNITED STATES	ATIS
Uangel **(Uangel Corporation)**	KOREA (REPUBLIC OF)	TTA
ubinexus **(Beijing Ubinexus Technology Development Co., Ltd)**	CHINA	CCSA
u-blox AG **(u-blox AG)**	SWITZERLAND	ETSI
UESTC **(University of Electronic Science and Technology of China)**	CHINA	CCSA
UL VS Ltd **(UL VS Ltd)**	UNITED KINGDOM	ETSI
UMA **(Universidad de Malaga)**	SPAIN	ETSI
umlaut **(umlaut communications GmbH)**	GERMANY	ETSI
UNIBO **(ALMA MATER STUDIORUM Università di Bologna)**	ITALY	ETSI
UniBw M **(University of the Bundeswehr Munich)**	GERMANY	ETSI
Unicom Broadband Online **(Unicom Broadband Online Co., Ltd.)**	CHINA	CCSA
Unicompay **(Unicompay Co., Ltd.)**	CHINA	CCSA
Union Inter. Chemins de Fer **(Union Internationale des Chemins de Fer)**	FRANCE	ETSI
Union Telephone Company **(Union Telephone Company)**	UNITED STATES	ATIS
Unisoc **(Unisoc (Shanghai) Technologies Co., Ltd.)**	CHINA	CCSA
Unisoc Beijing **(Beijing Unisoc Communications Technology Co., Ltd.)**	CHINA	CCSA
UPV/EHU **(Universidad del País Vasco/Euskal Herriko Unibertsitatea)**	SPAIN	ETSI
US Cellular Corporation. **(US Cellular Corporation/TDS.)**	UNITED STATES	ATIS
UTIMACO TS GmbH **(UTIMACO TS GmbH)**	GERMANY	ETSI
UTokyo **(The University of Tokyo)**	JAPAN	ETSI
Vaan Megam **(Vaan Megam Networks)**	INDIA	TSDSI
Valeo **(Valeo Telematik und Akustik GmbH)**	GERMANY	ETSI
VALID SOLUCIONES TECNOLÓGICAS **(VALID SOLUCIONES TECNOLÓGICAS S.A.U)**	SPAIN	ETSI
Valid8 **(Valid8.com, Inc.)**	UNITED STATES	ETSI
Vanchip **(Vanchip (Tianjin) Technology Co., Ltd.)**	CHINA	CCSA
Verizon Denmark **(Verizon Denmark A/S)**	DENMARK	ETSI
Verizon Spain **(Verizon Spain S.L.)**	SPAIN	ETSI
Verizon Sweden **(Verizon Sweden Aktiebolag 2116)**	SWEDEN	ETSI
Verizon Switzerland AG **(Verizon Switzerland AG)**	SWITZERLAND	ETSI
Verizon UK Ltd **(Verizon UK Ltd)**	UNITED KINGDOM	ETSI
Vestel **(Vestel Elektronik Sanayi ve Ticaret A.S)**	TÜRKIYE	ETSI
ViaSat Satellite Holdings Ltd **(ViaSat Satellite Holdings Ltd)**	UNITED KINGDOM	ETSI

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VIAVI Solutions **(Viavi Solutions UK Ltd.)**	UNITED KINGDOM	ETSI
vivo Mobile Com. (Chongqing) **(vivo Mobile Communication (Chongqing) Co., Ltd)**	CHINA	CCSA
vivo Mobile Communication (H) **(vivo Mobile Communication (Hangzhou) Co., Ltd.)**	CHINA	CCSA
vivo Mobile Communication (S) **(vivo Mobile Communication (Shenzhen) Co., Ltd.)**	CHINA	CCSA
vivo Mobile Communication Co., **(vivo Mobile Communication Co., Ltd)**	CHINA	CCSA
VIVO TECH GmbH **(VIVO TECH GmbH)**	GERMANY	ETSI
Vodafone GmbH **(Vodafone GmbH)**	GERMANY	ETSI
VODAFONE Group Plc **(Vodafone Group Plc)**	UNITED KINGDOM	ETSI
Vodafone Ireland Plc **(Vodafone Ireland Plc)**	IRELAND	ETSI
Vodafone Italia SpA **(Vodafone Italia SpA)**	ITALY	ETSI
Vodafone Romania S.A. **(Vodafone Romania S.A.)**	ROMANIA	ETSI
Vodafone Telekomünikasyon A.S. **(Vodafone Telekomünikasyon A.S.)**	TÜRKIYE	ETSI
VoiceAge Corporation **(VoiceAge Corporation)**	CANADA	ETSI
Volkswagen AG **(Volkswagen AG)**	GERMANY	ETSI
VSENS **(Unicom Vsens Telecommunications Co., Ltd)**	CHINA	CCSA
VTT **(VTT Technical Research Centre of Finland)**	FINLAND	ETSI
WE Certification Oy **(WE Certification Oy)**	FINLAND	ETSI
Wiliot Ltd. **(Wiliot Ltd.)**	ISRAEL	ETSI
WILUS Inc. **(WILUS Inc.)**	KOREA (REPUBLIC OF)	TTA
Wipro GE **(Wipro GE Healthcare Private Limited)**	INDIA	TSDSI
Wisig Networks Pvt Ltd **(Wisig Networks Pvt Ltd)**	INDIA	TSDSI
Wuhan CICT Mobile **(Wuhan CICT Mobile Communications Technology Co., Ltd.)**	CHINA	CCSA
Wuhan Hongxin Technical **(Wuhan Hongxin Technical Services Co., Ltd.)**	CHINA	CCSA
Wuhan Hongxin Technology **(Wuhan Hongxin Technology Development Co., Ltd.)**	CHINA	CCSA
Xiaomi Communications **(Xiaomi Communications)**	CHINA	CCSA
Xiaomi EV Technology **(Xiaomi EV Technology Co., Ltd.)**	CHINA	CCSA
Xiaomi Technology **(Xiaomi Technology)**	CHINA	CCSA
Xidian University **(Xidian University)**	CHINA	CCSA
Xilinx Ireland **(Xilinx Ireland)**	IRELAND	ETSI
Zhejiang Lab **(Zhejiang Lab)**	CHINA	CCSA
Zhejiang University **(Zhejiang University)**	CHINA	CCSA
ZITiS **(Central Office for Information Technology in the Security Sector)**	GERMANY	ETSI
Zollkriminalamt (ZKA)	GERMANY	ETSI

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(Zollkriminalamt (ZKA))		
ZONSON **(ZONSON SAMRT AUTO CORPORATION)**	CHINA	CCSA
ZTE **(ZTE Telecom India Pvt Ltd)**	INDIA	TSDSI
ZTE Corporation **(ZTE Corporation)**	CHINA	CCSA
ZTE Corporation **(ZTE Corporation)**	CHINA	ETSI
ZTE FRANCE SASU **(ZTE FRANCE SASU)**	FRANCE	ETSI
ZTE Italia **(ZTE Italia S.R.L)**	ITALY	ETSI
ZTE JAPAN K.K. **(ZTE JAPAN K.K..)**	JAPAN	TTC
ZTE Japan K.K. **(ZTE Japan K.K.)**	JAPAN	ARIB
ZTE Korea Limited **(ZTE Korea Limited)**	KOREA (REPUBLIC OF)	TTA
ZTE Photonics **(ZTE Photonics Technology Co.,Ltd.)**	CHINA	CCSA
ZXNE **(ZXNE CORPORATION)**	CHINA	CCSA

Total : 781 Individual Members

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

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APPENDIX 10

The Wayback Machine - https://web.archive.org/web/20180609101552/http://www.3gpp.org:80/about-3gpp/3gpp-faqs



The Mobile Broadband Standard

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

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?

Search

3GPP Website: Search for...

Search and download specs, docs, CRs and more from the 3GPP FTP Server:

ADVANCED FTP SEARCH

Recent news stories

Links to some of the news stories that were recently on the home page and news pages:

3GPP 5G DESCRIPTION FOR IMT-2020 (1 OF 3)

SYSTEM ARCHITECTURE MILESTONE OF 5G PHASE 1 IS ACHIEVED

MISSION CRITICAL SERVICES IN 3GPP

TOWARDS A BETTER PUBLIC WARNING SYSTEM (EPWS)

MANAGEMENT, ORCHESTRATION AND CHARGING FOR 5G NETWORKS

News Feeds

3GPP News
3GPP tweets
3GPP webinars

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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)

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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.

Are meeting contributions to ETSI TC SMG publically available?

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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?

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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

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.

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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, 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

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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.

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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.

TDoc numbers are allocated sequentially, from lowest to highest.

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.

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 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 or nearly 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 its own 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.

Some final considerations:

> Some FTP tools will retain the original timestamp of a file when copying it to (or from) a server, whilst others will use the current time for the new copy.
> The observed timestamp of a file depends on the time zone and the daylight saving time setting in force. Thus the apparent upload time of a given file may vary when viewed in summer compared to when viewed in winter.

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. 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.

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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?

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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.

Revision histoory:

2018-01-04: Clarifications to the answer to faq M12. (JMM)
2016-11-16: Correction of minor typo. (JMM)

ABOUT RELEASES

Release 16
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

CT	**80**	**La Jolla, CA**	11-12 Jun 2018
RAN	**80**	**La Jolla, CA**	11-14 Jun 2018
SA	**80**	**La Jolla, CA**	13-15 Jun 2018
CT	**81**	**Gold Coast**	10-11 Sep 2018
RAN	**81**	**Gold Coast**	10-13 Sep 2018
SA	**81**	**Gold Coast**	12-14 Sep 2018
CT	**82**	**Sorrento**	10-11 Dec 2018
RAN	**82**	**Sorrento**	10-13 Dec 2018
SA	**82**	**Sorrento**	12-14 Dec 2018
CT	**83**	**TBD**	18-19 Mar 2019
RAN	**83**	**TBD**	18-21 Mar 2019
SA	**83**	**TBD**	20-22 Mar 2019
CT	**84**	**US**	03-04 Jun 2019
RAN	**84**	**US**	03-06 Jun 2019
SA	**84**	**US**	05-07 Jun 2019

BROWSE KEYWORDS & TECH.

Carrier Aggregation Explained
Coordinated Vulnerability Disclosure (CVD)
Control and User Plane Separation of EPC nodes (CUPS)
The Evolved Packet Core
GPRS & EDGE
HetNet/Small Cells
HSPA
LTE-Advanced
LTE
UMTS
W-CDMA
...more keywords

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APPENDIX 11

The Wayback Machine - https://web.archive.org/web/20180604023944/http://www.3gpp.org:80/specifications/specifications



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 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 #
2018-03	Target for availablilty of all new/revised specs: TSG CT, SA = 2018-04-08 TSG RAN = 2018-04-13	StatusList	2018-03		79		79		79
2017-12		StatusList	2017-12		78		78		78
2017-09		StatusList	2017-09		77		77		77
2017-06		StatusList	2017-06		76		76		76
2017-03		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
2016-03		StatusList	2016-03		71		71	69	71
2015-12		StatusList	2015-12		70		70	68	70

Search

3GPP Website: Search for...

Search and download specs, docs, CRs and more from the 3GPP FTP Server:

ADVANCED FTP SEARCH

Recent news stories

Links to some of the news stories that were recently on the home page and news pages:

3GPP 5G DESCRIPTION FOR IMT-2020 (1 OF 3)

SYSTEM ARCHITECTURE MILESTONE OF 5G PHASE 1 IS ACHIEVED

MISSION CRITICAL SERVICES IN 3GPP

TOWARDS A BETTER PUBLIC WARNING SYSTEM (EPWS)

MANAGEMENT, ORCHESTRATION AND CHARGING FOR 5G NETWORKS

News Feeds

- 3GPP News
- 3GPP tweets
- 3GPP webinars

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year-month	remark	latest status	specs directory	TSG CN #	TSG RAN* #	TSG T #	TSG SA #	TSG GERAN #	TSG CT #
	click here to see list of specs awaiting upload								
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
2009-03		StatusList	2009-03		43		43	41	43
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	
2004-09		StatusList	2004-09	25	25	25	25		
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	

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year-month	remark	latest status	specs directory	TSG CN #	TSG RAN* #	TSG T #	TSG SA #	TSG GERAN #	TSG CT #
	click here to see list of specs awaiting upload								
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	
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 »

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Page reviewed and updated every 3 months

ABOUT RELEASES

- Release 16
- 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

CT	**80**	**La Jolla, CA**	11-12 Jun 2018
RAN	**80**	**La Jolla, CA**	11-14 Jun 2018
SA	**80**	**La Jolla, CA**	13-15 Jun 2018
CT	**81**	**Gold Coast**	10-11 Sep 2018
RAN	**81**	**Gold Coast**	10-13 Sep 2018
SA	**81**	**Gold Coast**	12-14 Sep 2018
CT	**82**	**Sorrento**	10-11 Dec 2018
RAN	**82**	**Sorrento**	10-13 Dec 2018
SA	**82**	**Sorrento**	12-14 Dec 2018
CT	**83**	**TBD**	18-19 Mar 2019
RAN	**83**	**TBD**	18-21 Mar 2019
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CT	**84**	**US**	03-04 Jun 2019
RAN	**84**	**US**	03-06 Jun 2019
SA	**84**	**US**	05-07 Jun 2019

BROWSE KEYWORDS & TECH.

- Carrier Aggregation Explained
- Coordinated Vulnerability Disclosure (CVD)
- Control and User Plane Separation of EPC nodes (CUPS)
- The Evolved Packet Core
- GPRS & EDGE
- HetNet/Small Cells
- HSPA
- LTE-Advanced
- LTE
- UMTS
- W-CDMA
- ...more keywords

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APPENDIX 12

The Wayback Machine - https://web.archive.org/web/20180702022330/http://www.3gpp.org:80/specifications/79-specification-numbering

The Mobile Broadband Standard

A GLOBAL INITIATIVE

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.

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.

Search

3GPP Website: Search for...

Search and download specs, docs, CRs and more from the 3GPP FTP Server:

ADVANCED FTP SEARCH

Recent news stories

Links to some of the news stories that were recently on the home page and news pages:

3GPP 5G DESCRIPTION FOR IMT-2020 (1 OF 3)

SYSTEM ARCHITECTURE MILESTONE OF 5G PHASE 1 IS ACHIEVED

MISSION CRITICAL SERVICES IN 3GPP

TOWARDS A BETTER PUBLIC WARNING SYSTEM (EPWS)

MANAGEMENT, ORCHESTRATION AND CHARGING FOR 5G NETWORKS

News Feeds

- 3GPP News
- 3GPP tweets
- 3GPP webinars

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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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ABOUT RELEASES

Release 16
Release 15
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Release 10
Release 9
Release 8
Release 7
Release 6
Release 5
Release 4
Release 1999

FULL MEETING CALENDAR

CT	**81**	**Gold Coast**	10-11 Sep 2018
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RAN	**84**	**US**	03-06 Jun 2019
SA	**84**	**US**	05-07 Jun 2019

BROWSE KEYWORDS & TECH.

Carrier Aggregation Explained
Coordinated Vulnerability Disclosure (CVD)
Control and User Plane Separation of EPC nodes (CUPS)
The Evolved Packet Core
GPRS & EDGE
HetNet/Small Cells
HSPA
LTE-Advanced
LTE
UMTS
W-CDMA
...more keywords

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APPENDIX 13

The Wayback Machine - https://web.archive.org/web/20180701043538/http://www.3gpp.org/specifications/releases



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.

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	Start date	End date (Protocols stable)	Closure date
	[Note 3]	[Note 2a]		
Release 16	Open	2017-03-22	2020-12-20 (SA#87-dates TBC)	
Release 15	Open (Freeze date planned for June 2018)	2016-06-01	2018-09-14 (SA#81)	
Release 14	Frozen	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)
Release 4	Closed	1998-08-01	2001-06-21 (SP-12)	2014-09-17 (SP-65)

Search

3GPP Website: Search for...

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ADVANCED FTP SEARCH

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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	14.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).

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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).

ABOUT RELEASES

Release 16
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

CT	**81**	**Gold Coast**	10-11 Sep 2018
RAN	**81**	**Gold Coast**	10-13 Sep 2018
SA	**81**	**Gold Coast**	12-14 Sep 2018
CT	**82**	**Sorrento**	10-11 Dec 2018
RAN	**82**	**Sorrento**	10-13 Dec 2018
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RAN	**83**	**TBD**	18-21 Mar 2019
SA	**83**	**TBD**	20-22 Mar 2019
CT	**84**	**US**	03-04 Jun 2019
RAN	**84**	**US**	03-06 Jun 2019
SA	**84**	**US**	05-07 Jun 2019

BROWSE KEYWORDS & TECH.

Carrier Aggregation Explained
Coordinated Vulnerability Disclosure (CVD)
Control and User Plane Separation of EPC nodes (CUPS)
The Evolved Packet Core
GPRS & EDGE
HetNet/Small Cells
HSPA
LTE-Advanced
LTE
UMTS
W-CDMA
...more keywords

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APPENDIX 14

The Mobile Broadband Standard
GPRS

Cover Story

Webina ds full 5G in Rel-16

July 3, 10:(

Balazs Bertenyi rogress made at RAN#80, and specifically abo

Details of t dalone specifications
Rel-15 late ds of migration to 5G
Rel-16 wor e fulfilling the full 5G vision



READ MORE...

Recent News



RAN3 Clocks up the 100

June 28, 2018

By Gino Masini, Sasha Sirotkin and Yin Gao

May 2018 will be remembered by some for two very special events; the finalization of the Non-Standalone NR specification and the RAN3 centennial celebration. In Busan, Korea.

3GPP RAN WG3 took some time off after heated discussions, hectic drafting and careful ASN.1 polishing for a well-deserved party at the RAN3#100 meeting.

Different opinions about intricate details of XnAP Information Element definitions have been put aside, questions for clarification forgotten and replaced by compliments and toasts to recognize this significant landmark.

There was singing at dinner (Lyrics in R3-183485) and stories told about the old days when meeting schedules were less hectic and summers were longer. There were also awards made, notably to some of the characters that have made RAN3 a special place to be.

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3GPP 5G DESCRIPTION FOR IMT-2020 (1 OF 3)

SYSTEM ARCHITECTURE MILESTONE OF 5G PHASE 1 IS ACHIEVED

MISSION CRITICAL SERVICES IN 3GPP

TOWARDS A BETTER PUBLIC WARNING SYSTEM (EPWS)

MANAGEMENT, ORCHESTRATION AND CHARGING FOR 5G NETWORKS

News Feeds

3GPP News
3GPP tweets

ABOUT RELEASES

Release 16
Release 15
Release 14
Release 13
Release 12

FULL MEETING CALENDAR

CT	81	Gold Coast	10-11 Sep 2018
RAN	81	Gold Coast	10-13 Sep 2018
SA	81	Gold Coast	12-14 Sep 2018
CT	82	Sorrento	10-11 Dec 2018
RAN	82	Sorrento	10-13 Dec 2018

BROWSE KEYWORDS & TECH.

Carrier Aggregation Explained
Coordinated Vulnerability Disclosure (CVD)
Control and User Plane Separation of EPC nodes (CUPS)
The Evolved Packet Core

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Release 11	**SA**	**82**	**Sorrento**
Release 10	**CT**	**83**	**TBD**
Release 9	**RAN**	**83**	**TBD**
Release 8	**SA**	**83**	**TBD**
Release 7	**CT**	**84**	**US**
Release 6	**RAN**	**84**	**US**
Release 5	**SA**	**84**	**US**
Release 4			
Release 1999			

12-14 Dec 2018	GPRS & EDGE
18-19 Mar 2019	HetNet/Small Cells
18-21 Mar 2019	HSPA
20-22 Mar 2019	LTE-Advanced
03-04 Jun 2019	LTE
03-06 Jun 2019	UMTS
05-07 Jun 2019	W-CDMA
	...more keywords

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APPENDIX 20

Secretary Remarks	Available	Decision	Agenda	Tdoc	Title	Source	Doc-type	Spec	CRnbr	CRrev	CRcat
	Yes	approved	3	RP-180600	Agenda for RAN #80 held in La Jolla, USA, 11.06.-14.06.2018	RAN chairman (Nokia)	agenda	-	-	-	-
	Yes	revised	4	RP-180601	Draft report of RAN #79 held in Chennai, India, 19.03.-22.03.2018	ETSI MCC	report	-	-	-	-
	Yes	noted	5.1	RP-180602	Status Report RAN WG1	RAN1 chairman (Qualcomm)	report	-	-	-	-
	Yes	noted	5.1	RP-180603	List of CRs from RAN WG1	ETSI MCC	discussion	-	-	-	-

	Yes	noted	5.2	RP-180604	Status Report RAN WG2	RAN2 chairman (Intel)	report	-	-	-	-
	Yes	noted	5.2	RP-180605	List of CRs from RAN WG2	ETSI MCC	discussion	-	-	-	-
	Yes	noted	5.3	RP-180606	Status Report RAN WG3	RAN3 chairman (Ericsson)	report	-	-	-	-
	Yes	revised	5.3	RP-180607	List of CRs from RAN WG3	ETSI MCC	discussion	-	-	-	-
	Yes	noted	5.4	RP-180608	Status Report RAN WG4	RAN4 chairman (Samsung)	report	-	-	-	-
	Yes	noted	5.4	RP-180609	List of CRs from RAN WG4	ETSI MCC	discussion	-	-	-	-

	Yes	noted	5.5	RP-180610	Status Report RAN WG5	RAN5 chairman (Motorola Mobility)	report	-	-	-	-
	Yes	noted	5.5	RP-180611	List of CRs from RAN WG5	ETSI MCC	discussion	-	-	-	-
	Yes	approved	5.5	RP-180612	Status Report MCC TF160 (for approval)	ETSI MCC TF160 Leader	report	-	-	-	-
	Yes	noted	5.6	RP-180613	Status Report RAN WG6	RAN6 chairman (Nokia)	report	-	-	-	-
	Yes	noted	5.6	RP-180614	List of CRs from RAN WG6	ETSI MCC	discussion	-	-	-	-
	Yes	noted	6.1	RP-180615	TSG SA Report to TSG RAN - Questions for Advice and Requests	SA chairman (Samsung)	report	-	-	-	-
	Yes	noted	6.3	RP-180616	3GPP Support Team Report	ETSI MCC	report	-	-	-	-
	Yes	noted	8.1	RP-180617	Status Report ITU-R Ad hoc	3GPP ITU-R Ad hoc Contact (Telecom Italia)	report	-	-	-	-
	Yes	not treated	18	RP-180618	3GPP Work Plan review at Plenary #80	ETSI MCC	Work Plan	-	-	-	-
80_LS01	Yes	noted	9.3.1	RP-180619	Reply LS to RP-180590 on secured Signalling-only connection (S2-184507; to: RAN3, RAN2, SA3; cc: RAN, SA; contact: Nokia)	SA2	LS in	-	-	-	-
	Yes	noted	9.8	RP-180620	Reply LS to RP-180598 on optimisation of UE capability signalling (S2-184608; to: SA, RAN, RAN2; cc: RAN3, CT1, CT4; contact: MediaTek)	SA2	LS in	-	-	-	-
80_LS01	Yes	noted	9.3.1	RP-180621	Reply LS to RP-180590 on Secured Signalling-only connection (S3-181451; to: RAN, RAN3, RAN2, SA2; cc: SA; contact: Nokia)	SA3	LS in	-	-	-	-
	Yes	noted	8.5	RP-180622	Reply LS to ITU-T SG5 LS52 = S5-182061 on Energy Efficiency (S5-182439; to: ITU-T SG5 Q6/5; cc: SA, CT, RAN, ETSI TC EE, ETSI TC ATTM, NGMN; contact: Orange)	SA5	LS in	-	-	-	-

	Yes	noted	9.5.1	RP-180623	Reply LS to SAE 12112017-1 = RP-172178 on Establishment of SAE Cellular V2X Technical Committee and Associated Task Forces (SP-180215; to: SAE C-V2X TC; cc: SAE DSRC TC, NGMN Alliance V2X Task-Force, RAN, SA1, SA6; contact: LG)	SA	LS in	-	-	-	-
	Yes	noted	7	RP-180624	LS on Guidance on UE WiFi MAC Address inclusion in LTE Positioning Protocol (SP-180234; to: SA1, SA2, SA3, RAN2; cc: RAN; contact: MediaTek)	SA	LS in	-	-	-	-
	Yes	noted	9.3.1	RP-180625	LS on on the 5G trials framework (NGMN_LS180320; to: RAN; cc: -; contact: Vodafone)	NGMN	LS in	-	-	-	-
80_LS05	Yes	replied to	9.3.1	RP-180626	LS on minimum number of RX antennae for NR vehicular UEs (5GAA_A-180148; to: RAN4, RAN; cc: RAN1, RAN2; contact: BMW)	5GAA WG2	LS in	-	-	-	-
	Yes	noted	7	RP-180627	LS on LTE and the upcoming 5G standard (GSMA_CVD_1804_001; to: SA3, RAN2; cc: RAN; contact: GSMA)	GSMA	LS in	-	-	-	-

	Yes	noted	8.2	RP-180628	LS on Invitation to update the information in the IMT2020 roadmap (ITU_T_JCA-IMT2020-O-005; to: RAN, CT, SA, ITU-R study groups, ITU-T study groups, ITU-D study groups, BBF (Architecture and Migration, Routing and Transport, Wireline Convergence), ETSI (ISG MEC, ISG NFV, Millimetre Wave Transmission), GSMA (Network 2020), IEEE (Next Generation Fronthaul Interface (1914) Working Group, Time-Sensitive Networking for Fronthaul - 802.1cm, 5G), IETF (DETNET, DMM, SFC), MEF (Technical & Operations Committee), NGNM (5G Work Programme), OASIS (TOSCA), oneM2M, ONF (Architecture, Mobile Networks), ONAP, OSSDN, SCF, TM Forum, TTA (Telecommunications Convergence), TSDSI; cc: -; contact: Ericsson)	ITU-T JCA IMT2020	LS in	-	-	-	-
	Yes	noted	9.1.9	RP-180629	LS on 5G for Industrial Communication (5G-ACIA_LS-2018-001; to: SA1, SA2; cc: SA, RAN, SA3, SA5; contact: Ericsson)	5G-ACIA	LS in	-	-	-	-
80_LS03	Yes	noted	9.5.1	RP-180630	Reply LS to R1-1719239 = RP-172155 on eV2X evaluation methodology (SAE_C_V2X_TC_LS_180418; to: RAN, RAN1; cc: -; contact: LG)	SAE C-V2X TC Advanced Application Task-Force	LS in	-	-	-	-
	Yes	noted	7	RP-180631	LS on LTE OTA TRP and TRS requirements definition in 3GPP (TFES(18)059027r1; to: RAN; cc: RAN4, RAN5; contact: Ericsson)	ETSI TC MSG TFES	LS in	-	-	-	-
80_LS02	Yes	replied to	9.3.1	RP-180632	LS on coexistence of NR-NR and NR-LTE networks with synchronised, unsynchronised and semi-synchronised operation in 3400-3800 MHz (CEPT_ECC_PT1_LS_180420; to: RAN1, RAN4; cc: RAN; contact: Ofcom)	CEPT ECC PT1	LS in	-	-	-	-
	Yes	noted	9.4.1	RP-180633	LS to RAN about TR38.811 chap 6 text proposal completion (R1-1807719; to: RAN; cc: -; contact: Thales)	RAN1	LS in	-	-	-	-

80_LS02	Yes	noted	9.3.1	RP-180634	Reply LS to CEPT_ECC_PT1_LS_180420 = RP-180632 on Coexistence of NR-NR and NR-LTE networks with synchronised, unsynchronised and semi-synchronised operation in 3400-3800 MHz (R1-1807868; to: RAN; cc: RAN4; contact: Huawei)	RAN1	LS in	-	-	-	-
80_LS04	Yes	replied to	9.8	RP-180635	LS on NR UE feature list (R1-1807896; to: RAN, RAN2, RAN4; cc: RAN3; contact: NTT DOCOMO)	RAN1	LS in	-	-	-	-
	Yes	noted	9.3.1	RP-180636	LS on Lead Time for Beam Switching (R4-1808542; to: RAN, RAN1; cc: -; contact: Qualcomm)	RAN4	LS in	-	-	-	-
	Yes	noted	7	RP-180637	LS on Removal of LTE specific terminology from Group Communication System Enablers TS 22.468 (S1-181249; to: SA2, SA3, SA4, SA5, SA6, CT1, CT3, CT4, CT6, RAN1, RAN2, RAN3, RAN4, RAN5, RAN6; cc: SA, CT, RAN; contact: Nokia)	SA1	LS in	-	-	-	-
80_LS03	Yes	noted	9.5.1	RP-180638	Additional Reply LS to R1-1719239 = RP-172155 on eV2X evaluation methodology (SAE_C_V2X_TC_LS_180529; to: RAN, RAN1, SA1; cc: -; contact: LG)	SAE C-V2X TC Advanced Application Task-Force	LS in	-	-	-	-
80_LS04	Yes	replied to	9.8	RP-180639	LS on NR UE feature list – RAN2 (R2-1809153; to: RAN; cc: -; contact: Intel)	RAN2	LS in	-	-	-	-

80_LS05	Yes	noted	9.3.1	RP-180640	LS on 2RX requirements for vehicle mounted NR UE (R4-1808188; to: RAN; cc: RAN1; contact: LG)	RAN4	LS in	-	-	-	-
80_LS02	Yes	noted	9.3.1	RP-180641	Reply LS to CEPT_ECC_PT1_LS_180420 = RP-180632 on Coexistence of NR-NR and NR-LTE networks (R4-1808253; to: RAN; cc: RAN1; contact: Qualcomm)	RAN4	LS in	-	-	-	-

80_LS06	Yes	noted	10.3.3	RP-180642	Reply LS to RP-172840 on CP latency reduction (R2-1809244; to: RAN; cc: RAN1; contact: Ericsson)	RAN2	LS in	-	-	-	-
	Yes	noted	7	RP-180643	Reply LS to R4-1801423 on unwanted emissions for the revision of ERC Rec 74 01 (R4-1808505; to: CEPT ECC WG SE; cc: RAN, ETSI TC MSG TFES, CEPT ECC WG SE21; contact: Nokia)	RAN4	LS in	-	-	-	-
	Yes	replied to	9.8	RP-180644	LS on UE feature list (R4-1808552; to: RAN; cc: -; contact: NTT DOCOMO)	RAN4	LS in	-	-	-	-
	Yes	noted	9.1.5	RP-180645	LS on Prioritized Vehicle to Cloud Automotive Use Cases (AECC_LS_180601; to: RAN, SA; cc: -; contact: Toyota)	AECC	LS in	-	-	-	-

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	Yes	noted	8.4	RP-180646	LS on the revision of recommendation ITU-R M.2084-0: Radio interface standards of vehicle-to-vehicle and vehicle-to-infrastructure communications for Intelligent Transport System applications (ITU-R WP5A/TEMP/304; to: RAN, SA, 5GAA, 79 GHz Project, ARIB, ATIS, AWG, C2C-CC, CCSA, CEPT ECC CPG, CEPT ECC WG FM, C-Roads, ETSI ERM-TG37, ETSI ERM-TGSRR, ETSI ISG MEC, ETSI TC ERM, ETSI TC ITS, ETSI TC MSG, GSA, IEEE, IETF ITS, ISO TC 204, SAE C-V2X TC, TIA, TTA, WFA; cc: -; contact: Counsellor ITU-R SG5)	ITU-R WP5A	LS in	-	-	-	-
	Yes	noted	9.1.5	RP-180647	LS to 3GPP on Prioritised Use Cases for consideration in Rel-16 NR-V2X (5GAA_LS_A-180185; to: RAN, SA; cc: 5GAA WG1, 5GAA WG2, 5GAA WG4; cc: -; contact: 5GAA)	5GAA Board	LS in	-	-	-	-

	Yes	noted	9.1	RP-180648	LS on NGMN View on RAN activities proposed for inclusion in Release 16 (NGMN_LS_180604; to: RAN; cc: -; contact: Telecom Italia)	NGMN	LS in	-	-	-	-

	Yes	revised	9.1	RP-180649	Release 16 WI/SI package	RAN chairman (Nokia), RAN1 chairman (Qualcomm), RAN2 Chairman (Intel), RAN3 chairman (Ericsson)	discussion	-	-	-	-
FLAG T	Yes	noted	13.5.4	RP-180650	Status Report for WI UE Conformance Test Aspects - Add UE Power Class 2 to band 41 intra-band contiguous LTE Carrier Aggregation; rapporteur: Sprint	RAN5	WI status report	-	-	-	-
	Yes	noted	13.3.4	RP-180651	Status report for WI UE Conformance Test Aspects - Support for Mission Critical Push To Talk (MCPTT) over LTE; rapporteur: NIST	RAN5	WI status report	-	-	-	-
	Yes	not treated	9.1.3	RP-180652	Trials, Tests and Projects Relating to 5G Broadcast	EBU	discussion	-	-	-	-
	Yes	noted	13.4.13	RP-180653	Status report for WI UE Conformance Test Aspects - Mission Critical Improvements (UID - 790052) MCImp-UEConTest; rapporteur: NIST	RAN5	WI status report	-	-	-	-
	Yes	not treated	10.1.3	RP-180654	Motivation for IoT Relay(or Multi-hop)	Hisense Co., Ltd.	discussion	-	-	-	-
R5	Yes	approved	13.3.4	RP-180655	TS 36.579-3 v2.0.0 on Mission Critical (MC) services over LTE; Part 3: Mission Critical Push To Talk (MCPTT) Server Application conformance specification	NIST, Samsung	draft TS	36.579-3	-	-	-
R5	Yes	approved	13.3.4	RP-180656	TS 36.579-5 v2.0.0 Mission Critical (MC) services over LTE; Part 5: Abstract test suite (ATS); for approval	NIST, Samsung	draft TS	36.579-5	-	-	-

	Yes	not treated	9.1.3	RP-180657	Motivation for SID proposal for 5G Multicast and Broadcast	Academy of broadcasting Science	discussion	-	-	-	-
	Yes	revised	9.4.1	RP-180658	NR-NTN: TP for Chap 7.3 - NR modifications to support NTN	Thales, HNS, Inter Digital, Nokia, Nokia Shanghai Bell	pCR	38.811	-	-	-
FLAG M	Yes	revised	9.4.1	RP-180659	Status report for SI Study on NR to support non-terrestrial networks; rapporteur: Thales	THALES	WI status report	-	-	-	-
	Yes	revised	9.4.1	RP-180660	NR-NTN: TP for Chap 8 Recommendations on the way forward	THALES	pCR	38.811	-	-	-
	Yes	approved	9.4.1	RP-180661	NR-NTN: update on chap 4.8 spectrum and related chap	THALES	pCR	38.811	-	-	-
	Yes	revised	9.1.17	RP-180662	New SI: Solutions for NR to support Non Terrestrial Networks	THALES	SID new	-	-	-	-
	Yes	revised	9.1.17	RP-180663	Summary of the mail discussion about the Study item on NR solutions for Non Terrestrial Network (NTN)	THALES	report	-	-	-	-
	Yes	noted	9.4.1	RP-180664	NR-NTN: solution principles for NR to support non-terrestrial networks	THALES	discussion	38.811	-	-	-
	Yes	withdrawn	9.4.1	RP-180665	NR-NTN: update on link budget analysis	THALES, HNS, Ligado	pCR	38.811	-	-	-

	Yes	noted	9.1	RP-180666	Views & principles on 3GPP RAN Rel-16	Qualcomm	discussion	-	-	-	-
	No	withdrawn	9.1.3	RP-180667	Broadcast email discussion (NR & LTE): summary	Qualcomm	report	-	-	-	-
	Yes	noted	9.1.3	RP-180668	Broadcast email discussion (NR & LTE): summary	Qualcomm	report	-	-	-	-
	Yes	not treated	9.1.3	RP-180669	New SID on NR mixed mode broadcast/multicast	Qualcomm Europe Inc.(Italy)	SID new	-	-	-	-
	Yes	not treated	9.1.5	RP-180670	Co-channel coexistence of NR-V2X with other technologies	Qualcomm Europe Inc.(Italy)	discussion	-	-	-	-
	Yes	not treated	9.1.5	RP-180671	Relationship between LTE V2X & NR V2X	Qualcomm Europe Inc.(Italy)	discussion	-	-	-	-
	Yes	revised	10.1.4	RP-180672	New WID on LTE-based 5G Terrestrial Broadcast	Qualcomm Europe Inc.(Italy)	WID new	-	-	-	-
	Yes	not treated	9.2.2	RP-180673	New SID on Wireless Ethernet over NR	Qualcomm	SID new	-	-	-	-

FLAG D, FLAG T, FLAG M	Yes	noted	9.4.3	RP-180674	Status report for SI Study on NR-based access to unlicensed spectrum	RAN1	WI status report	-	-	-	-
80_LS02	Yes	noted	9.3.1	RP-180675	Discussion of response LS to CEPT	Qualcomm Incorporated	discussion	-	-	-	-
	Yes	noted	9.8	RP-180676	NR UE features	Qualcomm Incorporated	discussion	-	-	-	-

	Yes	not treated	9.8	RP-180677	Dynamic TDD as a UE feature	Qualcomm Incorporated	discussion	-	-	-	-
	Yes	noted	9.8	RP-180678	Support of power efficient panel switch UE feature	Qualcomm Incorporated	discussion	-	-	-	-
	Yes	revised	9.3.1	RP-180679	Discrepancy between RAN1 and RAN4 power control decisions	Qualcomm Incorporated	discussion	-	-	-	-
	Yes	noted	9.3.1	RP-180680	Solutions for single Tx TDM	Qualcomm Incorporated	discussion	-	-	-	-
R3	Yes	approved	9.3.1.2	RP-180681	TS 38.412 v1.0.0 on NG-RAN; NG signalling transport; for approval	NTT DOCOMO, INC.	draft TS	38.412	-	-	-
R3	Yes	revised	9.3.1.2	RP-180682	TS 38.422 v1.0.0 on NG-RAN; Xn signalling transport; for approval	NTT DOCOMO, INC.	draft TS	38.422	-	-	-

FLAG M	Yes	noted	9.4.6	RP-180683	Status Report for SI Study on CU-DU lower layer split for New Radio; rapporteur: NTT DOCOMO	RAN3	WI status report	-	-	-	-
	Yes	approved	9.4.6	RP-180684	Revised SID on CU-DU lower layer split for New Radio	NTT DOCOMO, INC.	SID revised	-	-	-	-
FLAG T	Yes	noted	13.4.4	RP-180685	Status report of WI: UE Conformance Test Aspects – Enhanced LAA for LTE	RAN5	WI status report	-	-	-	-
FLAG T	Yes	noted	13.4.8	RP-180686	Status report of WI: UE Conformance Test Aspects – Requirements for a new UE category 1bis with single receiver based on category 1 for LTE	RAN5	WI status report	-	-	-	-
R3	Yes	approved	9.3.1.2	RP-180687	TS 38.420 v1.0.0 on NG-RAN; Xn general aspects and principles; for approval	Qualcomm Incorporated	draft TS	38.420	-	-	-
	Yes	approved	10.7.1	RP-180688	Revised WID on addition of Power Class 1 UE to bands B31/B72 for LTE	Airbus DS SLC, Ministere de l'Interieur	WID revised	-	-	-	-
R2	Yes	approved	9.3.1.2	RP-180689	TS 38.305 v2.0.0 on NG Radio Access Network (NG-RAN); Stage 2 functional specification of User Equipment (UE) positioning in NG-RAN; for approval	Qualcomm Incorporated	draft TS	38.305	-	-	-
	Yes	noted	9.1.5	RP-180690	U.S. Department of Transportation Views on NR V2X SI	U.S. Department of Transport.	discussion	-	-	-	-
R4	Yes	approved	9.3.1.2	RP-180691	TR 37.863-01-01 V2.0.0 Rel-15 Dual connectivity (DC) band combinations of LTE 1DL/1UL + one NR band; for approval	NTT DOCOMO, INC.	draft TR	37.863-01-01	-	-	-
FLAG T	Yes	noted	10.3.3	RP-180692	Status report of WI Ultra Reliable Low Latency Communication for LTE; rapporteur: Ericsson	RAN1	WI status report	-	-	-	-
	Yes	noted	10.3.3	RP-180693	Summary of WI Ultra Reliable Low Latency Communication for LTE	Ericsson	WI summary	-	-	-	-
R2	Yes	approved	9.3.1.2	RP-180694	TS 38.304 v2.0.0; NR; User Equipment (UE) procedures in Idle mode and RRC Inactive state; for approval	Qualcomm Incorporated	draft TS	38.304	-	-	-

	Yes	approved	13.2.1	RP-180695	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	-	-	-	-
	Yes	approved	13.3.1	RP-180696	RAN5 agreed non TTCN CR(s) WI UE Conformance Test Aspects - Rel-13 LTE CA configurations (LTE_CA_Rel13-UEConTest)	RAN5	CR pack	-	-	-	-
	Yes	approved	13.3.4	RP-180697	RAN5 agreed non TTCN CR(s) WI MS Conformance Test Aspects - Support for Mission Critical Push To Talk over LTE (MCPTT) (MCPTT-ConTest)	RAN5	CR pack	-	-	-	-
	Yes	approved	13.3.5	RP-180698	RAN5 agreed non TTCN CR(s) WI MS Conformance Test Aspects -Interference Mitigation for Downlink Control Channels of LTE (LTE_IM_DLCCH-UEConTest)	RAN5	CR pack	-	-	-	-
	Yes	approved	13.4.1	RP-180699	RAN5 agreed non TTCN CR(s) WI UE Conformance Test Aspects - Rel-14 CA configurations (LTE_CA_R14-UEConTest)	RAN5	CR pack	-	-	-	-
	Yes	approved	13.4.2	RP-180700	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	-	-	-	-
	Yes	approved	13.4.3	RP-180701	RAN5 agreed non TTCN CR(s) WI MS Conformance Test Aspects - Support for LTE-based V2X Services (LTE_V2X-UEConTest)	RAN5	CR pack	-	-	-	-
	Yes	approved	13.4.4	RP-180702	RAN5 agreed non TTCN CR(s) WI MS Conformance Test Aspects -Enhanced LAA for LTE (LTE_eLAA-UEConTest)	RAN5	CR pack	-	-	-	-
	Yes	approved	13.4.5	RP-180703	RAN5 agreed non TTCN CR(s) WI UE Conformance Test Aspects – SRS (sounding reference signal) switching between LTE component carriers (LTE_SRS_switch-UEConTest)	RAN5	CR pack	-	-	-	-
	Yes	approved	13.4.6	RP-180704	RAN5 agreed non TTCN CR(s) WI UE Conformance Test Aspects – Performance enhancements for high speed scenario in LTE (LTE_high_speed-UEConTest)	RAN5	CR pack	-	-	-	-
	Yes	approved	13.4.7	RP-180705	RAN5 agreed non TTCN CR(s) WI UE Conformance Test Aspects – 4 Rx antenna ports with CA for LTE DL (LTE_4Rx_AP_DL_CA-UEConTest)	RAN5	CR pack	-	-	-	-
	Yes	approved	13.4.8	RP-180706	RAN5 agreed non TTCN CR(s) under WI UE Conformance Test Aspects – Requirements for a new UE category 1bis with single receiver based on category 1 for LTE (LTE_UE_cat_1RX-UEConTest)	RAN5	CR pack	-	-	-	-
	Yes	approved	13.4.9	RP-180707	RAN5 agreed non TTCN CR(s) under WI UE Conformance Test Aspects – Voice and Video Enhancement for LTE (LTE_VoLTE_ViLTE_enh-UEConTest)	RAN5	CR pack	-	-	-	-
	Yes	approved	13.4.10	RP-180708	RAN5 agreed non TTCN CR(s) WI UE Conformance Test Aspects - Enhancements of NB-IoT (NB_IOTenh-UEConTest)	RAN5	CR pack	-	-	-	-
	Yes	approved	13.4.11	RP-180709	RAN5 agreed non TTCN CR(s) WI UE Conformance Test Aspects - Further enhanced MTC for LTE (LTE_feMTC-UEConTest)	RAN5	CR pack	-	-	-	-
	Yes	approved	13.4.12	RP-180710	RAN5 agreed non TTCN CR(s) under WI UE Conformance Test Aspects – Uplink capacity enhancements for LTE (LTE_UL_CAP_enh-UEConTest)	RAN5	CR pack	-	-	-	-
	Yes	approved	13.5.1	RP-180711	RAN5 agreed non TTCN CR(s) WI UE Conformance Test Aspects - 5G system with NR and LTE (5GS_NR_LTE-UEConTest)	RAN5	CR pack	-	-	-	-
	Yes	approved	13.5.2	RP-180712	RAN5 agreed non TTCN CR(s) WI UE Conformance Test Aspects - Rel-15 CA configurations (LTE_CA_R15-UEConTest)	RAN5	CR pack	-	-	-	-

	Yes	approved	13.5.3	RP-180713	RAN5 agreed non TTCN CR(s) under WI UE Conformance Test Aspects – FDD operating band in the L-band for LTE (LTE_FDD_L_band-UEConTest)	RAN5	CR pack	-	-	-	-
	Yes	approved	13.5.5	RP-180714	RAN5 agreed non TTCN CR(s) under WI UE Conformance Test Aspects – LTE bands with UE category M1 and/or NB1 in Rel-15 (LTE_bands_R15_M1_NB1-UEConTest)	RAN5	CR pack	-	-	-	-
	Yes	approved	13.5.6	RP-180715	RAN5 agreed non TTCN CR(s) under WI UE Conformance Test Aspects – UE Conformance Test aspects - LTE bands with UE category M2 and/or NB2 in Rel-15 (LTE_bands_R15_M2_NB2-UEConTest)	RAN5	CR pack	-	-	-	-
	Yes	approved	13.5.7	RP-180716	RAN5 agreed non TTCN CR(s) WI UE Conformance Test Aspects - 450MHz E-UTRA FDD Band for LTE PPDR and PMR/PAMR in Europe (Band 72) (LTE450_Reg3-UEConTest)	RAN5	CR pack	-	-	-	-
	Yes	approved	13.5.9	RP-180717	RAN5 agreed non TTCN CR(s) under WI Small Technical Enhancements and Improvements for Rel-15 Conformance Testing (TEI15_Test)	RAN5	CR pack	-	-	-	-
	Yes	approved	13.6.1	RP-180718	RAN5 agreed non TTCN CR(s) under WI Study on UE Application Layer Data Throughput Performance Expansion for Carrier Aggregation (FS_UE_App_Data_Perf_CA)	RAN5	CR pack	-	-	-	-
	Yes	approved	14.5.1	RP-180719	RAN5 agreed non TTCN CR(s) under WI Small Technical Enhancements and Improvements for Rel-99 Conformance Testing(TEI_Test)	RAN5	CR pack	-	-	-	-
	Yes	approved	14.5.1	RP-180720	RAN5 agreed non TTCN CR(s) under WI Small Technical Enhancements and Improvements for Rel-8 Conformance Testing(TEI8_Test)	RAN5	CR pack	-	-	-	-
	Yes	approved	14.5.1	RP-180721	RAN5 agreed non TTCN CR(s) under WI Small Technical Enhancements and Improvements for Rel-9 Conformance Testing(TEI9_Test)	RAN5	CR pack	-	-	-	-
	Yes	approved	14.5.1	RP-180722	RAN5 agreed non TTCN CR(s) under WI Small Technical Enhancements and Improvements for Rel-10 Conformance Testing (TEI10_Test)	RAN5	CR pack	-	-	-	-
	Yes	approved	14.5.2	RP-180723	RAN5 agreed non TTCN CR(s) under WI Small Technical Enhancements and Improvements for Rel-11 Conformance Testing (TEI11_Test)	RAN5	CR pack	-	-	-	-
	Yes	approved	14.5.3	RP-180724	RAN5 agreed non TTCN CR(s) under WI Small Technical Enhancements and Improvements for Rel-12 Conformance Testing (TEI12_Test)	RAN5	CR pack	-	-	-	-
	Yes	approved	14.5.4	RP-180725	RAN5 agreed non TTCN CR(s) under WI Small Technical Enhancements and Improvements for Rel-13 Conformance Testing (TEI13_Test)	RAN5	CR pack	-	-	-	-
	Yes	approved	14.5.5	RP-180726	RAN5 agreed non TTCN CR(s) under WI Small Technical Enhancements and Improvements for Rel-14 Conformance Testing (TEI14_Test)	RAN5	CR pack	-	-	-	-
	Yes	approved	14.5.5	RP-180727	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	-	-	-
	Yes	approved	14.5.5	RP-180728	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	-	-	-
	No	withdrawn	14.5.5	RP-180729	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	-	-	-
	Yes	approved	14.5.5	RP-180730	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	-	-	-
	Yes	approved	14.5.5	RP-180731	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	-	-	-

	Yes	approved	14.5.5	RP-180732	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	-	-	-
	No	withdrawn	14.5.5	RP-180733	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	-	-	-
	Yes	approved	14.5.5	RP-180734	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	-	-	-
	Yes	withdrawn	13.6.1	RP-180735	Status report of SI: Study on UE Application Layer Data Throughput Performance Expansion for Carrier Aggregation; rapporteur: PCTEST Engineering Lab	RAN5	WI status report	-	-	-	-
	Yes	noted	13.6.1	RP-180736	Status report of SI: Study on UE Application Layer Data Throughput Performance Expansion for Carrier Aggregation; rapporteur: PCTEST Engineering Lab	RAN5	WI status report	-	-	-	-
R3	Yes	approved	9.3.1.2	RP-180737	TS 38.413 v1.0.0 on NG-RAN; NG Application Protocol (NGAP); for approval	Nokia	draft TS	38.413	-	-	-
FLAG T	Yes	noted	10.7.1	RP-180738	Status report of WI: Core part: Addition of Power Class 1 UE to bands B31/B72 for LTE rapporteur: Airbus DS SLC	RAN4	WI status report	-	-	-	-
R3	Yes	approved	9.3.1.2	RP-180739	TS 38.410 v1.0.0 on NG-RAN; NG general aspects and principles; for approval	Nokia	draft TS	38.410	-	-	-
R3	Yes	approved	9.3.1.2	RP-180740	TS 38.415 v1.0.0 on PDU Session User Plane protocol; for approval	Nokia	draft TS	38.415	-	-	-
R3	No	withdrawn	9.3.1.2	RP-180741	TS 38.423 v1.0.0 on NG-RAN; Xn Application Protocol (XnAP); for approval	Ericsson LM	draft TS	38.423	-	-	-
	Yes	noted	10.4.5	RP-180742	Status Report for WI LTE Advanced inter-band CA Rel-15 for 5DL/1UL; rapporteur: Nokia	RAN4	WI status report	-	-	-	-
	Yes	approved	10.4.5	RP-180743	Revised WI: LTE Advanced inter-band CA Rel-15 for 5DL/1UL	Nokia	WID revised	-	-	-	-
R4	Yes	approved	10.4.5	RP-180744	TR 36.715-05-01 v1.0.0 on Evolved Universal Terrestrial Radio Access (E-UTRA); LTE Advanced intra-band Carrier Aggregation (CA) Rel-15 for 5 Down Link (DL) / 1 Up Link (UL); for approval	Nokia	draft TR	36.715-05-01	-	-	-
	Yes	revised	10.2.5	RP-180745	New WI: Rel16 LTE inter-band CA for 4 or 5 bands DL with 1 band UL	Nokia, Nokia Shanghai Bell	WID new	-	-	-	-

R3	Yes	approved	9.3.2	RP-180746	TS 38.460 v1.0.0 on NG-RAN; E1 general aspects and principles; for approval	Nokia	draft TS	38.460	-	-	-
	Yes	revised	9.1.2	RP-180747	Summary of email discussion on IoT_MTC	Ericsson	report	-	-	-	-
	Yes	revised	10.1.3	RP-180748	New WID on Rel-16 MTC for LTE	Ericsson	WID new	-	-	-	-
	Yes	revised	10.1.3	RP-180749	New WID on Rel-16 NB-IoT	Ericsson	WID new	-	-	-	-
	Yes	not treated	10.1.3	RP-180750	New SID on Relaying for NB-IoT and LTE-MTC	Ericsson	SID new	-	-	-	-
	Yes	not treated	9.1.14	RP-180751	Motivation for new SI on NR coverage	China Telecomunication Corp.	discussion	-	-	-	-
	Yes	not treated	9.1.14	RP-180752	New SI: study on NR coverage	China Telecomunication Corp.	SID new	-	-	-	-
	Yes	not treated	9.1.14	RP-180753	Summary of email discussion on NR coverage	China Telecomunication Corp.	report	-	-	-	-
	Yes	not treated	9.2.3	RP-180754	Motivation for New SID on Multi-RAT Traffic Steering Enhancement	China Telecomunication Corp.	discussion	-	-	-	-

R3	Yes	approved	9.3.1.2	RP-180755	TS 29.413 v1.0.0 on Application of the NG Application Protocol (NGAP) to non-3GPP access; for approval	Nokia	draft TS	29.413	-	-	-
R1YY	No	withdrawn	9.4.3	RP-180756	TR 38.889 v0.0.2 Study on NR-based Access to Unlicensed Spectrum; for Information	Qualcomm Incorporated	draft TR	38.889	-	-	-
	Yes	revised	10.1.1	RP-180757	Summary of email discussion on LTE enhancements (other than IoT, MIMO, broadcast)	SoftBank (Email discussion moderator)	report	-	-	-	-
	Yes	not treated	10.1.1	RP-180758	Detail of email discussion on LTE enhancements (other than IoT, MIMO, broadcast) – guidance and structure	SoftBank (Email discussion moderator)	discussion	-	-	-	-
	Yes	not treated	10.1.1	RP-180759	Detail of email discussion on LTE enhancements (other than IoT, MIMO, broadcast) - phase 1	SoftBank (Email discussion moderator)	discussion	-	-	-	-
	Yes	not treated	10.1.1	RP-180760	Detail of email discussion on LTE enhancements (other than IoT, MIMO, broadcast) - phase 2	SoftBank (Email discussion moderator)	discussion	-	-	-	-
	Yes	not treated	10.1.1	RP-180761	New Study Item on LTE uplink enhancements for WTTc	SoftBank (Email discussion moderator)	SID new	-	-	-	-
	Yes	revised	10.1.1	RP-180762	New Work Item on even further Mobility enhancement in E-UTRAN	SoftBank (Email discussion moderator)	WID new	-	-	-	-
	Yes	not treated	10.1.1	RP-180763	New Study Item on Study on Advanced Receivers for LTE V2X	SoftBank (Email discussion moderator)	SID new	-	-	-	-
	Yes	revised	10.1.1	RP-180764	New Work Item on Further performance enhancement for LTE in high speed scenario	SoftBank (Email discussion moderator)	WID new	-	-	-	-
R4	Yes	approved	9.3.1.2	RP-180765	TR 37.864-11-22 v1.0.0 for Dual connectivity (DC) band combinations of LTE 1DL1UL + inter-intra-band NR 2DL2UL bands (FR1+FR2); for approval	NTT DOCOMO, INC.	draft TR	37.864-11-22	-	-	-
	Yes	revised	9.2.5	RP-180766	New WID on EN-DC for 2 bands DL with 2 bands UL (1 LTE band + 1 NR band)	NTT DOCOMO, INC.	WID new	-	-	-	-
	Yes	withdrawn	9.2.5	RP-180767	New WID on introduction of n74	NTT DOCOMO, INC.	WID new	-	-	-	-
R3	Yes	approved	9.3.2	RP-180768	TS 38.462 v1.0.0 on NG-RAN; E1 signalling transort; for approval	Huawei	draft TS	38.462	-	-	-

FLAG D. FLAG M, FLAG T	Yes	revised	10.3.14	RP-180769	Status report for WI UE requirements for network-based CRS interference mitigation for LTE; rapporteur: Ericsson	RAN4	WI status report	-	-	-	-
	Yes	approved	10.4.8	RP-180770	Revised WID on LTE-A inter-band xDL/2UL CA with x=3,4,5	LG Electronics	WID revised	-	-	-	-
	Yes	revised	10.3.14	RP-180771	Updated WID for UE requirements for network-based CRS interference mitigation for LTE	Ericsson LM	WID revised	-	-	-	-
	Yes	noted	10.4.8	RP-180772	Status report for WI xDL2UL CA basket WI; Rapporteur: LG Electronics	RAN WG4	WI status report	-	-	-	-
	Yes	noted	10.4.10	RP-180773	Status report for WI V2X new band combinations; Rapporteur: LG Electronics	RAN4	WI status report	-	-	-	-
R4	Yes	approved	10.4.8	RP-180774	TR 36.715-00-02 v1.0.0 on Evolved Universal Terrestrial Radio Access (E-UTRA); LTE Advanced intra-band Carrier Aggregation (CA) Rel-15 for x Down Link (DL) / 2 Up Link (UL) with x=3,4,5; for approval	LG Electronics	draft TR	36.715-00-02	-	-	-
R4	Yes	approved	10.4.10	RP-180775	TR 36.787 v1.0.0 for LTE Vehicle-to-Everything (V2X) new band combinations; for approval	LG Electronics	draft TR	36.787	-	-	-
R4	Yes	approved	9.3.1.2	RP-180776	TR37.864-41-21 v1.0.0 on Dual connectivity (DC) band combinations of LTE xDL/1UL (x=1, 2, 3, 4) + Inter-band NR 2DL/1UL; for approval	LG Electronics	draft TR	37.864-41-21	-	-	-

R4s	Yes	approved	9.2.5	RP-180777	New WID on EN-DC of LTE CA for up to 4 bands DL with 1 band UL + NR CA for 2 bands DL with 1 band UL	LG Electronics	WID new	-	-	-	-
R4s	Yes	approved	10.2.5	RP-180778	New WID on Rel16 LTE inter-band CA for x bands DL with 2 bands UL with x=3, 4, 5	LG Electronics	WID new	-	-	-	-
	Yes	revised	9.3.1	RP-180779	Coverage related issues for 2Rx RF requirements of vehicle mounted NR UE as exception case	Samsung, LG Electronics, Volkswagen AG	discussion	-	-	-	-
	No	withdrawn	9.3.1	RP-180780	4Rx implementation difficulty of vehicle mounted NR UE	Volkswagen AG, General Motors, Samsung, LG Electronics	discussion	-	-	-	-
	Yes	not treated	9.1.3	RP-180781	Motivation for NR mixed mode broadcast/multicast	LG Electronics Polska	discussion	-	-	-	-

80_LS05, R4	Yes	not treated	9.3.1	RP-180782	Company CR on 2Rx REFSENS requirements for vehicle mounted NR UE at FR1	LG Electronics, Volkswagen AG, General Motors, Samsung, Qualcomm	CR	38.101-1	12	-	F
	Yes	not treated	10.1.3	RP-180783	Views on REL-16 IoT	LG Electronics Polska	discussion	-	-	-	-
	Yes	not treated	10.2.2	RP-180784	Further consideration on LTE V2X	LG Electronics Polska	discussion	-	-	-	-
FLAG D, FLAG M	Yes	noted	9.4.4	RP-180785	Status Report of SI Study on 5G Non-Orthogonal Multiple Access ; rapporteur: ZTE	RAN1	WI status report	-	-	-	-

	Yes	noted	9.1	RP-180786	The way forwward of R16 WI and SI	ZTE Corporation	discussion	-	-	-	-
R3	Yes	approved	9.3.1.2	RP-180787	TS 38.414 v1.0.0 on NG-RAN; NG data transport; for approval	ZTE	draft TS	38.414	-	-	-
	No	withdrawn	9.2.2	RP-180788	Work Item Proposal for Intergrated Access and Backhaul	AT&T GNS Belgium SPRL	discussion	-	-	-	-
	Yes	not treated	9.2.2	RP-180789	Motivation for Intergrated Access abd Backhaul WI	AT&T GNS Belgium SPRL	discussion	-	-	-	-
	Yes	not treated	9.1.1	RP-180790	Further views on scope of NR MIMO Enhancements in Rel 16	AT&T GNS Belgium SPRL	discussion	-	-	-	-
	Yes	not treated	9.1.5	RP-180791	Further views on scope and porposals for NR V2X Study Item	AT&T GNS Belgium SPRL	discussion	-	-	-	-
	Yes	not treated	9.1.9	RP-180792	URLLC Scenarios and Enhancements for NR Rel 16	AT&T GNS Belgium SPRL	discussion	-	-	-	-
	Yes	noted	9.8	RP-180793	UE Feature prioritization for NR Rel 15	AT&T GNS Belgium SPRL	discussion	-	-	-	-
	Yes	not treated	9.1.12	RP-180794	View on CA and BWP Enhancements for NR Rel 16	AT&T GNS Belgium SPRL	discussion	-	-	-	-
R4	Yes	approved	9.3.1.2	RP-180795	TR 38.817-02 v1.0.0 on General aspects for BS RF for NR; for approval	Ericsson LM	draft TR	38.817-02	-	-	-

FLAG T	Yes	noted	10.3.9	RP-180796	Status Report of WI Core part: Quality of Experience (QoE) Measurement Collection for streaming services in E-UTRAN; rapporteur: China Unicom	RAN2	WI status report	-	-	-	-
	No	withdrawn	10.3.9	RP-180797	Work item exception for QMC in E-UTRAN	China Unicom	WI exception request	-	-	-	-
	Yes	noted	10.4.1	RP-180798	Status report of WI LTE Advanced intra-band Carrier Aggregation Rel-15 for xDL/yUL including contiguous and non-contiguous spectrum; rapporteur: Ericsson	RAN4	WI status report	-	-	-	-
	Yes	noted	10.4.4	RP-180799	Status report of WI LTE Advanced inter-band Carrier Aggregation Rel-15 for 4DL/1UL; rapporteur: Ericsson	RAN4	WI status report	-	-	-	-
	Yes	approved	10.4.1	RP-180800	Revised WID: Rel-15 Basket WI for LTE Advanced Intra-band CA including contiguous and non-contiguous spectrum	Ericsson	WID revised	-	-	-	-
	Yes	approved	10.4.4	RP-180801	Revised WID: Rel-15 Basket WI for LTE Advanced Inter-band CA Rel-15 for 4DL/1UL	Ericsson	WID revised	-	-	-	-
R4	Yes	approved	10.4.1	RP-180802	TR 36.715-00-00 v1.0.0 on Evolved Universal Terrestrial Radio Access (E-UTRA); LTE Advanced intra-band Carrier Aggregation (CA) Rel-15 for x Down Link (DL) / y Up Link (UL) including contiguous and non-contiguous spectrum	Ericsson	draft TR	36.715-00-00	-	-	-
R4	Yes	approved	10.4.4	RP-180803	TR 36.715-04-01 v1.0.0 on Evolved Universal Terrestrial Radio Access (E-UTRA); LTE Advanced intra-band Carrier Aggregation (CA) Rel-15 for 4 Down Link (DL) / 1 Up Link (UL)	Ericsson	draft TR	36.715-04-01	-	-	-
R4	Yes	approved	9.3.1.2	RP-180804	TR 37.865-01-01 v01.0.0 on Intra-band (mDL/1UL) and Inter-band (nDL/1UL) NR Carrier Aggregation; for approval	Ericsson	draft TR	37.865-01-01	-	-	-
R4	Yes	approved	9.3.1.2	RP-180805	TR 37.863-03-01 v1.0.0 Rel-15 DC combinations LTE 3DL and one NR band; for approval	Ericsson	draft TR	37.863-03-01	-	-	-
R4s	Yes	approved	10.2.5	RP-180806	New WID: Basket WI for LTE Intra-band CA Rel-16	Ericsson	WID new	-	-	-	-
	Yes	revised	9.2.5	RP-180807	New WID: Basket Rel-16 WID NR Intra	Ericsson	WID new	-	-	-	-
	Yes	revised	9.2.5	RP-180808	New WID: Basket Rel-16 WID 3 LTE + 1 NR	Ericsson	WID new	-	-	-	-
	Yes	not treated	9.1.1	RP-180809	Views on Rel-16 NR MIMO enhancements	vivo	discussion	-	-	-	-
	Yes	not treated	9.1.8	RP-180810	Views on Rel-16 NR UE power saving	vivo	discussion	-	-	-	-
	Yes	not treated	9.1.9	RP-180811	Views on Rel-16 NR URLLC enhancements	vivo	discussion	-	-	-	-
	Yes	not treated	9.1.10	RP-180812	Views on Rel-16 NR mobility enhancements	vivo	discussion	-	-	-	-
	Yes	not treated	9.2.2	RP-180813	Views on Rel-16 MR-DC and CA enhancements	vivo	discussion	-	-	-	-

R3	Yes	approved	9.3.1.2	RP-180814	TS 38.424 v1.0.0 on NG-RAN; Xn data transport; for approval	Mitsubishi Electric RCE	draft TS	38.424	-	-	-
	Yes	not treated	9.8	RP-180815	NR UE feature list	Ericsson	discussion	-	-	-	-
R3	Yes	approved	9.3.1.2	RP-180816	TS 38.423 v1.0.0 on NG-RAN; Xn Application Protocol (XnAP); for approval	Ericsson	draft TS	38.423	-	-	-
R4s	Yes	approved	9.2.5	RP-180817	New WID: Basket Rel-16 WID NR inter-band CA/DC for 2 DL bands with up to 2 UL bands	ZTE Corporation	WID new	-	-	-	-
R4	Yes	approved	9.3.1.2	RP-180818	TR 37.866-00-02 v1.0.0 on Inter-band (nDL/2UL bands) NR Carrier Aggregation; for approval	ZTE Corporation	draft TR	37.866-00-02	-	-	-
	Yes	revised	9.2.5	RP-180819	New WID on 29 dBm UE Power Class for LTE and NR Bands 41 and n41	Sprint Corporation	WID new	-	-	-	-
	Yes	approved	11.3	RP-180820	RAN6 agreed CRs for UMTS REL-15 WI: TEI15	RAN6	CR pack	-	-	-	-
	Yes	approved	12.2.1	RP-180821	RAN6 agreed CRs for GERAN REL-15 WI: CIoT_EC_GSM_fenh	RAN6	CR pack	-	-	-	-
	Yes	approved	12.3	RP-180822	RAN6 agreed CRs for GERAN REL-15 WI: TEI15	RAN6	CR pack	-	-	-	-
	Yes	approved	14.6.6	RP-180823	RAN6 agreed CRs for REL-13 WI: CIoT_EC_GSM-Perf	RAN6	CR pack	-	-	-	-
	Yes	approved	14.6.7	RP-180824	RAN6 agreed CR for REL-14 WI: CIoT_EC_GSM_radio_enh-Perf	RAN6	CR pack	-	-	-	-
	Yes	approved	14.6.7	RP-180825	RAN6 agreed CRs for REL-14 WI: TEI14 (+ mirror CR)	RAN6	CR pack	-	-	-	-
	Yes	approved	12.2.1	RP-180826	Rel-15 Work Item Exception for Further enhancements for Extended Coverage GSM for support of Cellular Internet of Things (CIoT_EC_GSM_fenh)	Nokia	WI exception request	-	-	-	-
	Yes	not treated	9.2.5	RP-180827	Motivation for 29 dBm UE Power Class for LTE and NR Bands 41 and n41	Sprint Corporation	discussion	-	-	-	-
	Yes	not treated	9.1.4	RP-180828	Motivation for TCP enhancement in NR	LG Electronics Finland	discussion	-	-	-	-
	Yes	not treated	9.2.2	RP-180829	Motivation for New WI proposal on RRC_Inactive enhancement	LG Electronics Finland	discussion	-	-	-	-
	Yes	not treated	9.2.2	RP-180830	New WI proposal: RRC_Inactive enhancement	LG Electronics Finland	WID new	-	-	-	-
R4	Yes	approved	9.3.1.2	RP-180831	TR 38.815 v1.0.0 on New frequency range for NR (24.25-29.5 GHz); for approval	Samsung	draft TR	38.815	-	-	-
	Yes	not treated	9.2.3	RP-180832	New SID on Enhancement for Disaggregated gNB Architecture	China Telecommunications,CATT,China Unicom	SID new	-	-	-	-
	Yes	not treated	9.2.3	RP-180833	Motivation for SI <study on Enhancement for Disaggregated gNB Architecture>	China Telecommunications	discussion	-	-	-	-

	Yes	not treated	9.1.8	RP-180834	Considerations on NR power saving	OPPO	discussion	-	-	-	-
	Yes	not treated	9.1.9	RP-180835	Considerations on NR URLLC Enhancements	OPPO	discussion	-	-	-	-
	Yes	not treated	9.1.11	RP-180836	Considerations on Other miscellaneous NR enhancements/leftovers	OPPO	discussion	-	-	-	-
	Yes	noted	9.8	RP-180837	Considerations on UE Category for 5G NR	KT Corp.	discussion	-	-	-	-
	Yes	noted	9.1	RP-180838	Operator view for New Rel-16 WI/SIs	KT Corp.	discussion	-	-	-	-
	Yes	revised	9.2.4	RP-180839	New WID: Add support of NR DL 256QAM for FR2	China Telecomunication Corp.	WID new	-	-	-	-
	Yes	not treated	9.2.4	RP-180840	Motivations on NR DL 256QAM support for FR2	China Telecomunication Corp.	discussion	-	-	-	-
	Yes	postponed	9.2.5	RP-180841	New WID: Add high power UE (power class 2) to NR CA for Rel-16	China Telecomunication Corp.	WID new	-	-	-	-
FLAG D	Yes	revised	10.7.2	RP-180842	Status Report for WI: E-UTRA 2.4 GHz TDD Band for US; rapporteur: GLOBALSTAR Inc.	RAN4	WI status report	-	-	-	-
FLAG T	Yes	noted	13.4.3	RP-180843	Status report for WI: UE Conformance Test Aspects -Support for LTE-based V2X Services; rapporteur: Huawei	RAN5	WI status report	-	-	-	-
FLAG T	Yes	noted	13.4.2	RP-180844	Status report for WI: UE Conformance Test Aspects - Support for V2V services based on LTE sidelink; rapporteur: Huawei	RAN5	WI status report	-	-	-	-
	Yes	noted	13.3.3	RP-180845	Status report for WI: UE Conformance Test Aspects - LTE Carrier Aggregation Enhancement Beyond 5 Carriers - PUCCH on Scell; rapporteur: Huawei	RAN5	WI status report	-	-	-	-
	Yes	noted	13.4.5	RP-180846	Status report for WI: UE Conformance Test Aspects - SRS (sounding reference signal) switching between LTE component carriers; rapporteur: Huawei	RAN5	WI status report	-	-	-	-
	Yes	noted	13.4.10	RP-180847	Status report for WI: UE Conformance Test Aspects – Enhancements of NB-IoT; rapporteur: Huawei	RAN5	WI status report	-	-	-	-

	Yes	approved	13.4.5	RP-180848	Revised WID:UE Conformance Test Aspects - SRS (sounding reference signal) switching between LTE component carriers; rapporteur: Huawei	RAN5	WID revised	-	-	-	-
	Yes	noted	10.3.13	RP-180849	Status report for WI: Further NB-IoT enhancements; rapporteur: Huawei	RAN1	WI status report	-	-	-	-
	Yes	approved	10.3.13	RP-180850	WI exception for Further NB-IoT enhancements	Huawei, HiSilicon	WI exception request	-	-	-	-
	Yes	noted	10.3.13	RP-180851	WI summary for Further NB-IoT enhancements	Huawei, HiSilicon	WI summary	-	-	-	-
FLAG T	Yes	noted	10.3.6	RP-180852	Status report for WI: Enhancements for high capacity stationary wireless link and introduction of 1024 QAM for LTE DL; rapporteur: Huawei	RAN1	WI status report	-	-	-	-
	No	withdrawn	10.3.6	RP-180853	WI exception for Enhancements for high capacity stationary wireless link and introduction of 1024 QAM for LTE DL	Huawei, HiSilicon	WI exception request	-	-	-	-
	Yes	noted	10.3.6	RP-180854	WI summary for Enhancements for high capacity stationary wireless link and introduction of 1024 QAM for LTE DL	Huawei, HiSilicon	WI summary	-	-	-	-
	No	withdrawn	10.3.6	RP-180855	WID revision: Enhancements for high capacity stationary wireless link and introduction of 1024 QAM for LTE DL	Huawei, HiSilicon	WID revised	-	-	-	-
FLAG T	Yes	noted	10.3.4	RP-180856	Status report for WI: V2X phase 2 based on LTE; rapporteur: Huawei	RAN1	WI status report	-	-	-	-
	Yes	withdrawn	10.3.4	RP-180857	WI exception for V2X phase 2 based on LTE	Huawei, HiSilicon	WI exception request	-	-	-	-

	Yes	noted	10.3.4	RP-180858	WI summary for V2X phase 2 based on LTE	Huawei, HiSilicon	WI summary	-	-	-	-
FLAG T	Yes	noted	10.3.11	RP-180859	Status report for WI: LTE connectivity to 5G-CN; rapporteur: Huawei	RAN2	WI status report	-	-	-	-
	Yes	approved	10.3.11	RP-180860	Revision of WI: LTE connectivity to 5G-CN;	Huawei, HiSilicon	WID revised	-	-	-	-
	No	withdrawn	10.3.11	RP-180861	WI exception for LTE connectivity to 5G-CN	Huawei, HiSilicon	WI exception request	-	-	-	-
	Yes	noted	10.3.11	RP-180862	WI summary for LTE connectivity to 5G-CN	Huawei, HiSilicon	WI summary	-	-	-	-
	Yes	noted	9.1.16	RP-180863	Summary of email discussion on NR data collection/SON/MDT	CMCC	report	-	-	-	-
	Yes	not treated	9.1.16	RP-180864	Motivation for SID proposal for RAN-centric Data Collection and Utilization for NR	CMCC	discussion	-	-	-	-
	Yes	revised	9.1.16	RP-180865	New Study Item proposal: RAN-centric Data Collection and Utilization for NR	CMCC	SID new	-	-	-	-
FLAG T	Yes	noted	10.3.17	RP-180866	Status Report of WI BluetoothWLAN measurement collection in LTE Minimization of Drive Tests (MDT); rapporteur: CMCC	RAN2	WI status report	-	-	-	-
	Yes	noted	10.3.17	RP-180867	WI Summary for BluetoothWLAN measurement collection in LTE Minimization of Drive Tests (MDT)	CMCC	WI summary	-	-	-	-
	Yes	approved	10.3.17	RP-180868	Rel-15 Work Item Exception for Bluetooth/WLAN measurement collection in LTE Minimization of Drive Tests (MDT)	CMCC	WI exception request	-	-	-	-
FLAG T	Yes	noted	10.3.8	RP-180869	Status Report of WI Core part: Further video enhancements for LTE; rapporteur: CMCC	RAN2	WI status report	-	-	-	-
	No	withdrawn	10.3.8	RP-180870	Rel-15 Work Item Exception for Further video enhancements for LTE	CMCC	WI exception request	-	-	-	-

FLAG T	Yes	noted	13.4.6	RP-180871	Status report for WI UE Conformance Test Aspects - Performance enhancements for high speed scenario in LTE (eHST); rapporteur: CMCC	RAN5	WI status report	-	-	-	-
	Yes	revised	9.1.7	RP-180872	Motivation for SID proposal for Remote Interference Management in NR	CMCC	discussion	-	-	-	-
	Yes	noted	9.8	RP-180873	Views on NR UE capabilities	Huawei, HiSilicon	discussion	-	-	-	-
	Yes	noted	9.8	RP-180874	LTE UE capabilities for multi-mode LTE/NR UE	Huawei, HiSilicon	discussion	-	-	-	-
	Yes	noted	9.1	RP-180875	Proposal on the approval of Rel-16 work and study items	Huawei, HiSilicon	discussion	-	-	-	-
	Yes	revised	9.1.12	RP-180876	Summary of email discussion on NR spectrum utilization efficiency enhancements; moderator: Huawei	Huawei	report	-	-	-	-
	Yes	not treated	10.1.3	RP-180877	On NB-IoT evolution in Rel-16	Huawei, HiSilicon	discussion	-	-	-	-
	Yes	not treated	10.1.3	RP-180878	On the scope of Rel-16 LTE MTC work	Huawei, HiSilicon	discussion	-	-	-	-

	Yes	not treated	10.1.1	RP-180879	Motivation for new SI proposal on LTE uplink enhancements for WTTc	Huawei, HiSilicon	discussion	-	-	-	-
	Yes	revised	10.1.2	RP-180880	New WI proposal: DL MIMO efficiency enhancements for LTE	Huawei, HiSilicon	WID new	-	-	-	-
	Yes	not treated	10.1.2	RP-180881	Motivation for new WI proposal on DL MIMO efficiency enhancements for LTE	Huawei, HiSilicon	discussion	-	-	-	-
	Yes	not treated	10.1.1	RP-180882	New WID proposal: Enhancements of LTE Services with Low Latency	Huawei, HiSilicon	WID new	-	-	-	-
	Yes	not treated	10.1.1	RP-180883	Motivation for new WID proposal on Enhancements of LTE Services with Low Latency	Huawei, HiSilicon	discussion	-	-	-	-
	Yes	not treated	10.1.3	RP-180884	Motivation for relaying for IoT devices	Huawei, Huawei Device	discussion	-	-	-	-
	Yes	revised	9.1.12	RP-180885	New WI proposal: NR spectrum aggregation enhancements	Huawei	WID new	-	-	-	-
	No	withdrawn	9.1.12	RP-180886	Motivation for enhancements to NR spectrum aggregation	Huawei, HiSilicon	discussion	-	-	-	-
	Yes	not treated	9.2.1	RP-180887	New WI proposal: NR uplink enhancements for broadband MTC	Huawei, HiSilicon	WID new	-	-	-	-
	Yes	not treated	9.2.1	RP-180888	Motivation for WI proposal on NR uplink enhancements for broadband MTC	Huawei, HiSilicon	discussion	-	-	-	-
	Yes	not treated	9.1.9	RP-180889	Views on NR URLLC work in Rel-16	Huawei, HiSilicon	discussion	-	-	-	-
	Yes	not treated	9.1.5	RP-180890	Views on 5G V2X work in Rel-16	Huawei, HiSilicon	discussion	-	-	-	-
	Yes	not treated	9.1.7	RP-180891	Motivation for cross-link interference management for NR FDD and TDD in Rel-16	Huawei, HiSilicon	discussion	-	-	-	-
	Yes	not treated	9.1.1	RP-180892	Views on Rel-16 NR Multi-TRP and MIMO enhancements	Huawei, HiSilicon	discussion	-	-	-	-
	Yes	not treated	9.1.8	RP-180893	Motivation for UE power savings in Rel-16	Huawei, Huawei Device	discussion	-	-	-	-
80_LS02	Yes	revised	9.3.1	RP-180894	Draft LS reply on Coexistence of NR-NR and NR-LTE networks with synchronised, unsynchronised and semi-synchronised operation in 3400-3800 MHz	Huawei	LS out	-	-	-	-

FLAG T, FLAG M	Yes	noted	10.3.2	RP-180895	Status report of WI: Further enhancements to Coordinated Multi-Point (CoMP) Operation for LTE; rapporteur: Intel Corporation	RAN1	WI status report	-	-	-	-
	Yes	noted	9.1.6	RP-180896	Email Discussion Summary on New NR SI Proposal: Study on NR Positioning Support	Intel Corporation	report	-	-	-	-
	Yes	revised	9.1.6	RP-180897	New SID: Study on NR positioning support	Intel Corporation	SID new	-	-	-	-
	Yes	revised	10.12	RP-180898	Introduction of new Rel-15 UL categories for LTE	Intel Corporation, NTT DOCOMO, Telstra, Telecom Italia	discussion	-	-	-	-
	Yes	noted	9.8	RP-180899	Views on Rel-15 NR UE feature list	Intel Corporation	discussion	-	-	-	-
	Yes	noted	9.1.1	RP-180900	Summary of email discussion on NR MIMO enhancements	Samsung	report	-	-	-	-
	Yes	revised	9.1.1	RP-180901	New Draft WI proposal on NR MIMO enhancements	Samsung	WID new	-	-	-	-
	Yes	not treated	9.2.2	RP-180902	Motivation and overview of RRC_INACTIVE state enhancements	Samsung	discussion	-	-	-	-
	No	withdrawn	9.2.2	RP-180903	New Draft WI proposal for RRC_INACTIVE state enhancements	Samsung	WID new	-	-	-	-

	No	withdrawn	9.2.2	RP-180904	New draft SI proposal for data transmission in RRC_INACTIVE	Samsung	SID new	-	-	-	-
	Yes	revised	9.2	RP-180905	Support of sync NR-NR DC in Rel-15	Samsung	discussion	-	-	-	-
	Yes	not treated	10.1.2	RP-180906	Summary of email discussion on LTE MIMO enhancements	Samsung	report	-	-	-	-
	Yes	not treated	10.1.2	RP-180907	New Draft WI proposal on LTE MIMO enhancements	Samsung	WID new	-	-	-	-
	Yes	revised	10.3.19	RP-180908	Status report for WI on extended number of bearers for LTE; rapporteur: Samsung	RAN2	WI status report	-	-	-	-
	Yes	noted	9.5.1	RP-180909	Status report of SI: Study on evaluation methodology of new V2X use cases for LTE and NR; rapporteur: LG Electronics	RAN1	WI status report	-	-	-	-
R1	Yes	approved	9.5.1	RP-180910	TR 37.885 v1.0.0 on Study on evaluation methodology of new Vehicle-to-Everything V2X use cases for LTE and NR; for approval	LG Electronics Inc.	draft TR	37.885	-	-	-
FLAG T	Yes	noted	10.3.16	RP-180911	Status Report for WI: UL data compression in LTE; rapporteur: CATT	RAN2	WI status report	-	-	-	-
	Yes	noted	10.3.16	RP-180912	Summary for WI of UL data compression in LTE	CATT	WI summary	-	-	-	-
	No	withdrawn	10.3.16	RP-180913	Rel-15 Work Item Exception for UL data compression in LTE	CATT	WI exception request	-	-	-	-
	Yes	approved	10.3.16	RP-180914	Revised WID on UL data compression in LTE	CATT, CMCC	WID revised	-	-	-	-
	Yes	not treated	9.2.2	RP-180915	Supporting UDC in NR in Rel-16	CATT, CMCC, MediaTek Inc.	discussion	-	-	-	-
	Yes	not treated	9.2.2	RP-180916	New WID on UL data compression in NR	CATT, CMCC, MediaTek Inc.	WID new	-	-	-	-
FLAG T	Yes	noted	13.4.9	RP-180917	Status Report for WI: UE Conformance Test Aspects - Voice and Video Enhancement for LTE	RAN5	WI status report	-	-	-	-
R5	Yes	approved	13.1	RP-180918	New Work Item Proposal: UE Conformance Test Aspects - UL Data Compression in LTE	CATT	WID new	-	-	-	-

	Yes	not treated	9.1.5	RP-180919	Views on NR V2X Study	CATT	discussion	-	-	-	-
	Yes	not treated	9.2.4	RP-180920	Views on 256QAM for FR2 in Rel-16	CATT	discussion	-	-	-	-
	Yes	not treated	9.2.3	RP-180921	Discussion on further enhancement for disaggregated gNB scenario	CATT	discussion	-	-	-	-
	Yes	not treated	9.1.8	RP-180922	Views on the Study of UE Power Saving and Wakeup Mechanism	CATT	discussion	-	-	-	-
	Yes	revised	9.1.8	RP-180923	Summary of NR Power Consumption	CATT	report	-	-	-	-
	Yes	not treated	9.1.6	RP-180924	Views on the study of NR Positioning	CATT	discussion	-	-	-	-
	Yes	not treated	9.1.9	RP-180925	On the scope of NR URLLC enhancements for Rel-16	CATT	discussion	-	-	-	-
	Yes	noted	10.3.15	RP-180926	Status report of WI: LTE CRS Interference Mitigation Performance Requirements for Single RX Chain UEs; rapporteur: Intel Corporation	RAN4	WI status report	-	-	-	-
FLAG T	Yes	noted	9.4.7	RP-180927	Status report of SI: Study on test methods for New Radio; rapporteur: Intel	RAN4	WI status report	-	-	-	-
	Yes	not treated	10.1.1	RP-180928	Motivation for SI: Study on Advanced Receivers LTE V2X	Intel Corporation	discussion	-	-	-	-

	Yes	noted	9.1.13	RP-180929	Email Discussion Summary on New NR SI Proposal: Study on NR design above 52.6GHz	Intel Corporation (UK) Ltd	report	-	-	-	-
FLAG D, FLAG T	Yes	revised	9.4.2	RP-180930	Status report for SI: Study on Self-Evaluation towards IMT-2020 submission; rapporteur: Huawei	Huawei	WI status report	-	-	-	-
	Yes	revised	9.1.13	RP-180931	New SID: Study on NR design above 52.6GHz	Intel Corporation (UK) Ltd	SID new	-	-	-	-
	Yes	revised	9.4.2	RP-180932	Revised SID: Study on Self-Evaluation towards IMT-2020 submission	Huawei, Ericsson, Telecom Italia	SID revised	-	-	-	-

	Yes	noted	9.3.1.1	RP-180933	Extending FR2 spherical coverage requirement to multi-band UEs	Apple Inc.	discussion	-	-	-	-
R4	Yes	not treated	9.3.1.1	RP-180934	CR to TS 38.101-2: Correction of the spherical coverage requirement for PC3	Apple Inc.	CR	38.101-2	11	-	F
R4	Yes	postponed	9.3.1.1	RP-180935	CR to TS 38.101-2: Introduction of the requirement on beam correspondence	Apple Inc.	CR	38.101-2	12	-	B
	Yes	revised	9.4.2	RP-180936	Text proposal to TR37.910	Huawei, Ericsson, Telecom Italia	pCR	37.910	-	-	-

	Yes	noted	9.4.2	RP-180937	Work plan for preparation of IMT-2020 self evaluation towards 3GPP updated submission	Huawei, Ericsson, Telecom Italia	discussion	-	-	-	-
	Yes	revised	9.1.10	RP-180938	Email Discussion Summary on NR mobility enhancements	Intel Corporation	report	-	-	-	-
	Yes	revised	9.1.10	RP-180939	New WID: NR mobility enhancements	Intel Corporation	WID new	-	-	-	-
	Yes	noted	13.3.2	RP-180940	Status Report of WI: UE Conformance Test Aspects – Wireless Local Area Network (WLAN) – 3GPP Radio Level Integration and Interworking Enhancements; rapporteur: Intel	RAN5	WI status report	-	-	-	-
	Yes	noted	13.3.5	RP-180941	Status Report of WI: UE Conformance Test Aspects – Interference Mitigation for Downlink Control Channels of LTE; rapporteur: Intel Corporation	RAN5	WI status report	-	-	-	-
	Yes	approved	13.3.2	RP-180942	Revised WID: UE Conformance Test Aspects – Wireless Local Area Network (WLAN) – 3GPP Radio Level Integration and Interworking Enhancements	Intel Corporation (UK) Ltd	WID revised	-	-	-	-
	No	withdrawn	13.3.5	RP-180943	Revised WID: UE Conformance Test Aspects – Interference Mitigation for Downlink Control Channels of LTE	Intel Corporation (UK) Ltd	WID revised	-	-	-	-
FLAG M	Yes	revised	10.3.5	RP-180944	Status report of WI UE Positioning Accuracy Enhancements for LTE; rapporteur: Nokia	RAN2	WI status report	-	-	-	-

	Yes	approved	10.3.14	RP-180945	Exception request for Network-based CRS interference mitigation for LTE	Ericsson LM	WI exception request	-	-	-	-
FLAG M	Yes	revised	10.3.7	RP-180946	Status report for WI: Enhancements to LTE operation in unlicensed spectrum; rapporteur: Nokia	RAN1	WI status report	-	-	-	-
	Yes	noted	10.3.5	RP-180947	Summary for WI UE Positioning Accuracy Enhancements for LTE	Nokia	WI summary	-	-	-	-
	Yes	noted	10.3.7	RP-180948	Summary of WI Enhancements to LTE operation in unlicensed spectrum	Nokia	WI summary	-	-	-	-
R4	Yes	approved	9.3.1.2	RP-180949	TR 38.817-01 v2.0.0 on General aspects for UE RF for NR; for approval	DOCOMO Communications Lab.	draft TR	38.817-01	-	-	-
	Yes	not treated	9.1.5	RP-180950	On the coexistence scope of potential Rel-16 NR V2X study item	LG Electronics Inc.	discussion	-	-	-	-
R4	Yes	approved	9.3.1.2	RP-180951	TR 38.814 v2.0.0 on New frequency range for NR (4.4-5.0 GHz); for approval	DOCOMO Communications Lab.	draft TR	38.814	-	-	-
FLAG T	Yes	noted	10.5.1	RP-180952	Status report for WI Perf Part: Enhancements of Base Station (BS) RF and EMC requirements for Active Antenna System (AAS), rapporteur: Huawei	RAN4	WI status report	-	-	-	-
FLAG T	Yes	revised	10.4.11	RP-180953	Status report for WI: Introduction of new band support for 4Rx antenna ports for LTE for Rel-15; rapporteur: Huawei	RAN4	WI status report	-	-	-	-
	Yes	revised	10.4.3	RP-180954	Status report for WI: LTE Advanced inter-band CA Rel-15 for 3DL/1UL; rapporteur: Huawei	RAN4	WI status report	-	-	-	-
	Yes	approved	10.4.3	RP-180955	Revised WID: LTE Advanced inter-band CA Rel-15 for 3DL/1UL	Huawei, HiSilicon	WID revised	-	-	-	-
	Yes	noted	10.4.7	RP-180956	Status report for WI: LTE Advanced inter-band CA Rel-15 for 2DL/2UL; rapporteur: Huawei	RAN4	WI status report	-	-	-	-
	Yes	approved	10.4.7	RP-180957	Revised WID: LTE Advanced inter-band CA Rel-15 for 2DL/2UL	Huawei, HiSilicon	WID revised	-	-	-	-
	Yes	noted	10.3.20	RP-180958	Status report for WI: UE requirements for LTE DL 8Rx antenna ports; rapporteur: Huawei	RAN4	WI status report	-	-	-	-
	Yes	noted	10.3.20	RP-180959	WI summary for UE requirements for LTE DL 8Rx antenna ports	Huawei, HiSilicon	WI summary	-	-	-	-
	Yes	approved	10.3.20	RP-180960	Revised WI: UE requirements for LTE DL 8Rx antenna ports	Huawei, HiSilicon	WID revised	-	-	-	-
	Yes	noted	10.4.12	RP-180961	Status report for WI: LTE Advanced high power TDD UE (power class 2) for Rel-15; rapporteur: Huawei	RAN4	WI status report	-	-	-	-
	Yes	not treated	9.3.1	RP-180962	Discussion on the number of Rx antennae for a vehicular NR UE	Huawei, HiSilicon	discussion	-	-	-	-

	Yes	withdrawn	9.3.1	RP-180963	Draft LS reply to 5GAA_A-180148 = RP-180626 on minimum number of RX antennae for NR vehicular UEs	Huawei, HiSilicon	LS out	-	-	-	-
	Yes	not treated	9.2.4	RP-180964	New WI proposal: NR RF requirements for coexistence with in-band NB-IoT and eMTC	Huawei, HiSilicon	WID new	-	-	-	-
	Yes	not treated	9.2.4	RP-180965	Motivation for WI on NR RF requirements for coexistence with in-band NB-IoT and eMTC	Huawei, HiSilicon	discussion	-	-	-	-
	Yes	revised	9.2.5	RP-180966	New WID on EN-DC for 3 bands DL with 2 bands UL (2 LTE bands + 1 NR band)	Huawei, HiSilicon	WID new	-	-	-	-
R4s	Yes	approved	9.2.5	RP-180967	New WID on SA NR Supplementary uplink (SUL), NSA NR SUL, NSA NR SUL with UL sharing from the UE perspective (ULSUP)	Huawei, HiSilicon	WID new	-	-	-	-
	Yes	revised	10.2.5	RP-180968	New WID: LTE Advanced inter-band CA Rel-16 for 3DL/1UL	Huawei, HiSilicon	WID new	-	-	-	-
	Yes	revised	10.2.5	RP-180969	New WID: LTE Advanced inter-band CA Rel-16 for 2DL/2UL	Huawei, HiSilicon	WID new	-	-	-	-
	Yes	noted	9.8	RP-180970	On ULSUP FDM and TDM operation	Huawei, HiSilicon	discussion	-	-	-	-
	Yes	withdrawn	9.2.5	RP-180971	New WID: introduction of NR band n50	Huawei, HiSilicon	WID new	-	-	-	-
	Yes	revised	9.1.18	RP-180972	Email discussion status on Study Item for 6 – 24 GHz frequency range	Dish Network	report	-	-	-	-
	Yes	noted	9.1.9	RP-180973	NR URLLC Enhancements: Summary of email discussion	Nokia, Nokia Shanghai Bell	report	-	-	-	-

	Yes	noted	9.1.9	RP-180974	Release 16 NR URLLC Enhancements: Company positions on technical proposal	Nokia, Nokia Shanghai Bell	discussion	-	-	-	-
	Yes	revised	9.1.9	RP-180975	New SID: NR URLLC Enhancements	Nokia, Nokia Shanghai Bell	SID new	-	-	-	-
	Yes	noted	9.1	RP-180976	NR Release 16 work and study item considerations	Nokia, Nokia Shanghai Bell	discussion	-	-	-	-
R4	Yes	approved	10.3.4	RP-180977	TR 36.788 v1.0.0 on V2X Phase 2; User Equipment (UE) radio transmission and reception; for approval	Huawei, HiSilicon	draft TR	36.788	-	-	-
R4	Yes	approved	10.4.7	RP-180978	TR 36.715-02-02 v1.0.0 on Evolved Universal Terrestrial Radio Access (E-UTRA); LTE Advanced intra-band Carrier Aggregation (CA) Rel-15 for 2 Down Link (DL) / 2 Up Link (UL); for approval	Huawei, HiSilicon	draft TR	36.715-02-02	-	-	-
R4	Yes	approved	9.3.1.2	RP-180979	TR 37.872 v1.0.0 on Supplementary uplink (SUL) and LTE-NR co-existence; for approval	Huawei, HiSilicon	draft TR	37.872	-	-	-
	Yes	merged	9.2	RP-180980	New WID: NR-NR Dual Connectivity	Nokia, Nokia Shanghai Bell	WID new	-	-	-	-
	Yes	not treated	9.1.9	RP-180981	NR URLLC Enhancements SID: Motivation paper	Nokia, Nokia Shanghai Bell	discussion	-	-	-	-
R3	Yes	approved	9.3.1.2	RP-180982	TS 38.421 v1.0.0 on NG-RAN; Xn layer 1; for approval	CATT	draft TS	38.421	-	-	-

	Yes	not treated	9.2	RP-180983	NR-NR Dual Connectivity WI: Motivation paper	Nokia, Nokia Shanghai Bell	discussion	-	-	-	-
R4	Yes	approved	10.4.3	RP-180984	TR 36.715-03-01 v1.0.0 on Evolved Universal Terrestrial Radio Access (E-UTRA); LTE Advanced intra-band Carrier Aggregation (CA) Rel-15 for 3 Down Link (DL) / 1 Up Link (UL); for approval	Huawei,HiSilicon	draft TR	36.715-03-01	-	-	-
R4	Yes	approved	9.3.1.2	RP-180985	TR 37.863-05-01 v1.0.0 on Dual connectivity (DC) band combinations of LTE 5DL/1UL + one NR band	Samsung R&D Institute UK	draft TR	37.863-05-01	-	-	-
R3	Yes	approved	9.3.1.2	RP-180986	TS 38.411 v1.0.0 on NG-RAN; NG layer 1; for approval	LG Electronics UK	draft TS	38.411	-	-	-
	No	withdrawn	9.3.1	RP-180987	Performance of single Tx solutions	Ericsson	discussion	-	-	-	-
R4	Yes	approved	9.3.1.2	RP-180988	TS 38.307 v1.0.0 on NR; Requirements on User Equipments (UEs) supporting a release-independent frequency band; for approval	Nokia, Nokia Shanghai Bell	draft TS	38.307	-	-	-
FLAG S, FLAG D	Yes	revised	9.3.1	RP-180989	Status Report of WI on New Radio Access Technology; rapporteur: NTT DOCOMO	RAN1	WI status report	-	-	-	-
	Yes	revised	9.3.1	RP-180990	WI Summary of New Radio Access Technology	NTT DOCOMO, INC.	WI summary	-	-	-	-
	Yes	revised	9.3.1	RP-180991	Rel-15 Work Item Exception for New Radio Access Technology - Core	NTT DOCOMO, INC.	WI exception request	-	-	-	-
	Yes	revised	9.3.1	RP-180992	Revision of WI: New Radio Access Technology	NTT DOCOMO, INC.	WID revised	-	-	-	-
	Yes	not treated	9.1.11	RP-180993	Summary of email discussion; Other miscellaneous NR enhancements/leftovers	NTT DOCOMO, INC.	report	-	-	-	-
	Yes	not treated	9.8	RP-180994	Views on Rel-15 NR UE features	NTT DOCOMO, INC.	discussion	-	-	-	-
	Yes	noted	9.8	RP-180995	Highlights on NR UE feature list	Ericsson	discussion	-	-	-	-

R3	Yes	approved	9.3.2	RP-180996	TS 38.461 v1.0.0 on NG-RAN; E1 layer 1; for approval	Intel Mobile Denmark	draft TS	38.461	-	-	-
R4s	Yes	approved	9.2.5	RP-180997	New WID on EN-DC for 6 bands DL with 2 bands UL (5 LTE bands + 1 NR band)	Samsung R&D Institute UK	WID new	-	-	-	-
R4	Yes	approved	9.3.1.2	RP-180998	TR 37.863-04-01 v1.0.0 on Dual connectivity (DC) band combinations of LTE 4DL/1UL + one NR band; for approval	Nokia, Nokia Shanghai Bell	draft TR	37.863-04-01	-	-	-
	Yes	noted	9.1.7	RP-180999	Summary of moderated email discussion on 'support on flexible duplex operation and remote interference management'	LG Electronics	report	-	-	-	-
	Yes	revised	9.1.7	RP-181000	New SI proposal: Study on flexible duplex operation and remote interference management for NR	LG Electronics	SID new	-	-	-	-
R4s	Yes	approved	9.2.5	RP-181001	New WID on EN-DC for 5 bands DL with 2 bands UL (4 LTE bands + 1 NR band)	Nokia, Nokia Shanghai Bell	WID new	-	-	-	-
	Yes	noted	9.3.1	RP-181002	5G Spectrum Status in the Republic of Korea	TTA	discussion	-	-	-	-
FLAG T	Yes	noted	12.2.1	RP-181003	Status Report for WI Further enhancements for EC-GSM-IoT; rapporteur: Nokia	RAN6	WI status report	-	-	-	-
	Yes	noted	10.4.14	RP-181004	Status_Report of WI Additional LTE bands for UE category M1 and_or NB1 in Rel-15; rapporteur: Ericsson	RAN4	WI status report	-	-	-	-
	Yes	noted	10.4.15	RP-181005	Status_Report of WI Additional LTE bands for UE category M2 and_or NB2 in Rel-15; rapporteur: Ericsson	RAN4	WI status report	-	-	-	-
R4s	Yes	approved	10.2.5	RP-181006	New WID on Additional LTE bands for UE category M1 and_or NB1 in Rel-16	Ericsson	WID new	-	-	-	-
R4s	Yes	approved	10.2.5	RP-181007	New WID on Additional LTE bands for UE category M2 and_or NB2 in Rel-16	Ericsson	WID new	-	-	-	-
	Yes	noted	10.3.1	RP-181008	Summary for WI Shortened TTI and processing time for LTE	Ericsson	WI summary	-	-	-	-

FLAG M	Yes	noted	10.4.9	RP-181009	Status report for WI: LTE Advanced inter-band CA Rel-15 for xDL/3UL with x=3,4,5; rapporteur: KDDI	RAN4	WI status report	-	-	-	-
	Yes	noted	9.4.1	RP-181010	SID NR-NTN summary of achievements since RAN#79	THALES	discussion	38.811	-	-	-
	Yes	noted	9.8	RP-181011	IOdT Bits for NR	Qualcomm Incorporated	discussion	-	-	-	-
FLAG S	Yes	noted	10.4.2	RP-181012	Status report for WI LTE Advanced inter-band CA Rel-15 for 2DL/1UL; rapporteur: Qualcomm	RAN4	WI status report	-	-	-	-
	Yes	approved	10.4.2	RP-181013	Revised WID for LTE Advanced inter-band CA Rel-15 for 2DL/1UL	Qualcomm Incorporated	WID revised	-	-	-	-
FLAG T	Yes	noted	10.4.6	RP-181014	Status Report for WI LTE Advanced inter-band CA Rel-15 for xDL/1UL with x>5; rapporteur: Qualcomm	RAN4	WI status report	-	-	-	-

	Yes	revised	10.4.6	RP-181015	Revised WID for LTE Advanced inter-band CA Rel-15 for xDL/1UL with x>5	Qualcomm Incorporated	WID revised	-	-	-	-
	No	withdrawn	10.1.4	RP-181016	Motivation for longer eMBMS CP for large ISD's	Telstra Corporation Limited	discussion	-	-	-	-
	Yes	noted	9.5.2	RP-181017	Status of coexistence studies for 6 GHz frequency range in US	Ericsson	discussion	-	-	-	-
	Yes	approved	9.5.2	RP-181018	TP to TR 37.890 EU Regulatory Aspects section	Ericsson	pCR	37.890	-	-	-
	Yes	approved	9.5.2	RP-181019	Revised SID on Feasibility Study on 6 GHz for LTE and NR in Licensed and Unlicensed Operations	Ericsson	SID revised	-	-	-	-
	Yes	noted	9.5.2	RP-181020	Status Report on SI Feasibility Study on 6 GHz for LTE and NR in Licensed and Unlicensed Operations; rapporteur: Ericsson	Ericsson	WI status report	-	-	-	-
RP	Yes	agreed	9.5.2	RP-181021	TR 37.890 v0.3.0 on Feasibility Study on 6 GHz for LTE and NR in Licensed and Unlicensed Operations	Ericsson	draft TR	37.890	-	-	-
	Yes	not treated	9.1.3	RP-181022	Motivation for longer eMBMS CP for large ISD's	Telstra Corporation Limited	discussion	-	-	-	-
FLAG M	Yes	revised	10.3.1	RP-181023	Status report of WI Shortened TTI and processing time for LTE; rapporteur: Ericsson	RAN1	WI status report	-	-	-	-

	Yes	not treated	9.2.4	RP-181024	Motivation for SI: Study on radiated test methodology for the verification of multi-antenna reception performance of NR UEs	CATR	discussion	-	-	-	-
	Yes	revised	9.2.5	RP-181025	New WID on Band 65 for New Radio for Region 1	Dish Network, HNS, Thales	WID new	-	-	-	-
	Yes	revised	9.2.4	RP-181026	New SID on Study on radiated test methodology for the verification of multi-antenna reception performance of NR UEs	CATR	SID new	-	-	-	-
FLAG D	Yes	revised	9.4.5	RP-181027	Status report for SI on integrated access and backhaul for NR; rapporteur: Qualcomm Incorporated	RAN2	WI status report	-	-	-	-
	Yes	revised	9.4.5	RP-181028	Revision of SID on integrated access and backhaul for NR	Qualcomm Incorporated	SID revised	-	-	-	-
	Yes	not treated	9.2.2	RP-181029	New WI proposal on integrated access and backhaul for NR	Qualcomm Incorporated	WID new	-	-	-	-
R4	Yes	approved	10.3.7	RP-181030	TS 37.106 User Equipment (UE) requirements for shared spectrum channel access; for approval	Huawei, HiSilicon	draft TS	37.106	-	-	-
	Yes	not treated	10.1.1	RP-181031	LTE HRLLC for Rel-16 Discussion	Ericsson	discussion	-	-	-	-
R5	Yes	approved	13.1	RP-181032	New Work Item Proposal: UE Conformance Test Aspects – 5G System Non-3GPP Access	Motorola Mobility	WID new	-	-	-	-
	Yes	revised	9.4.1	RP-181033	NR-NTN: RAN architecture	THALES	pCR	38.811	-	-	-
	Yes	noted	13.5.8	RP-181034	Status Report for WI UE Conformance Test Aspects - Quality of Experience (QoE) Measurement Collection for streaming services in E-UTRAN; rapporteur: China Unicom	RAN5	WI status report	-	-	-	-
R3	No	withdrawn	9.3.3	RP-181035	TS 37.470 v1.0.0 W1 general aspects and principles	China Unicom	draft TS	37.470	-	-	-
R3XX	No	withdrawn	9.3.3	RP-181036	TS 37.470 v1.0.0 on W1 general aspects and principles; for approval	China Unicom	draft TS	37.470	-	-	-

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R3	No	withdrawn	9.3.3	RP-181037	TS 37.471 v100 W1 layer 1	China Unicom	draft TS	37.471	-	-	-
R3XX	No	withdrawn	9.3.3	RP-181038	TS 37.471 v1.0.0 on W1 layer 1; for approval	China Unicom	draft TS	37.471	-	-	-
R3XX	No	withdrawn	9.3.3	RP-181039	TS 37.472 v1.0.0 on W1 signalling transport; for approval	China Unicom	draft TS	37.472	-	-	-
	Yes	approved	13.5.7	RP-181040	Revised WID on: UE Conformance Test Aspects - 450 MHz Band for LTE in Region 3	China Unicom	WID revised	-	-	-	-
	Yes	revised	9.4.1	RP-181041	NR-NTN: HAPS related modifications	THALES	pCR	38.811	-	-	-
R3XX	No	withdrawn	9.3.3	RP-181042	TS 37.473 v1.0.0 on W1 application protocol (E1AP); for approval	China Unicom	draft TS	37.473	-	-	-
FLAG M	Yes	revised	10.3.18	RP-181043	Status report for WI Enhanced LTE Support for Aerial Vehicles; rapporteur: Ericsson	RAN2	WI status report	-	-	-	-
	Yes	noted	13.5.7	RP-181044	Status Report for WI UE Conformance Test Aspects - 450 MHz Band for LTE in Region 3; rapporteur: China Unicom	RAN5	WI status report	-	-	-	-
	Yes	noted	10.3.18	RP-181045	Summary for WI Enhanced LTE Support for Aerial Vehicles	Ericsson	WI summary	-	-	-	-
	Yes	not treated	10.2.2	RP-181046	New WID on Further Enhanced LTE Support for Aerial Vehicles	Ericsson	WID new	-	-	-	-
	Yes	revised	9.8	RP-181047	Discussion on UE feature for DL 4-layer MIMO	China Unicom	discussion	-	-	-	-
	Yes	revised	9.3.3	RP-181048	Revised WID: eNB(s) Architecture Evolution for E-UTRAN and NG-RAN	China Unicom	WID revised	-	-	-	-
	Yes	not treated	10.2.2	RP-181049	Motivation for new WID on Further Enhanced LTE Support for Aerial Vehicles	Ericsson	discussion	-	-	-	-
FLAG M	Yes	revised	9.3.3	RP-181050	Status Report for WI eNB architecuture evolution for E-UTRAN and NG-RAN; rapporteur: China Unicom	RAN3	WI status report	-	-	-	-
	No	withdrawn	9.3.3	RP-181051	WF for eNB(s) Architecture Evolution for E-UTRAN and NG-RAN WI	China Unicom	discussion	-	-	-	-
	Yes	withdrawn	9.3.3	RP-181052	WF for eNB(s) Architecture Evolution for E-UTRAN and NG-RAN WI	China Unicom	discussion	-	-	-	-
	Yes	not treated	9.1.4	RP-181053	Summary of the email discussion on NR voice/video/TCP	Huawei Technologies Co. Ltd.	report	-	-	-	-
	Yes	not treated	9.2.2	RP-181054	New WI proposal: Service oriented RAN support of network slicing	Huawei, HiSilicon	WID new	-	-	-	-
	Yes	not treated	9.2.2	RP-181055	Motivation for new WI proposal on Service oriented RAN support of network slicing	Huawei, HiSilicon	discussion	-	-	-	-

	No	withdrawn	5.4	RP-181056	CR to TS 38.101-1: pi/2 BPSK with Spectrum Shaping	Indian Institute of Tech (M)	draftCR	38.101-1	-	-	B
	Yes	revised	10.2.2	RP-181057	New WI proposal: LTE to new 5G core enhancements	Huawei Technologies Co. Ltd.	WID new	-	-	-	-
	Yes	not treated	10.2.2	RP-181058	Motivation for new WI on LTE to new 5G core enhancements	Huawei Technologies Co. Ltd.	discussion	-	-	-	-
R4	Yes	revised	5.4	RP-181059	CR to TS 38.101-1: pi/2 BPSK with Spectrum Shaping	Indian Institute of Tech (M), Indian Institute of Tech (H), CEWiT, Nokia, Nokia Shanghai Bell	CR	38.101-1	13	-	B
	Yes	revised	9.1.4	RP-181060	New SI proposal: NR voice enhancements	Huawei, HiSilicon	SID new	-	-	-	-
	Yes	not treated	9.1.4	RP-181061	New SID on Study on NR Enhancements for TCP	Huawei	SID new	-	-	-	-
	Yes	not treated	9.2.4	RP-181062	New WID on NR UE MPR requirements	Nokia, Nokia Shanghai Bell	WID new	-	-	-	-
	Yes	noted	9.1.5	RP-181063	Summary of email discussion on NR V2X	Vodafone Group Plc	report	-	-	-	-

	Yes	revised	9.1.5	RP-181064	New SID on NR V2X	Vodafone Group Plc	SID new	-	-	-	-
	Yes	not treated	9.2.4	RP-181065	Motivation for New WID on NR UE MPR requirements	Nokia, Nokia Shanghai Bell	discussion	-	-	-	-
R2	No	withdrawn	9.8	RP-181066	CR to TS38.331 to introduce UE capability signaling for ULSUP to differentiate TDM and FDM	Huawei Technologies Co. Ltd.	CR	38.331	111	-	B
FLAG D	Yes	revised	10.3.10	RP-181067	Status Report of WI on Enhanced utilization of CA; rapporteur: Nokia	RAN2	WI status report	-	-	-	-
	Yes	approved	10.3.10	RP-181068	Rel-15 Work Item Exception for Enhanced utilization of CA - Core	Nokia (rapporteur)	WI exception request	-	-	-	-
	Yes	noted	10.3.10	RP-181069	Summary for WI Enhanced utilization of CA	Nokia (rapporteur)	WI summary	-	-	-	-
	Yes	not treated	9.2.2	RP-181070	New WID on NR Support for Aerial Vehicles	Ericsson	WID new	-	-	-	-

	Yes	not treated	9.2.2	RP-181071	Motivation for new WID on NR Support for Aerial Vehicles	Ericsson	discussion	-	-	-	-
	Yes	not treated	9.8	RP-181072	UE features and capability signalling	Nokia, Nokia Shanghai Bell	discussion	-	-	-	-
	No	withdrawn	9.8	RP-181073	Rel-15 NR UE requirement finalization	Nokia, Nokia Shanghai Bell	discussion	-	-	-	-
R4	Yes	approved	10.4.6	RP-181074	TR 36.715-00-01 v1.0.0 on Evolved Universal Terrestrial Radio Access (E-UTRA); LTE Advanced intra-band Carrier Aggregation (CA) Rel-15 for x Down Link (DL) / 1 Up Link (UL) with x>5; for approval	Qualcomm Incorporated	draft TR	36.715-00-01	-	-	-
	Yes	approved	9.3.1.1	RP-181075	RAN4 CRs to New Radio Access Technology, part 1	RAN4	CR pack	-	-	-	-
	Yes	approved	9.3.1.1	RP-181076	RAN4 CRs to New Radio Access Technology, part 2	RAN4	CR pack	-	-	-	-
	Yes	approved	10.3.1	RP-181077	RAN4 CRs to Shortened TTI and processing time for LTE	RAN4	CR pack	-	-	-	-
	Yes	approved	10.3.2	RP-181078	RAN4 CRs to Further enhancements to Coordinated Multi-Point (CoMP) Operation for LTE	RAN4	CR pack	-	-	-	-
	Yes	approved	10.3.4	RP-181079	RAN4 CRs to V2X phase 2 based on LTE	RAN4	CR pack	-	-	-	-
	Yes	approved	10.3.6	RP-181080	RAN4 CRs to Enhancements for high capacity stationary wireless link and introduction of 1024 QAM for LTE DL	RAN4	CR pack	-	-	-	-
	Yes	approved	10.3.7	RP-181081	RAN4 CRs to Enhancements to LTE operation in unlicensed spectrum	RAN4	CR pack	-	-	-	-
	Yes	approved	10.3.11	RP-181082	RAN4 CRs to LTE connectivity to 5G-CN	RAN4	CR pack	-	-	-	-
	Yes	approved	10.3.12	RP-181083	RAN4 CRs to Even further enhanced MTC for LTE	RAN4	CR pack	-	-	-	-
	Yes	approved	10.3.13	RP-181084	RAN4 CRs to Further NB-IoT enhancements	RAN4	CR pack	-	-	-	-
	Yes	approved	10.3.14	RP-181085	RAN4 CRs to UE requirements for network-based CRS interference mitigation for LTE	RAN4	CR pack	-	-	-	-
	Yes	approved	10.3.15	RP-181086	RAN4 CRs to LTE CRS-Interference Mitigation performance requirements for single RX chain UEs	RAN4	CR pack	-	-	-	-
	Yes	approved	10.3.20	RP-181087	RAN4 CRs to UE requirements for LTE DL 8Rx antenna ports	RAN4	CR pack	-	-	-	-
	Yes	approved	10.4.1	RP-181088	RAN4 CRs to LTE Advanced intra-band CA Rel-15 for xDL/yUL including contiguous and non-contiguous spectrum	RAN4	CR pack	-	-	-	-

	Yes	approved	10.4.2	RP-181089	RAN4 CRs to LTE Advanced inter-band CA Rel-15 for 2DL/1UL	RAN4	CR pack	-	-	-	-
	Yes	approved	10.4.3	RP-181090	RAN4 CRs to LTE Advanced inter-band CA Rel-15 for 3DL/1UL	RAN4	CR pack	-	-	-	-
	Yes	approved	10.4.4	RP-181091	RAN4 CRs to LTE Advanced inter-band CA Rel-15 for 4DL/1UL	RAN4	CR pack	-	-	-	-
	Yes	approved	10.4.5	RP-181092	RAN4 CRs to LTE Advanced inter-band CA Rel-15 for 5DL/1UL	RAN4	CR pack	-	-	-	-
	Yes	approved	10.4.6	RP-181093	RAN4 CRs to LTE Advanced inter-band CA Rel-15 for xDL/1UL with x>5	RAN4	CR pack	-	-	-	-
	Yes	approved	10.4.8	RP-181094	RAN4 CRs to LTE Advanced inter-band CA Rel-15 for xDL/2UL with x=3,4,5	RAN4	CR pack	-	-	-	-
	Yes	approved	10.4.9	RP-181095	RAN4 CRs to LTE Advanced inter-band CA Rel-15 for xDL/3UL with x=3,4,5	RAN4	CR pack	-	-	-	-
	Yes	approved	10.4.10	RP-181096	RAN4 CRs to V2X new band combinations for LTE	RAN4	CR pack	-	-	-	-
	Yes	approved	10.4.11	RP-181097	RAN4 CRs to Introduction of new band support for 4Rx antenna ports for LTE	RAN4	CR pack	-	-	-	-
	Yes	approved	10.4.12	RP-181098	RAN4 CRs to LTE Advanced high power TDD UE (power class 2)	RAN4	CR pack	-	-	-	-
FLAG M	Yes	postponed	10.5.1	RP-181099	RAN4 CRs to Enhancements of Base Station (BS) RF and EMC requirements for Active Antenna System (AAS)	RAN4	CR pack	-	-	-	-
	Yes	approved	10.6	RP-181100	RAN4 CRs to TEI15	RAN4	CR pack	-	-	-	-
	Yes	approved	10.7.1	RP-181101	RAN4 CRs to Addition of Power Class 1 UE to bands B31/B72 for LTE	RAN4	CR pack	-	-	-	-
	Yes	approved	10.8.1	RP-181102	RAN4 CRs to Performance requirements of interference cancellation receiver for LTE BS	RAN4	CR pack	-	-	-	-
	Yes	approved	10.10.3	RP-181103	RAN4 CRs to TDD operating band in the L-band for LTE	RAN4	CR pack	-	-	-	-
	Yes	approved	10.10.6	RP-181104	RAN4 CRs to US 600 MHz Band for LTE	RAN4	CR pack	-	-	-	-
	Yes	approved	14.4.1	RP-181105	RAN4 CRs to closed Rel-8 WIs and WIs of previous releases	RAN4	CR pack	-	-	-	-
	Yes	approved	14.4.3	RP-181106	RAN4 CRs to closed Rel-10 WIs (incl. TEI10)	RAN4	CR pack	-	-	-	-

	Yes	approved	14.4.4	RP-181107	RAN4 CRs to closed Rel-11 WIs (incl. TEI11)	RAN4	CR pack	-	-	-	-
	Yes	approved	14.4.5	RP-181108	RAN4 CRs to closed Rel-12 WIs (incl. TEI12)	RAN4	CR pack	-	-	-	-
	Yes	approved	14.4.6	RP-181109	RAN4 CRs to closed Rel-13 WIs (incl. TEI13), part 1	RAN4	CR pack	-	-	-	-
	Yes	approved	14.4.6	RP-181110	RAN4 CRs to closed Rel-13 WIs (incl. TEI13), part 2	RAN4	CR pack	-	-	-	-
	Yes	approved	14.4.6	RP-181111	RAN4 CRs to closed Rel-13 WIs (incl. TEI13), part 3	RAN4	CR pack	-	-	-	-
	Yes	approved	14.4.6	RP-181112	RAN4 CRs to closed Rel-13 WIs (incl. TEI13), part 4	RAN4	CR pack	-	-	-	-
	Yes	approved	14.4.6	RP-181113	RAN4 CRs to closed Rel-13 WIs (incl. TEI13), part 5	RAN4	CR pack	-	-	-	-
	Yes	approved	14.4.7	RP-181114	RAN4 CRs to closed Rel-14 WIs (incl. TEI14), part 1	RAN4	CR pack	-	-	-	-
	Yes	approved	14.4.7	RP-181115	RAN4 CRs to closed Rel-14 WIs (incl. TEI14), part 2	RAN4	CR pack	-	-	-	-
	Yes	approved	14.4.7	RP-181116	RAN4 CRs to closed Rel-14 WIs (incl. TEI14), part 3	RAN4	CR pack	-	-	-	-
	Yes	not treated	9.3.1	RP-181117	Minimum requirement of 2Rx antennas for permanently mounted UE in vehicles for NR	Volkswagen AG	discussion	-	-	-	-

	Yes	noted	9.8	RP-181118	Summary of email discussion on UE categories	Telecom Italia S.p.A.	report	-	-	-	-
	Yes	noted	13.5.3	RP-181119	Status report for WI: UE Conformance Test Aspects - FDD operating band in the L-band for LTE; rapporteur: NTT DOCOMO, INC.	RAN5	WI status report	-	-	-	-
	Yes	noted	9.1	RP-181120	View on Rel 16 activities	Telecom Italia S.p.A.	discussion	-	-	-	-
	Yes	not treated	5.4	RP-181121	Summary of Rel16 band combination basket WIs	NTT DOCOMO INC.	discussion	-	-	-	-

	Yes	noted	10.7.2	RP-181122	Way Forward for_x00B_impact analysis on Bluetooth and IEEE 802.11 operation for new TDD E-UTRA band as proposed by GlobalStar	CableLAbs, BROADCOM CORPORATION	discussion	-	-	-	-
R4	Yes	approved	9.3.1.2	RP-181123	TR 37.863-02-01 v1.0.0 on Dual connectivity (DC) band combinations of LTE 2DL/1UL + one NR band; for approval	Huawei, HiSilicon	draft TR	37.863-02-01	-	-	-
	Yes	not treated	9.1.12	RP-181124	On scoping of NR spectrum utilization efficiency enhancements	Ericsson	discussion	-	-	-	-
	Yes	endorsed	5.4	RP-181125	Summary of workload reduction activity due to band combinations	NTT DOCOMO INC.	discussion	-	-	-	-
	Yes	endorsed	5.4	RP-181126	WF to reduce further TPs due to band combination in RAN4	NTT DOCOMO INC.	discussion	-	-	-	-
	Yes	revised	10.2.5	RP-181127	New WID on Rel16 LTE inter-band CA for 2 bands DL with 1 band UL	Qualcomm Incorporated	WID new	-	-	-	-
	Yes	not treated	9.1.4	RP-181128	Motivation for new Study Item on NR enhancements for TCP	MediaTek Inc.	discussion	-	-	-	-

	Yes	noted	9.2.4	RP-181129	Motivation for continued development of OTA requirements and test methods	Keysight Technologies UK Ltd	discussion	-	-	-	-
	Yes	revised	10.7.2	RP-181130	Revised WID: E-UTRA 2.4 GHz TDD Band for US	GLOBALSTAR Inc.	WID revised	-	-	-	-
	Yes	revised	10.1.3	RP-181131	Motivation for Multi Hop IoT Relay	NOVAMINT	discussion	-	-	-	-
R4	Yes	approved	10.3.7	RP-181132	TS37.107 v1.0.0 on Base Station (BS) requirements and conformance tests for shared spectrum channel access; for approval	Nokia France	draft TS	37.107	-	-	-
	Yes	revised	5.3	RP-181133	RAN WG3 Planning	RAN3 Chairman (Ericsson)	discussion	-	-	-	-
R4	Yes	approved	10.4.2	RP-181134	TR 36.715-02-01 v1.0.0 on LTE Advanced intra-band Carrier Aggregation (CA) for 2 Down Link (DL) / 1 Up Link (UL)	Qualcomm	draft TR	36.715-02-01	-	-	-
	Yes	not treated	9.1.9	RP-181135	On the scope of NR URLLC Enhancements	Ericsson	discussion	-	-	-	-

	Yes	postponed	9.2.3	RP-181136	New SI proposal: Study on Network Assistance for Network Synchronization in NG-RAN	Huawei, HiSilicon	SID new	-	-	-	-
	Yes	postponed	9.2.3	RP-181137	Motivation for new SI on Network Assistance for Network Synchronization in NG-RAN	Huawei, HiSilicon	discussion	-	-	-	-
	No	withdrawn	9.2.3	RP-181138	Discussion on CU-DU split for NR	Huawei, HiSilicon	discussion	-	-	-	-
	Yes	noted	20	RP-181139	Management of 3GPP SCTP based interface	Huawei, HiSilicon	discussion	-	-	-	-
	Yes	not treated	18	RP-181140	Handling of Ad-Hoc Meetings	MediaTek, CAICT	discussion	-	-	-	-
	Yes	not treated	9.1	RP-181141	MediaTek Rel-16 Priorities	MediaTek Inc.	discussion	-	-	-	-
R3	Yes	rejected	10.3.13	RP-181142	Introduction of UE differentiation	Huawei, China Telecom, CMCC, Ericsson, Vodafone, China Unicom	CR	36.413	1579	5	B
	No	withdrawn	10.1	RP-181143	MediaTek Rel-16 Priorities	MediaTek Inc.	discussion	-	-	-	-

	Yes	noted	9.8	RP-181144	UE Support for Rel-15 Architecture Options	MediaTek Inc.	discussion	-	-	-	-
R3	Yes	rejected	10.3.13	RP-181145	Introduction of UE differentiation	Huawei, China Telecom, CMCC, Ericsson, Vodafone, China Unicom	CR	36.423	1100	5	B

	Yes	noted	9.8	RP-181146	UE Capability ID Motivation	MediaTek Inc.	discussion	-	-	-	-
R3	Yes	approved	9.3.1.2	RP-181147	TS 38.455 v1.0.0 on NG-RAN; NR Positioning Protocol A (NRPPa); for approval	Ericsson	draft TS	38.455	-	-	-
	Yes	noted	9.3.2	RP-181148	Status report of WI on Core part: Separation of CP and UP for split option 2 of NR; rapporteur: Ericsson	RAN3	WI status report	-	-	-	-
	Yes	noted	9.3.2	RP-181149	WI summary for WI on Separation of CP and UP for Split Option 2 of NR	Ericsson	WI summary	-	-	-	-

R2	Yes	rejected	10.3.13	RP-181150	Introduction of UE differentiation	Ericsson, Vodafone, Huawei	CR	36.300	1168	-	B
	Yes	not treated	5.5	RP-181151	Handling of Early ENDC UEs	MediaTek Inc.	discussion	-	-	-	-
	Yes	noted	9.3.1	RP-181152	Test Methodology for Beam Correspondence	MediaTek Inc.	discussion	-	-	-	-
	No	withdrawn	9.1.8	RP-181153	Motivation for NR Power Consumption Enhancement	MediaTek Inc.	discussion	-	-	-	-
R3	Yes	approved	9.3.2	RP-181154	TS 38.463 v1.0.0 on NG-RAN; E1 application protocol (E1AP); for approval	Ericsson	draft TS	38.463	-	-	-
	Yes	not treated	9.1.8	RP-181155	Observations on NR UE Power Consumption	MediaTek Inc.	discussion	-	-	-	-
	No	withdrawn	9.1	RP-181156	Summary of Rel-16 email discussions	NEC	discussion	-	-	-	-

	Yes	revised	9.2.2	RP-181157	Summary of email discussion on MR-DC enhancements	Ericsson	discussion	-	-	-	-
	Yes	revised	9.2.2	RP-181158	New WID proposal on MR-DC enhancements	Ericsson	WID new	-	-	-	-
	Yes	not treated	9.2.2	RP-181159	Motivation for new WID proposal on MR-DC enhancements	Ericsson	discussion	-	-	-	-
	No	withdrawn	9.3.1	RP-181160	L2 measurements to be available to OAM in Rel-15	Ericsson	discussion	-	-	-	-
	Yes	approved	14.1.7	RP-181161	Maintenance of Rel-14 Uplink Capacity Enhancements for LTE	RAN1	CR pack	-	-	-	-
	Yes	approved	14.1.6	RP-181162	Maintenance of Rel-13 LTE carrier aggregation enhancement beyond 5 carriers	RAN1	CR pack	-	-	-	-
	Yes	approved	14.1.7	RP-181163	Maintenance of Rel-14 eFD-MIMO	RAN1	CR pack	-	-	-	-
	Yes	approved	14.1.6	RP-181164	Maintenance of Rel-13 Further LTE Physical Layer Enhancements for MTC	RAN1	CR pack	-	-	-	-
	Yes	approved	14.1.7	RP-181165	Maintenance of Rel-14 FeMTC	RAN1	CR pack	-	-	-	-
	Yes	approved	10.3.13	RP-181166	Introduction Rel-15 Further NB-IoT enhancements	RAN1	CR pack	-	-	-	-
	Yes	approved	14.1.6	RP-181167	Maintenance of Rel-13 Elevation Beamforming/Full-Dimension (FD) MIMO for LTE	RAN1	CR pack	-	-	-	-
	Yes	approved	10.3.2	RP-181168	Corrections for feCoMP	RAN1	CR pack	-	-	-	-
	Yes	approved	14.1.7	RP-181169	Maintenance of Rel-14 Voice and Video Enhancement for LTE	RAN1	CR pack	-	-	-	-
	Yes	approved	10.3.1	RP-181170	Corrections to sTTI and SPT implementation	RAN1	CR pack	-	-	-	-
	Yes	approved	14.1.8	RP-181171	Linked CRs to 36.213/36.300/36.306/36.331 for Support of early contention resolution	RAN1	CR pack	-	-	-	-
	Yes	approved	9.3.1.1	RP-181172	CRs to 38.2xx NR specs capturing eMBB corrections agreed at RAN1#92b & RAN1#93	RAN1	CR pack	-	-	-	-
	Yes	approved	10.3.6	RP-181173	Introduction of enhancements for high capacity stationary wireless link and introduction of 1024 QAM for LTE	RAN1	CR pack	-	-	-	-
	Yes	approved	10.3.12	RP-181174	Introduction of even further enhanced MTC for LTE	RAN1	CR pack	-	-	-	-
	Yes	approved	10.3.10	RP-181175	Introduction of Enhancing CA Utilization	RAN1	CR pack	-	-	-	-
	Yes	approved	10.3.4	RP-181176	Introduction of V2X Phase 2 enhancements	RAN1	CR pack	-	-	-	-
	Yes	approved	10.3.3	RP-181177	Introduction of Ultra Reliable Low Latency Communication for LTE	RAN1	CR pack	-	-	-	-
	Yes	approved	14.1.7	RP-181178	CRs to 36.213 related to eMTC - timing advance correction	RAN1	CR pack	-	-	-	-

	Yes	approved	14.1.7	RP-181179	CRs to 36.213 related to SRS carrier switching	RAN1	CR pack	-	-	-	-
	Yes	approved	10.3.7	RP-181180	Introduction of enhancements to operation in unlicensed spectrum	RAN1	CR pack	-	-	-	-
	Yes	approved	14.1.7	RP-181181	Maintenance of Rel-14 NB-IoT enhancements	RAN1	CR pack	-	-	-	-
80_LS06	Yes	approved	10.6	RP-181182	Introduction of Rel-15 enhancements to 36.212/36.213	RAN1	CR pack	-	-	-	-
	Yes	not treated	9.3.1	RP-181183	NR UE Rx antenna requirements for devices integrated into vehicles	Vodafone Group Plc	discussion	-	-	-	-
	Yes	not treated	10.1.1	RP-181184	Motivation for LTE URLLC Rel-16 work	Vodafone Group Plc	discussion	-	-	-	-
	No	withdrawn	10.1.1	RP-181185	New WID LTE eURLLC	Vodafone Group Plc	WID new	-	-	-	-
	Yes	not treated	10.1.3	RP-181186	Scope of Rel-16 LTE-MTC	Ericsson	discussion	-	-	-	-
	Yes	not treated	10.1.3	RP-181187	Scope of Rel-16 NB-IoT	Ericsson	discussion	-	-	-	-
	Yes	not treated	9.8	RP-181188	NR UE capabilities outstanding issue	Vodafone Group Plc	discussion	-	-	-	-
	Yes	not treated	10.1.3	RP-181189	Thoughts on IoT relays	Ericsson	discussion	-	-	-	-
	Yes	not treated	9.1	RP-181190	View on NR priorites	SK Telecom	discussion	-	-	-	-
	Yes	not treated	9.1	RP-181191	3GPP RAN overall Rel-16 scope	Ericsson GmbH, Eurolab	discussion	-	-	-	-
FLAG T	Yes	noted	10.3.12	RP-181192	Status report of WI Even further enhanced MTC for LTE; rapporteur: Ericsson	RAN1	WI status report	-	-	-	-
	Yes	approved	10.3.12	RP-181193	Exception request for WI Even further enhanced MTC for LTE; rapporteur: Ericsson	Ericsson	WI exception request	-	-	-	-
FLAG T	Yes	noted	13.2.1	RP-181194	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	-	-	-	-

FLAG T	Yes	noted	13.3.1	RP-181195	Status report for WI UE Conformance Test Aspects - Rel-13 CA configurations; rapporteur: Ericsson	RAN5	WI status report	-	-	-	-
FLAG T	Yes	noted	13.3.6	RP-181196	Status report for WI UE Conformance Test Aspects – Elevation Beamforming/Full-Dimension MIMO for LTE; rapporteur: Ericsson	RAN5	WI status report	-	-	-	-
	Yes	noted	13.4.1	RP-181197	Status report for WI UE Conformance Test Aspects - Rel-14 CA configurations; rapporteur: Ericsson	RAN5	WI status report	-	-	-	-
FLAG T	Yes	noted	13.4.7	RP-181198	Status report for WI UE Conformance Test Aspects - 4 Rx antenna ports with CA for LTE DL; rapporteur: Ericsson	RAN5	WI status report	-	-	-	-
FLAG T	Yes	noted	13.4.11	RP-181199	Status report for WI UE Conformance Test Aspects - Further enhanced MTC for LTE; rapporteur: Ericsson	RAN5	WI status report	-	-	-	-
	Yes	noted	13.4.12	RP-181200	Status report for WIUE Conformance Test Aspects - Uplink capacity enhancements for LTE; rapporteur: Ericsson	RAN5	WI status report	-	-	-	-
	Yes	noted	13.5.2	RP-181201	Status report for WI UE Conformance Test Aspects - Rel-15 CA configurations; rapporteur: Ericsson	RAN5	WI status report	-	-	-	-

	Yes	approved	13.5.2	RP-181202	Revised WID on: UE Conformance Test Aspects - Rel-15 CA	Ericsson	WID revised	-	-	-	-
	Yes	noted	13.5.5	RP-181203	Status report for WI UE Conformance Test Aspects - Additional LTE bands for UE category M1 and/or NB1 in Rel-15; rapporteur: Ericsson	RAN5	WI status report	-	-	-	-
FL:AG T	Yes	noted	13.5.6	RP-181204	Status report for WI UE Conformance Test Aspects - Additional LTE bands for UE category M2and/or NB2 in Rel-15; rapporteur: Ericsson	RAN5	WI status report	-	-	-	-
	Yes	noted	13.5.1	RP-181205	Status report for WI UE Conformance Test Aspects – 5G system with NR and LTE; rapporteur: Ericsson	RAN5	WI status report	-	-	-	-
	Yes	approved	13.5.1	RP-181206	Revised WID: UE Conformance Test Aspects – 5G system with NR and LTE	Ericsson	WID revised	-	-	-	-
R5	Yes	approved	13.5.1	RP-181207	TS 38.508-1 v1.0.0 on 5GS; User Equipment (UE) conformance specification; Part 1: Common test environment; for approval	Ericsson	draft TS	38.508-1	-	-	-
R5	Yes	approved	13.5.1	RP-181208	TS 38.508-2 v1.0.0 on 5GS; User Equipment (UE) conformance specification; Part 2: Common Implementation Conformance Statement (ICS) proforma; for approval	Ericsson	draft TS	38.508-2	-	-	-
R5	Yes	approved	13.5.1	RP-181209	TS 38.509 v1.0.0 on 5GS; Special conformance testing functions for User Equipment (UE); for approval	Ericsson	draft TS	38.509	-	-	-
R5	Yes	approved	13.5.1	RP-181210	TS 38.523-1 v1.0.0 on 5GS; User Equipment (UE) conformance specification; Part 1: Protocol; for approval	Ericsson	draft TS	38.523-1	-	-	-
R5	Yes	approved	13.5.1	RP-181211	TS 38.523-2 v1.0.0 on 5GS; User Equipment (UE) conformance specification; Part 2: Applicability of protocol test cases; for approval	Ericsson	draft TS	38.523-2	-	-	-
R5	Yes	approved	13.5.1	RP-181212	TS 38.523-3 v1.0.0 on 5GS; User Equipment (UE) conformance specification; Part 3: Protocol Test Suites; for approval	Ericsson	draft TS	38.523-3	-	-	-
	Yes	noted	10.3.12	RP-181213	Summary for Even further enhanced MTC for LTE; rapporteur: Ericsson	Ericsson	WI summary	-	-	-	-
	Yes	approved	9.3.1.1	RP-181214	NR related CRs, part 1	RAN2	CR pack	-	-	-	-
	Yes	approved	9.3.1.1	RP-181215	NR related CRs, part 2	RAN2	CR pack	-	-	-	-

	Yes	approved	9.3.1.1	RP-181216	NR related CRs, part 3	RAN2	CR pack	-	-	-	-
FLAG M	Yes	partially approved	9.3.1.1	RP-181217	NR related CRs, part 4	RAN2	CR pack	-	-	-	-
	Yes	approved	10.3.1	RP-181218	RAN2 CRs to Shortened TTI and processing time for LTE	RAN2	CR pack	-	-	-	-
	Yes	approved	10.3.5	RP-181219	RAN2 CRs to UE Positioning Accuracy Enhancements for LTE	RAN2	CR pack	-	-	-	-
	Yes	approved	10.3.6	RP-181220	RAN2 CRs to Enhancements for high capacity stationary wireless link and introduction of 1024 QAM for LTE DL	RAN2	CR pack	-	-	-	-
	Yes	approved	10.3.8	RP-181221	RAN2 CRs to Further video enhancements for LTE	RAN2	CR pack	-	-	-	-
	Yes	approved	10.3.9	RP-181222	RAN2 CRs to Quality of Experience (QoE) Measurement Collection for streaming services in E-UTRAN	RAN2	CR pack	-	-	-	-
	Yes	approved	10.3.11	RP-181223	RAN2 CRs to LTE connectivity to 5G-CN	RAN2	CR pack	-	-	-	-
	Yes	approved	10.3.12	RP-181224	RAN2 CRs to Even further enhanced MTC for LTE	RAN2	CR pack	-	-	-	-
FLAG M	Yes	approved	10.3.14	RP-181225	RAN2 CRs to UE requirements for network-based CRS interference mitigation for LTE	RAN2	CR pack	-	-	-	-
	Yes	approved	10.3.16	RP-181226	RAN2 CRs to UL data compression in LTE	RAN2	CR pack	-	-	-	-
	Yes	approved	10.3.17	RP-181227	RAN2 CRs to Bluetooth/WLAN measurement collection in LTE Minimization of Drive Tests	RAN2	CR pack	-	-	-	-
80_LS06	Yes	approved	10.6	RP-181228	RAN2 CRs to Small Technical Enhancements and Improvements for REL-15	RAN2	CR pack	-	-	-	-
	Yes	approved	10.10.8	RP-181229	RAN2 CRs to Add UE Power Class 2 to band 41 intra-band contiguous LTE Carrier Aggregation	RAN2	CR pack	-	-	-	-

	Yes	approved	14.2.4	RP-181230	RAN2 CRs to closed Rel-11 WIs	RAN2	CR pack	-	-	-	-
	Yes	approved	14.2.5	RP-181231	RAN2 CRs to Closed Rel-12 Wis	RAN2	CR pack	-	-	-	-
	Yes	approved	14.2.6	RP-181232	RAN2 CRs to Closed Rel-13 Wis	RAN2	CR pack	-	-	-	-
	Yes	approved	14.2.7	RP-181233	RAN2 CRs to Closed REL-14 WIs, part 1	RAN2	CR pack	-	-	-	-
	Yes	approved	14.2.7	RP-181234	RAN2 CRs to Closed REL-14 WIs, part 2	RAN2	CR pack	-	-	-	-
FLAG M	Yes	partially approved	14.2.7	RP-181235	RAN2 CRs to Closed REL-14 WIs, part 3	RAN2	CR pack	-	-	-	-

FLAG M	Yes	partially approved	14.2.7	RP-181236	RAN2 CRs to Closed REL-14 WIs, part 4	RAN2	CR pack	-	-	-	-
	Yes	approved	9.3.1.1	RP-181237	CR for the introduction of SA NR	RAN3	CR pack	-	-	-	-
FLAG M	Yes	partially approved	9.3.1.1	RP-181238	CRs for corrections to NR - Set1	RAN3	CR pack	-	-	-	-
	Yes	approved	9.3.1.1	RP-181239	CRs for corrections to NR - Set2	RAN3	CR pack	-	-	-	-
	Yes	approved	9.3.2	RP-181240	Separation of CP and UP for Split Option 2 of NR	RAN3	CR pack	-	-	-	-
	Yes	approved	9.6	RP-181241	CRs for Small Technical Enhancements and Improvements for REL-15	RAN3	CR pack	-	-	-	-
	Yes	approved	10.3.13	RP-181242	CRs for Further NB-IoT enhancements and Even further enhanced MTC for LTE	RAN3	CR pack	-	-	-	-
	Yes	approved	10.3.18	RP-181243	CRs for Enhanced LTE Support for Aerial Vehicles	RAN3	CR pack	-	-	-	-
	Yes	approved	14.3.6	RP-181244	CRs to closed Rel-13 WIs	RAN3	CR pack	-	-	-	-
	Yes	approved	14.3.7	RP-181245	CRs to closed Rel-14 WIs	RAN3	CR pack	-	-	-	-
	No	withdrawn	9.3.1.1	RP-181246	Endorsed RAN2 RRC CRs for NR SA, for information	RAN2	CR pack	-	-	-	-
	Yes	approved	10.3.3	RP-181247	RAN2 CRs to Ultra Reliable Low Latency Communication for LTE	RAN2	CR pack	-	-	-	-
	Yes	approved	10.3.4	RP-181248	RAN2 CRs to V2X phase 2 based on LTE	RAN2	CR pack	-	-	-	-
	Yes	approved	10.3.7	RP-181249	RAN2 CRs to Enhancements to LTE operation in unlicensed spectrum	RAN2	CR pack	-	-	-	-
	Yes	approved	10.3.10	RP-181250	RAN2 CRs to Enhancing LTE CA Utilization	RAN2	CR pack	-	-	-	-

	No	withdrawn	10.3.11	RP-181251	Endorsed RAN2 CRs to LTE connectivity to 5G-CN, for information	RAN2	CR pack	-	-	-	-
	Yes	approved	10.3.13	RP-181252	RAN2 CRs to Further NB-IoT enhancements	RAN2	CR pack	-	-	-	-
	Yes	approved	10.3.18	RP-181253	RAN2 CRs to Enhanced LTE Support for Aerial Vehicles	RAN2	CR pack	-	-	-	-
	Yes	approved	10.3.19	RP-181254	RAN2 CRs to Increased number of E-UTRAN data bearers	RAN2	CR pack	-	-	-	-
	Yes	approved	14.2.3	RP-181255	RAN2 CRs to Closed Rel-10 Wis	RAN2	CR pack	-	-	-	-
R2	Yes	revised	9.3.1.2	RP-181256	TS 37.324 v2.0.1 on Evolved Universal Terrestrial Radio Access (E-UTRA) and NR; Service Data Adaptation Protocol (SDAP) specification; for approval	Huawei	draft TS	37.324	-	-	-
	Yes	approved	9.3.1.1	RP-181257	CRs to 38.2xx NR specs capturing URLLC agreements of RAN1#92b & RAN1#93	RAN1	CR pack	-	-	-	-
	No	withdrawn	9.3.3	RP-181258	REL-15 exception request for WI: Core part: eNB(s) Architecture Evolution for E-UTRAN and NG-RAN	China Unicom	WI exception request	-	-	-	-
	Yes	approved	10.3.3	RP-181259	Revised WID for WI Ultra Reliable Low Latency Communication for LTE	Ericsson	WID revised	-	-	-	-
	Yes	not treated	9.8	RP-181260	Discussion on NR UE Feature List	MediaTek	discussion	-	-	-	-
R4	No	withdrawn	9.3.1.1	RP-181261	Adding an Intra-band contiguous EN-DC configuration	T-Mobile	CR	38.101-3	14	-	F
	Yes	partially approved	9.3.1.1	RP-181262	RAN4 CRs for New Radio Access Technology for 38.101-X	RAN4	CR Pack	-	-	-	-
	Yes	revised	5.3	RP-181263	RAN WG3 Planning	RAN3 Chairman (Ericsson)	discussion	-	-	-	-
R1	Yes	approved	10.3.7	RP-181264	TS 37.213 v1.0.0 on Physical layer procedures for shared spectrum channel access; for approval	Ericsson	draft TS	37.213	-	-	-
	Yes	not treated	18	RP-181265	Revised WID template	ETSI MCC	other	-	-	-	-
R2	Yes	approved	9.3.1.2	RP-181266	TS 37.324 v2.0.2 on Evolved Universal Terrestrial Radio Access (E-UTRA) and NR; Service Data Adaptation Protocol (SDAP) specification; for approval	Huawei	draft TS	37.324	-	-	-
FLAG D, FLAG T	Yes	noted	9.4.5	RP-181267	Status report for SI on integrated access and backhaul for NR; rapporteur: Qualcomm Incorporated	RAN2	WI status report	-	-	-	-
	Yes	not treated	9.1.7	RP-181268	Motivation for SID proposal for Remote Interference Management in NR	CMCC	discussion	-	-	-	-

	Yes	endorsed	10.12	RP-181269	Introduction of new Rel-15 UL categories for LTE	Intel Corporation, NTT DOCOMO, Telstra, Telecom Italia, KDDI, CMCC	discussion	-	-	-	-
	Yes	noted	5.2	RP-181270	Endorsed RAN2 RRC CRs for NR SA, for information	RAN2 chairman (Intel)	discussion	-	-	-	-
80_LS06	Yes	noted	5.2	RP-181271	Endorsed RAN2 RRC CRs for LTE, for information	RAN2 chairman (Intel)	discussion	36.331	-	-	-
FLAG S	Yes	approved	9.3.1.1	RP-181272	Introduction of assistance information for DL PDCP duplication	RAN3	CR Pack	38.425	-	-	-
	Yes	revised	9.1.9	RP-181273	New SID: NR URLLC Enhancements	Nokia, Nokia Shanghai Bell	SID new	-	-	-	-

	Yes	noted	9.2	RP-181274	Support of sync NR-NR DC in Rel-15	Samsung, KT, KDDI, LGU+, SKT	discussion	-	-	-	-
FLAG S, FLAG T	Yes	noted	10.3.19	RP-181275	Status report for WI on Core part: Increased number of bearers for LTE; rapporteur: Samsung	RAN2	WI status report	-	-	-	-
R3	Yes	approved	9.3.1.2	RP-181276	TS 38.422 v1.0.1 on NG-RAN; Xn signalling transport; for approval	NTT DOCOMO, INC.	draft TS	38.422	-	-	-
	Yes	approved	10.3.18	RP-181277	Introduction of Aerial for LTE in 36.213	RAN1	CR Pack	-	-	-	-
	Yes	noted	9.3.1	RP-181278	Status Report of WI on New Radio Access Technology; rapporteur: NTT DOCOMO	RAN1	WI status report	-	-	-	-
FLAG S	Yes	noted	10.3.10	RP-181279	Status Report of WI on Enhanced utilization of CA; rapporteur: Nokia	RAN2	WI status report	-	-	-	-
	Yes	not treated	10.1.1	RP-181280	Summary of email discussion on LTE enhancements (other than IoT, MIMO, broadcast)	SoftBank (Email discussion moderator)	report	-	-	-	-

	Yes	revised	10.1.1	RP-181281	New Work Item on Further performance enhancement for LTE in high speed scenario	SoftBank (Email discussion moderator)	WID new	-	-	-	-
	Yes	not treated	9.3.1	RP-181282	Coverage related issues for 2Rx RF requirements of vehicle mounted NR UE as exception case	Samsung, LG Electronics, Volkswagen AG, Daimler AG, Toyota Info Technology Center	discussion	-	-	-	-
	Yes	noted	9.1.2	RP-181283	Summary of email discussion on IoT_MTC	Ericsson	report	-	-	-	-
	Yes	not treated	9.2.2	RP-181284	Summary of email discussion on MR-DC enhancements	Ericsson	discussion	-	-	-	-
FLAG S	Yes	noted	9.3.3	RP-181285	Status Report for WI eNB architecuture evolution for E-UTRAN and NG-RAN; rapporteur: China Unicom	RAN3	WI status report	-	-	-	-
	Yes	not treated	18	RP-181286	TR 21.915 v.0.1.0 on “Release 15 Description”	ETSI MCC	other	21.915	-	-	-
FLAG M	Yes	noted	10.3.1	RP-181287	Status report of WI Shortened TTI and processing time for LTE; rapporteur: Ericsson	RAN1	WI status report	-	-	-	-
FLAG T	Yes	noted	10.3.5	RP-181288	Status report of WI UE Positioning Accuracy Enhancements for LTE; rapporteur: Nokia	RAN2	WI status report	-	-	-	-
	No	withdrawn	9.1.4	RP-181289	New SI proposal: NR voice enhancements	Huawei, HiSilicon	SID new	-	-	-	-

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	No	withdrawn	10.2.2	RP-181290	New WI proposal: LTE to new 5G core enhancements	Huawei Technologies Co. Ltd.	WID new	-	-	-	-
FLAG S, FLAG M	Yes	rejected	10.3.13	RP-181291	RAN3 CR for Support of OTDOA in NB-IoT enhancement	RAN3	CR Pack	-	-	-	-
FLAG S	Yes	revised	10.3.5	RP-181292	RAN3 CR for Assistance Information Broadcasting	RAN3	CR Pack	-	-	-	-
	Yes	noted	9.4.1	RP-181293	Status report for SI Study on NR to support non-terrestrial networks; rapporteur: Thales	THALES	WI status report	-	-	-	-
	Yes	noted	9.1.12	RP-181294	Summary of email discussion on NR spectrum utilization efficiency enhancements; moderator: Huawei	Huawei	report	-	-	-	-
	Yes	not treated	9.1.12	RP-181295	New WI proposal: NR spectrum aggregation enhancements	Huawei	WID new	-	-	-	-
FLAG S, FLAG T	Yes	noted	10.3.18	RP-181296	Status report for WI Enhanced LTE Support for Aerial Vehicles; rapporteur: Ericsson	RAN2	WI status report	-	-	-	-
	Yes	approved	10.5.1	RP-181297	Revised WID: Enhancements of Base Station (BS) RF and EMC requirements for Active Antenna System (AAS)	Huawei	WID revised	-	-	-	-
	Yes	approved	10.3.5	RP-181298	Revised WID: UE Positioning Accuracy Enhancements for LTE	Nokia	WID revised	-	-	-	-
	Yes	not treated	9.8	RP-181299	Discussion on UE feature for DL 4-layer MIMO	China Unicom	discussion	-	-	-	-
	Yes	approved	4	RP-181300	Report of RAN #79 held in Chennai, India, 19.03.-22.03.2018	ETSI MCC	report	-	-	-	-
	Yes	noted	9.1.17	RP-181301	Summary of the mail discussion about the Study item on NR solutions for Non Terrestrial Network (NTN)	THALES	report	-	-	-	-
	Yes	not treated	9.1	RP-181302	AT&T's REL-16 priorities	AT&T	discussion	-	-	-	-

	Yes	not treated	9.1	RP-181303	Way forward for LTE REL-16 items	Telecom Italia, China Telecom, China Unicom, Telefonica, Softbank, Vodafone	discussion	-	-	-	-
	Yes	noted	9.3.1	RP-181304	Discrepancy between RAN1 and RAN4 power control decisions	Qualcomm Incorporated	discussion	-	-	-	-
	Yes	revised	9.4.2	RP-181305	Text proposal to TR37.910 on CP latency and evaluation models	Huawei, Ericsson, Telecom Italia	pCR	37.910	-	-	-
	Yes	endorsed	9.4.2	RP-181306	Way forward on on LTE evaluation towards 3GPP Updated Submission	Huawei, Ericsson, Telecom Italia	discussion	-	-	-	-

	Yes	revised	9.1	RP-181307	Release 16 WI/SI package	RAN chairman (Nokia), RAN1 chairman (Qualcomm), RAN2 Chairman (Intel), RAN3 chairman (Ericsson)	discussion	-	-	-	-
	No	withdrawn	9.1	RP-181308	Way forward on 5G Terrestrial Broadcast	Qualcomm	discussion	-	-	-	-
	Yes	withdrawn	9.4.2	RP-181309	Text proposal to TR37.910	Huawei, Ericsson, Telecom Italia	pCR	37.910	-	-	-
	Yes	approved	10.3.18	RP-181310	Revised WID: Enhanced LTE Support for Aerial Vehicles	Ericsson	WID revised	-	-	-	-
	Yes	approved	10.4.9	RP-181311	Revised WID: LTE Advanced inter-band CA Rel-15 for xDL/3UL with x=3,4,5	KDDI	WID revised	-	-	-	-
	Yes	revised	9.8	RP-181312	Discussion on L2 feature list	Intel	discussion	-	-	-	-
R3	Yes	approved	10.3.13	RP-181313	Support of OTDOA in NB-IoT enhancement	Huawei	CR	36.455	93	3	B
FLAG S	Yes	noted	10.3.14	RP-181314	Status report for WI UE requirements for network-based CRS interference mitigation for LTE; rapporteur: Ericsson	RAN4	WI status report	-	-	-	-
	Yes	approved	10.3.14	RP-181315	Updated WID for UE requirements for network-based CRS interference mitigation for LTE	Ericsson LM	WID revised	-	-	-	-
	Yes	not treated	7	RP-181316	LS on UAVs using MFCN (CEPT_ECC_PT1_LS_180420; to: ETSI TC ERM, RAN; cc: -; contact: Ofcom)	CEPT ECC PT1	LS in	-	-	-	-
	Yes	approved	9.4.2	RP-181317	Text proposal to TR37.910 on CP latency and evaluation models	Huawei, Ericsson, Telecom Italia	pCR	37.910	-	-	-

	Yes	approved	9.4.2	RP-181318	Revised SID: Study on Self-Evaluation towards IMT-2020 submission	Huawei, Ericsson, Telecom Italia	SID revised	-	-	-	-
	Yes	noted	9.4.2	RP-181319	Status report for SI: Study on Self-Evaluation towards IMT-2020 submission; rapporteur: Huawei	Huawei	WI status report	-	-	-	-
RP	Yes	agreed	9.4.2	RP-181320	TR 37.910 v0.2.0 on Study on self evaluation towards IMT-2020 submission	Huawei	draft TR	37.910	-	-	-
	Yes	noted	10.1.3	RP-181321	Motivation for Multi Hop IoT Relay	NOVAMINT	discussion	-	-	-	-
	Yes	revised	10.1.4	RP-181322	New SID on LTE-based 5G Terrestrial Broadcast	Qualcomm Europe Inc.(Italy)	SID new	-	-	-	-
	Yes	noted	9.1.7	RP-181323	Proposals on Flexible Duplex	LG Electronics	discussion	-	-	-	-
	Yes	revised	9.8	RP-181324	Offline discussion on L2 feature list	Intel	discussion	-	-	-	-
	Yes	revised	9.2.4	RP-181325	New SID on Study on radiated test methodology for the verification of multi-antenna reception performance of NR UEs	CATR	SID new	-	-	-	-

R2	Yes	approved	9.3.1.1	RP-181326	Miscellaneous EN-DC corrections	Ericsson	CR	38.331	42	7	F
	No	withdrawn	9.1	RP-181327	Release 16 WI/SI package	RAN chairman (Nokia), RAN1 chairman (Qualcomm), RAN2 Chairman (Intel), RAN3 chairman (Ericsson)	discussion	-	-	-	-
	Yes	noted	9.1.10	RP-181328	Email Discussion Summary on NR mobility enhancements	Intel Corporation	report	-	-	-	-
	Yes	revised	9.1.10	RP-181329	New WID: NR mobility enhancements	Intel Corporation	WID new	-	-	-	-
	Yes	revised	10.1.2	RP-181330	New WI proposal: DL MIMO efficiency enhancements for LTE	Huawei, HiSilicon	WID new	-	-	-	-
R4	Yes	postponed	5.4	RP-181331	CR to TS 38.101-1: pi/2 BPSK with Spectrum Shaping	Indian Institute of Tech (M), Indian Institute of Tech (H), CEWiT, Nokia, Nokia Shanghai Bell	CR	38.101-1	13	1	B

	Yes	revised	9.2.2	RP-181332	New Study Item proposal: Study on optimisations on UE radio capability signalling - NR/E-UTRA Aspects	MediaTek	SID new	-	-	-	-
	Yes	revised	5.3	RP-181333	RAN WG3 Planning	RAN3 Chairman (Ericsson)	discussion	-	-	-	-
	Yes	revised	9.1.17	RP-181334	New SI: Solutions for NR to support Non Terrestrial Networks	THALES	SID new	-	-	-	-
	Yes	revised	10.1.3	RP-181335	New WID on Rel-16 MTC for LTE	Ericsson	WID new	-	-	-	-
	Yes	revised	10.1.3	RP-181336	New WID on Rel-16 NB-IoT	Ericsson	WID new	-	-	-	-
	Yes	revised	10.1.1	RP-181337	New Work Item on even further Mobility enhancement in E-UTRAN	China Telecom	WID new	-	-	-	-
	Yes	noted	9.1.12	RP-181338	Draft CA enhancement objectives	Huawei	discussion	-	-	-	-
	Yes	approved	9.4.3	RP-181339	Revised SID: Study on NR-based access to unlicensed spectrum	Qualcomm	SID revised	-	-	-	-
	Yes	revised	5.3	RP-181340	List of CRs from RAN WG3	ETSI MCC	discussion	-	-	-	-
	Yes	approved	10.3.5	RP-181341	RAN3 CR for Assistance Information Broadcasting	RAN3	CR Pack	-	-	-	-
R1	Yes	approved	10.1.4	RP-181342	New SID on LTE-based 5G Terrestrial Broadcast	Qualcomm Europe Inc.(Italy)	SID new	-	-	-	-
	Yes	revised	20	RP-181343	Draft LS on 3GPP Interface transport protocol port number assignment (to: IETF, IANA; cc: SA, CT, RAN3, CT1; contact: Huawei)	Huawei	LS out	-	-	-	-

	Yes	revised	9.2.2	RP-181344	New WID proposal on MR-DC enhancements	Ericsson	WID new	-	-	-	-
	Yes	revised	9.1.7	RP-181345	New SI proposal: Study on remote interference management for NR	LG Electronics	SID new	-	-	-	-

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	Yes	revised	9.1.5	RP-181346	New SID on NR V2X	Vodafone Group Plc	SID new	-	-	-	-
	Yes	not treated	9.2.4	RP-181347	New WID: Add support of NR DL 256QAM for FR2	China Telecomunication Corp.	WID new	-	-	-	-
	Yes	revised	9.1.6	RP-181348	New SID: Study on NR positioning support	Intel Corporation	SID new	-	-	-	-
	Yes	approved	9.4.5	RP-181349	Revision of SID on integrated access and backhaul for NR	Qualcomm Incorporated	SID revised	-	-	-	-
	Yes	revised	9.1.7	RP-181350	New WID on Cross Link Interference (CLI) handling and Remote Interference Management (RIM) for NR	LG	WID new	-	-	-	-

	Yes	revised	9.1.10	RP-181351	New WID: NR mobility enhancements	Intel Corporation	WID new	-	-	-	-
	Yes	revised	9.1.8	RP-181352	New SID: NR Power Consumption	CATT	SID new	-	-	-	-
FLAG S	Yes	noted	10.4.3	RP-181353	Status report for WI: LTE Advanced inter-band CA Rel-15 for 3DL/1UL; rapporteur: Huawei	RAN4	WI status report	-	-	-	-
FLAG T, FLAG S	Yes	noted	10.4.11	RP-181354	Status report for WI: Introduction of new band support for 4Rx antenna ports for LTE for Rel-15; rapporteur: Huawei	RAN4	WI status report	-	-	-	-
	Yes	revised	10.2.5	RP-181355	New WID: LTE Advanced inter-band CA Rel-16 for 3DL/1UL	Huawei, HiSilicon	WID new	-	-	-	-
R4s	Yes	approved	10.2.5	RP-181356	New WID: LTE Advanced inter-band CA Rel-16 for 2DL/2UL	Huawei, HiSilicon	WID new	-	-	-	-
R4s	Yes	approved	9.2.5	RP-181357	New WID on EN-DC for 3 bands DL with 2 bands UL (2 LTE bands + 1 NR band)	Huawei, HiSilicon	WID new	-	-	-	-
	No	withdrawn	9.2	RP-181358	Way forward for new WI and SI proposals for RAN4 on LTE and NR	RAN4 Vice Chairman (Huawei)	discussion	-	-	-	-
	Yes	revised	9.1.9	RP-181359	New SID: NR URLLC Enhancements	Nokia, Nokia Shanghai Bell	SID new	-	-	-	-
	Yes	revised	9.1.10	RP-181360	New WID: NR mobility enhancements	Intel Corporation	WID new	-	-	-	-
	Yes	revised	9.1.12	RP-181361	Way forward on SDL/SUL pairing	Huawei	discussion	-	-	-	-
	Yes	revised	9.1.13	RP-181362	New SID: Study on NR design above 52.6GHz	Intel Corporation (UK) Ltd	SID new	-	-	-	-
	Yes	noted	9.1.9	RP-181363	Header Compression for Wireless Ethernet	Qualcomm	discussion	-	-	-	-

	Yes	revised	9.1.13	RP-181364	New SID: Study on NR design above 52.6GHz	Intel Corporation (UK) Ltd	SID new	-	-	-	-
	Yes	revised	10.1.1	RP-181365	New Work Item on Further performance enhancement for LTE in high speed scenario	SoftBank (Email discussion moderator)	WID new	-	-	-	-
	Yes	noted	9.4.1	RP-181366	NR-NTN: update on link budget analysis	THALES, HNS, Ligado	discussion	38.811	-	-	-
	Yes	noted	9.1.18	RP-181367	Email discussion status on Study Item for 6 – 24 GHz frequency range	Dish Network	report	-	-	-	-
	Yes	revised	9.1.13	RP-181368	New SID: Study on NR design above 52.6GHz	Intel Corporation (UK) Ltd	SID new	-	-	-	-
	Yes	revised	9.2.5	RP-181369	New WID on 29 dBm UE Power Class for LTE and NR Bands 41 and n41	Sprint Corporation	WID new	-	-	-	-
R3	Yes	approved	9.1.17	RP-181370	New SI: Solutions for NR to support Non Terrestrial Networks	THALES	SID new	-	-	-	-
	Yes	revised	5.3	RP-181371	RAN WG3 Planning	RAN3 Chairman (Ericsson)	discussion	-	-	-	-
	Yes	revised	9.2.2	RP-181372	New WID proposal on MR-DC enhancements	Ericsson	WID new	-	-	-	-

	Yes	approved	9.3.1.1	RP-181373	CR for Correction the max value of one octet	RAN3	CR Pack	-	-	-	-
R4	Yes	approved	9.3.1.1	RP-181374	CR to TS 38.101-3: Implementation of endorsed draft CRs from RAN4 #87	Qualcomm	CR	38.101-3	13	1	F
	Yes	approved	9.3.3	RP-181375	Revised WID: eNB(s) Architecture Evolution for E-UTRAN and NG-RAN	China Unicom	WID revised	-	-	-	-
	Yes	revised	9.2.5	RP-181376	New WID on 29 dBm UE Power Class for LTE and NR Bands 41 and n41	Sprint Corporation	WID new	-	-	-	-
	Yes	revised	9.3.1	RP-181377	Rel-15 Work Item Exception for New Radio Access Technology - Core	NTT DOCOMO, INC.	WI exception request	-	-	-	-
	Yes	revised	9.3.1	RP-181378	WI Summary of New Radio Access Technology	NTT DOCOMO, INC.	WI summary	-	-	-	-
	Yes	revised	9.8	RP-181379	Way forward on remaining parts of RAN4 UE feature list	NTT DOCOMO	report	-	-	-	-
	Yes	revised	9.4.1	RP-181380	NR-NTN: TP for Chap 7.3 - NR modifications to support NTN	Thales, HNS, Inter Digital, Nokia, Nokia Shanghai Bell	pCR	38.811	-	-	-
	Yes	approved	9.4.1	RP-181381	NR-NTN: TP for Chap 8 Recommendations on the way forward	THALES	pCR	38.811	-	-	-
	Yes	approved	9.4.1	RP-181382	NR-NTN: HAPS related modifications	THALES	pCR	38.811	-	-	-
	Yes	approved	9.4.1	RP-181383	NR-NTN: RAN architecture	THALES	pCR	38.811	-	-	-
	Yes	revised	9.1.1	RP-181384	New Draft WI proposal on NR MIMO enhancements	Samsung	WID new	-	-	-	-

	Yes	noted	16	RP-181385	SA-RAN Release 16 Focus Areas - Decisions and Coordination	SA chairman (Samsung), RAN chairman (Nokia)	discussion	-	-	-	-
	Yes	revised	9.8	RP-181386	RAN1 NR UE feature list	NTT DOCOMO	discussion	-	-	-	-
	Yes	revised	9.8	RP-181387	Draft LS on RAN1/2/4 NR Rel-15 UE feature list (to: RAN1, RAN2, RAN4; cc: RAN3; contact: NTT DOCOMO	NTT DOCOMO	LS out	-	-	-	-
	Yes	revised	9.3.1	RP-181388	New SI: 2Rx requirements for vehicle mounted NR UE	Samsung	SID new	-	-	-	-
	Yes	approved	9.3.1	RP-181389	Reply LS to CEPT_ECC_PT1_LS_180420 = RP-180632 on Coexistence of NR-NR and NR-LTE networks with synchronised, unsynchronised and semi-synchronised operation in 3400-3800 MHz (to: CEPT ECC PT1; cc: RAN1, RAN4; contact: Huawei)	RAN	LS out	-	-	-	-

	Yes	revised	9.1.9	RP-181390	New SID: NR URLLC Enhancements	Nokia, Nokia Shanghai Bell	SID new	-	-	-	-
	Yes	noted	5.3	RP-181391	RAN WG3 Planning	RAN3 Chairman (Ericsson)	discussion	-	-	-	-
	Yes	approved	9.4.1	RP-181392	pCR about chapter 6 from RAN1	Thales	pCR	38.811	-	-	-
RP	Yes	approved	9.4.1	RP-181393	TR 38.811 v1.0.0 on Study on NR to support non-terrestrial networks	Thales	draft TR	38.811	-	-	-
	Yes	approved	9.4.1	RP-181394	NR-NTN: TP for Chap 7.3 - NR modifications to support NTN	Thales, HNS, Inter Digital, Nokia, Nokia Shanghai Bell	pCR	38.811	-	-	-

	Yes	revised	9.4.4	RP-181395	Revised SID: Study on 5G Non-Orthogonal Multiple Access	ZTE	SID revised	-	-	-	-
	Yes	revised	9.1.7	RP-181396	New SI proposal: Study on remote interference management for NR	LG Electronics	SID new	-	-	-	-
	Yes	endorsed	9.8	RP-181397	Offline discussion on L2 feature list	Intel	discussion	-	-	-	-
FLAG S, FLAG T	Yes	noted	10.3.7	RP-181398	Status report for WI: Enhancements to LTE operation in unlicensed spectrum; rapporteur: Nokia	RAN1	WI status report	-	-	-	-
R1	Yes	approved	9.1.6	RP-181399	New SID: Study on NR positioning support	Intel Corporation	SID new	-	-	-	-
	Yes	revised	9.1.7	RP-181400	New WID on Cross Link Interference (CLI) handling and Remote Interference Management (RIM) for NR	LG	WID new	-	-	-	-
	Yes	revised	9.1.8	RP-181401	New SID: NR Power Consumption	CATT	SID new	-	-	-	-
R4	Yes	approved	9.2.4	RP-181402	New SID on Study on radiated test methodology for the verification of multi-antenna reception performance of NR UEs	CATR	SID new	-	-	-	-
	Yes	approved	9.4.4	RP-181403	Revised SID: Study on 5G Non-Orthogonal Multiple Access	ZTE	SID revised	-	-	-	-
	Yes	revised	9.1.1	RP-181404	New Draft WI proposal on NR MIMO enhancements	Samsung	WID new	-	-	-	-
	Yes	revised	9.8	RP-181405	Summary of discussion on supported number of MIMO layers	Qualcomm	discussion	-	-	-	-

	No	withdrawn	9.3.1	RP-181406	Proposal on EN-DC power control	Qualcomm	discussion	-	-	-	-
R4s	Yes	approved	9.2.5	RP-181407	New WID: Basket Rel-16 WID 3 LTE + 1 NR	Ericsson	WID new	-	-	-	-
R4s	Yes	approved	10.2.5	RP-181408	New WI: Rel16 LTE inter-band CA for 4 or 5 bands DL with 1 band UL	Nokia, Nokia Shanghai Bell	WID new	-	-	-	-
	Yes	revised	9.2.5	RP-181409	New WID on Band 65 for New Radio for Region 1	Dish Network, HNS, Thales	WID new	-	-	-	-
R3	Yes	approved	9.3.1.1	RP-181410	Addition of the full config indicator	Ericsson; Nokia, Nokia Shanghai Bell	CR	36.423	1107	4	F
R2	Yes	approved	14.2.3	RP-181411	Corrections to additionalSpectrumEmission extension	Ericsson	CR	36.331	3401	2	F
R2	Yes	approved	14.2.3	RP-181412	Corrections to additionalSpectrumEmission extension	Ericsson	CR	36.331	3402	2	A
R2	Yes	approved	14.2.3	RP-181413	Corrections to additionalSpectrumEmission extension	Ericsson	CR	36.331	3403	2	A
R2	Yes	approved	14.2.3	RP-181414	Corrections to additionalSpectrumEmission extension	Ericsson	CR	36.331	3404	2	A
R2	Yes	approved	14.2.3	RP-181415	Corrections to additionalSpectrumEmission extension	Ericsson	CR	36.331	3405	2	A
R2	Yes	approved	14.2.3	RP-181416	Corrections to additionalSpectrumEmission extension	Ericsson	CR	36.331	3406	2	A
	Yes	revised	9.1.13	RP-181417	New SID: Study on NR design above 52.6GHz	Intel Corporation (UK) Ltd	SID new	-	-	-	-
	Yes	revised	9.2.2	RP-181418	New Study Item proposal: Study on optimisations on UE radio capability signalling - NR/E-UTRA Aspects	MediaTek	SID new	-	-	-	-
	Yes	approved	10.7.2	RP-181419	Revised WID: E-UTRA 2.4 GHz TDD Band for US	GLOBALSTAR Inc.	WID revised	-	-	-	-
	Yes	noted	10.7.2	RP-181420	Status Report for WI: E-UTRA 2.4 GHz TDD Band for US; rapporteur: GLOBALSTAR Inc.	RAN4	WI status report	-	-	-	-
	Yes	approved	20	RP-181421	LS on 3GPP Interface transport protocol port number assignment (to: IETF, IANA; cc: SA, CT, RAN3, CT1; contact: Huawei)	RAN	LS out	-	-	-	-

	Yes	revised	7	RP-181422	Draft reply LS to CEPT_ECC_PT1_LS_180420 = RP-181316 on UAVs using MFCN (to: CEPT ECC PT1; cc: -)	Ericsson	LS out	-	-	-	-
	Yes	noted	5.4	RP-181423	Way forward on pi/2 BPSK with Spectrum Shaping	Indian Institute of Tech	discussion	-	-	-	-
	Yes	not treated	7	RP-181424	Draft reply LS to TFES(18)059027r1 = RP-180631 on LTE OTA TRP and TRS requirements definition in 3GPP (to: ETSI TC MSG TFES; cc: RAN4, RAN5; contact: Keysight Technologies)	Keysight Technologies	LS out	-	-	-	-
	Yes	revised	9.1.1	RP-181425	New Draft WI proposal on NR MIMO enhancements	Samsung	WID new	-	-	-	-
R4s	Yes	approved	9.2.5	RP-181426	New WID: Basket Rel-16 WID NR Intra	Ericsson	WID new	-	-	-	-
	Yes	not treated	10.1.3	RP-181427	Way Forward on Relay	NOVAMINT	discussion	-	-	-	-
	Yes	revised	10.1.1	RP-181428	New Work Item on Further performance enhancement for LTE in high speed scenario	SoftBank (Email discussion moderator)	WID new	-	-	-	-
	Yes	revised	9.1.5	RP-181429	New SID on NR V2X	Vodafone Group Plc	SID new	-	-	-	-
R1	Yes	approved	9.1.7	RP-181430	New SI proposal: Study on remote interference management for NR	LG Electronics	SID new	-	-	-	-
R1	Yes	approved	9.1.7	RP-181431	New WID on Cross Link Interference (CLI) handling and Remote Interference Management (RIM) for NR	LG	WID new	-	-	-	-
	Yes	revised	9.1.8	RP-181432	New SID: NR Power Consumption	CATT	SID new	-	-	-	-
R2	Yes	approved	9.1.10	RP-181433	New WID: NR mobility enhancements	Intel Corporation	WID new	-	-	-	-

	Yes	revised	9.1	RP-181434	Overview of RAN2 TU allocation for Rel-16	RAN2 chairman (Intel)	discussion	-	-	-	-
RP	Yes	approved	9.1.13	RP-181435	New SID: Study on NR design above 52.6GHz	Intel Corporation (UK) Ltd	SID new	-	-	-	-
R4s	Yes	approved	10.2.5	RP-181436	New WID: LTE Advanced inter-band CA Rel-16 for 3DL/1UL	Huawei, HiSilicon	WID new	-	-	-	-
	Yes	endorsed	9.2.4	RP-181437	Way forward on the study of co-existence of NB-IoT with NR	Huawei, HiSilicon, Dish	discussion	-	-	-	-
	Yes	revised	9.1.16	RP-181438	New Study Item proposal: RAN-centric Data Collection and Utilization for NR	CMCC	SID new	-	-	-	-
	Yes	noted	9.8	RP-181439	Summary of offline discussion on RAN1 NR UE features	NTT DOCOMO	discussion	-	-	-	-
	Yes	revised	9.2.2	RP-181440	New WID proposal on MR-DC enhancements	Ericsson	WID new	-	-	-	-
R4s	Yes	approved	10.2.5	RP-181441	New WID on Rel16 LTE inter-band CA for 2 bands DL with 1 band UL	Qualcomm Incorporated	WID new	-	-	-	-
	Yes	approved	10.4.6	RP-181442	Revised WID for LTE Advanced inter-band CA Rel-15 for xDL/1UL with x>5	Qualcomm Incorporated	WID revised	-	-	-	-
	Yes	endorsed	9.8	RP-181443	Way forward on IOdTbits for SCS and channell bandwidths	Qualcomm	discussion	-	-	-	-
	Yes	revised	9.3.1	RP-181444	Draft Reply LS to 5GAA_A-180148 = RP-180626 on minimum number of RX antennae for NR vehicular UEs (to: 5GAA; cc: -; contact: Samsung)	Samsung	LS out	-	-	-	-
R4s	Yes	approved	9.2.5	RP-181445	New WID on Band 65 for New Radio	Dish Network, HNS, Thales	WID new	-	-	-	-
	Yes	revised	10.1.2	RP-181446	New WI proposal: DL MIMO efficiency enhancements for LTE	Huawei, HiSilicon	WID new	-	-	-	-
R4s	Yes	approved	9.2.5	RP-181447	New WID on EN-DC for 2 bands DL with 2 bands UL (1 LTE band + 1 NR band)	NTT DOCOMO, INC.	WID new	-	-	-	-
	Yes	endorsed	9.8	RP-181448	Summary of discussion on supported number of MIMO layers	Qualcomm	discussion	-	-	-	-
	Yes	revised	9.8	RP-181449	RAN1 NR UE feature list	NTT DOCOMO	discussion	-	-	-	-

R1	Yes	approved	10.1.3	RP-181450	New WID on Rel-16 MTC for LTE	Ericsson	WID new	-	-	-	-
R1	Yes	approved	10.1.3	RP-181451	New WID on Rel-16 NB-IoT	Ericsson	WID new	-	-	-	-
	Yes	revised	9.1	RP-181452	Overview of RAN1/RAN2 TU allocation for Rel-16	RAN2 chairman (Intel)	discussion	-	-	-	-
R1	Yes	approved	9.1.1	RP-181453	New Draft WI proposal on NR MIMO enhancements	Samsung	WID new	-	-	-	-
	Yes	revised	9.1.9	RP-181454	New SID: NR URLLC Enhancements	Nokia, Nokia Shanghai Bell	SID new	-	-	-	-
	Yes	revised	9.1.9	RP-181455	New SID: NR support for Industrial IOT	Nokia	SID new	-	-	-	-
R3	Yes	approved	9.1.16	RP-181456	New Study Item proposal: RAN-centric Data Collection and Utilization for NR	CMCC	SID new	-	-	-	-
	Yes	revised	9.2.2	RP-181457	New WID proposal on on DC and CA enhancements	Ericsson	WID new	-	-	-	-
	Yes	revised	9.3.1	RP-181458	New SI: 2Rx requirements for vehicle mounted NR UE	Samsung	SID new	-	-	-	-
R2	Yes	approved	9.2.2	RP-181459	New Study Item proposal: Study on optimisations on UE radio capability signalling - NR/E-UTRA Aspects	MediaTek	SID new	-	-	-	-
R4s	Yes	approved	9.2.5	RP-181460	New WID on 29 dBm UE Power Class for LTE and NR Bands 41 and n41	Sprint Corporation	WID new	-	-	-	-
	Yes	revised	9.3.1	RP-181461	New SI: 2Rx requirements for vehicle mounted NR UE	Samsung	SID new	-	-	-	-
	Yes	not treated	9.1	RP-181462	Overview of RAN1/RAN2 TU allocation for Rel-16	RAN2 chairman (Intel)	discussion	-	-	-	-
R1	Yes	approved	9.1.8	RP-181463	New SID: NR Power Consumption	CATT	SID new	-	-	-	-
	Yes	noted	5.3	RP-181464	List of CRs from RAN WG3	ETSI MCC	discussion	-	-	-	-
	Yes	endorsed	9.1.12	RP-181465	Way forward on SDL/SUL pairing	Huawei	discussion	-	-	-	-
	Yes	noted	9.3.1	RP-181466	WI Summary of New Radio Access Technology	NTT DOCOMO, INC.	WI summary	-	-	-	-
R4	Yes	approved	9.3.1	RP-181467	New SI: 2Rx requirements for vehicle mounted NR UE	Samsung	SID new	-	-	-	-
	Yes	approved	9.3.1	RP-181468	Reply LS to 5GAA_A-180148 = RP-180626 on minimum number of RX antennae for NR vehicular UEs (to: 5GAA, 5GAA WG2; cc: RAN1, RAN4; contact: Samsung)	RAN	LS out	-	-	-	-
R2	Yes	approved	9.2.2	RP-181469	New WID proposal on on DC and CA enhancements	Ericsson	WID new	-	-	-	-
	Yes	not treated	7	RP-181470	Draft reply LS to CEPT_ECC_PT1_LS_180420 = RP-181316 on UAVs using MFCN (to: CEPT ECC PT1; cc: -)	Ericsson	LS out	-	-	-	-

	Yes	revised	10.1.2	RP-181471	New WI proposal: DL MIMO efficiency enhancements for LTE	Huawei, HiSilicon	WID new	-	-	-	-
	Yes	endorsed	9.8	RP-181472	Way forward on remaining parts of RAN4 UE feature list	NTT DOCOMO	report	-	-	-	-
	Yes	approved	9.3.1	RP-181473	Rel-15 Work Item Exception for New Radio Access Technology - Core	NTT DOCOMO, INC.	WI exception request	-	-	-	-
	Yes	approved	9.3.1	RP-181474	Revision of WI: New Radio Access Technology	NTT DOCOMO, INC.	WID revised	-	-	-	-
R2	Yes	approved	10.1.1	RP-181475	New Work Item on even further Mobility enhancement in E-UTRAN	China Telecom	WID new	-	-	-	-
	Yes	revised	9.1.9	RP-181476	New SID: NR support for Industrial IOT	Nokia	SID new	-	-	-	-
R1	Yes	approved	9.1.9	RP-181477	New SID: Physical Layer Enhancements for NR URLLC	Nokia, Nokia Shanghai Bell	SID new	-	-	-	-
	Yes	revised	10.1.1	RP-181478	New Work Item on Further performance enhancement for LTE in high speed scenario	SoftBank (Email discussion moderator)	WID new	-	-	-	-
R2	Yes	approved	9.1.9	RP-181479	New SID: NR support for Industrial IOT	Nokia	SID new	-	-	-	-
R1	Yes	approved	9.1.5	RP-181480	New SID on NR V2X	Vodafone Group Plc	SID new	-	-	-	-
	Yes	revised	10.1.2	RP-181481	New WI proposal: DL MIMO efficiency enhancements for LTE	Huawei, HiSilicon	WID new	-	-	-	-
R4	Yes	approved	10.1.1	RP-181482	New Work Item on Further performance enhancement for LTE in high speed scenario	SoftBank (Email discussion moderator)	WID new	-	-	-	-
	Yes	endorsed	9.8	RP-181483	RAN1 NR UE feature list	NTT DOCOMO	discussion	-	-	-	-
	Yes	approved	9.8	RP-181484	Reply LS to R1-1807896 = RP-180635, R2-1809153 = RP-180639, R4-1808552 = RP-180644 on NR UE feature list (to: RAN1, RAN2, RAN4; cc: RAN3; contact: NTT DOCOMO	RAN	LS out	-	-	-	-
R1	Yes	approved	10.1.2	RP-181485	New WI proposal: DL MIMO efficiency enhancements for LTE	Huawei, HiSilicon	WID new	-	-	-	-
	Yes	endorsed	18	RP-181486	Status of time budgets for RAN1/2/3/4/6 ongoing and new WIs/SIs after RAN #80	RAN1/RAN2/RAN3/RAN4/RAN6 chairmen	report	-	-	-	-

Version-Current	Release	WorkItem	Replaced-by	Replaces	Abstract	Report	originalLS	To	Cc	ReplyTo	ReplyIn	ReservationDate
..	-	-				An intitial timeplan was distributed via the RAN reflector last week together with the early items. T-Mobile: Gary Jones will retire after this meeting, on Wed there will be a farewell activity for him		-	-			5/21/2018 18:05
..	-	-	RP-181300					-	-			5/21/2018 18:05
..	-	-				Huawei: page 14 on NOMA: discussions on mMTC was strange as RAN #79 gave guidance to not work on LWPA use cases but this was exactly what RAN1 did; GERAN traffic model was picked (it is not mentioned that this is LWPA), we should focus on MBB and URLLC Mediatek: agrees that we have more proposals than supporting companies, so we need to downscope RAN chair: NOMA SI downscoping was not accepted but it is clear that by Dec.18 this topic has to converge in order to continue RAN1 chair: taking the traffic model does not mean that we ignored the RAN guidance LG: slide 9 on feNB-IOT: RAN2 got RAN1 results in the last minute with completely new decisions, RAN2 complained several times about such an approach and this should not be allowed anymore RAN1 chair: NB-IOT workload was beyong the 4TUs RAN chair: slide 26 seems to propose to have the RAN1 ad hoc in Jan.2019 Mediatek: would prefer to have one ad hoc but later		-	-			5/21/2018 18:05
..	-	-						-	-			5/21/2018 18:05

..	-	-				RAN5 chairman: the non-backward compatible changes of slide 5 have impacts on RAN5 work, we based our RAN5 work on the April 2018 specs and thought there would be only few non-backward compatible changes that we could fix; but as there is significant work to be done we had to postpone the TTCN delivery date to June 29, 2018 and June 2018 ASN.1 will be used for this; RAN2 chair: there is offline discussion in RAN2 to update the EN-DC CR Ericsson: the corresponding revision will be RP-181326		-	-			5/21/2018 18:05
..	-	-						-	-			5/21/2018 18:05
..	-	-				China Unicom: page 14: has a revised status report and WID on this		-	-			5/21/2018 18:05
..	-	-	RP-181340					-	-			5/21/2018 18:05
..	-	-				was presented by RAN4 vice-chairman Mr. Dai Xizeng (Huawei) because the RAN4 chairman could not attend RAN #80 Etisalat: slide 15: we may include our combination in the exception sheet RAN4 vice chairman (NTT DOCOMO): we agreed that not completed combinations will be shifted to REL-16 RAN chairman: would have someone have an objection to include only m50/m74 in the exception sheet? no Nokia: slide 11: hoping that also UE RRM requirements will be listed as well RAN chairman: will all open issues be captured in the exception sheet? RAN4 vice chairman (NTT DOCOMO): yes, we are working on it RAN chairman: so "etc." is not an open issue Nokia: slide 12: existing item that has additional system impacts and RAN4 has not yet completed other important requirements Vodafone: one of our band combinations is ffs Qualcomm: will revise R4-18XXXX of RP-		-	-			5/21/2018 18:05
..	-	-						-	-			5/21/2018 18:05

..	-	-				RAN5 chairman: the workload is so high that I got requests to introduce time units AT&T: it is very important to have RF in the July RAN4 agenda Verizon: supporting AT&T's comment RAN chairman: we cannot change the RAN4 agenda shortly before the RAN4 meeting esp. as RAN4 chairman is not here		-	-			5/21/2018 18:05
..	-	-						-	-			5/21/2018 18:05
..	-	-						-	-			5/21/2018 18:05
..	-	-						-	-			5/21/2018 18:05
..	-	-						-	-			5/21/2018 18:05
..	-	-						-	-			5/21/2018 18:05
..	-	-				Huawei: WORD is causing enormous number of problems (e.g. equations, file size), we would like to use docx; 36.213 is broken in 3 pieces because of the equations; currently we use a special software (Mathtype); so some guidance is needed Specs manager: Microsoft is no longer supporting equations editor; we will look into this		-	-			5/21/2018 18:05
..	-	-						-	-			5/21/2018 18:05
..	-	-						-	-			5/21/2018 18:05
..	Rel-15	5GS_Ph1, NR_newRAT			no RAN action requested	RAN chairman: issue is closed in RAN3	S2-184507	RAN3, RAN2, SA3	RAN, SA	RP-180590		5/21/2018 18:05
..	Rel-15	-			no explicit RAN action requested	Mediatek: SA2 SI proposed in SA #80 RAN chairman: it is clear now that this will not be in REL-15 anymore but REL-16 RAN2 chairman: RAN2 had not yet time to reply to the LS conclusion: no reply LS from RAN to SA2	S2-184608	SA, RAN, RAN2	RAN3, CT1, CT4	RP-180598		5/21/2018 18:05
..	Rel-15	NR_newRAT			no explicit RAN action requested	RAN chairman: issue is closed in RAN3	S3-181451	RAN, RAN3, RAN2, SA2	SA	RP-180590		5/21/2018 18:05
..	Rel-15	-			ITU-T SG5 LS52 = S5-182061 was only sent to SA5; no RAN action requested;	ITU-R ad hoc convener: no action for RAN conclusion: no LS answer	S5-182439	ITU-T SG5 Q6/5	SA, CT, RAN, ETSI TC EE, ETSI TC ATTM, NGMN	ITU-T SG5 LS52 = S5-182061		5/21/2018 18:05

..	-	-			no RAN action requested	conclusion: no LS answer to SA	SP-180215	SAE C-V2X TC	SAE DSRC TC, NGMN Alliance V2X Task-Force, RAN, SA1, SA6	SAE 121120171 = RP-172178		5/21/2018 18:05
..	-	-			no RAN action requested	RAN chairman: only for information for RAN	SP-180234	SA1, SA2, SA3, RAN2	RAN			5/21/2018 18:05
..	-	-			no explicit RAN action requested; resubmission of RP-180567 which was not treated at RAN #79	RAN chairman: is for information for RAN	NGMN_LS180320	RAN	-			5/21/2018 18:05
..	Rel-15	NR_newRAT			RAN action requested	Deutsche Telekom : what is a "vehicular device"? Samsung: REL-15 UE on a vehicular RAN chairman: does my smart phone become a vehicular UE if use my car? Samsung: no RAN chairman: then we need a definition Huawei: "exception" means only for convertible cars? Samsung: no all REL-15 UEs Nokia: how do we know that requirements are relaxed? Samsung: there were 2 RAN4 inputs on this but we are happy to address further questions/open issues draft LS replies in RP-180926 from Huawei and RP-181444 from Samsung	5GAA_A-180148	RAN4, RAN	RAN1, RAN2		RP-181468	5/21/2018 18:05
..	-	-			no RAN action requested	RAN chairman: RAN2 is handling this, RAN is only in cc	GSMA_CVD_1804_001	SA3, RAN2	RAN			5/21/2018 18:05

..	-	-			compare RP-171560 (LSin to RAN #77) and SP-170780 (LS answer from SA #77); no explcit RAN action requested	conclusion: no LS answer, it is left to SA to answer (if they want)	ITU_T_JCA-IMT2020-O-005	RAN, CT, SA, ITU-R study groups, ITU-T study groups, ITU-D study groups, BBF, ETSI (ISG MEC, ISG NFV, Millimetre Wave Transmission), GSMA, IEEE, IETF, MEF, NGNM, OASIS (TOSCA), oneM2M, ONF, ONAP, OSSDN,	-			5/21/2018 18:05
..	-	-			no RAN action requested; moved from AI 7 to AI 9.1	moved from AI 9.1 to AI 9.1.9; conclusion: no LS answer to 5G-ACIA	5G-ACIA_LS-2018-001	SA1, SA2	SA, RAN, SA3, SA5			5/21/2018 18:05
..	Rel-15	FS_LTE_NR_V2X_eval			SAE = Society of Automotive Engineers; no explicit RAN action requested	conclusion: no LS answer to SAE	SAE_C_V2X_TC_LS_180418	RAN, RAN1	-	R1-1719239 = RP-172155		5/21/2018 18:05
..	Rel-15	LTE_UTRA_TRP_TRS-Core			compare ETSI TC MSG TFES(17)000019r1 = R4-1712121 (which was not sent to/cc RAN), R4-1714549 = RP-172176 and R5-177410 (which was not sent to/cc RAN); RAN action requested; REL-15 WI LTE_UTRA_TRP_TRS-Core was stopped by RAN #78	RAN chair: we need to send them a short LS indicating that we stopped activities on this conclusion: Keysight is drafting LSout RP-181424	TFES(18)059027r1	RAN	RAN4, RAN5			5/21/2018 18:05
..	Rel-15	NR_newRAT-Core			RAN action requested	Huawei drafted an LS answer in RP-180894	CEPT_ECC_PT1_LS_180420	RAN1, RAN4	RAN		RP-181389	5/21/2018 18:05
..	Rel-15	FS_NR_nonterr_nw			RAN action requested;	conclusion: no LS answer to RAN1	R1-1807719	RAN	-			5/21/2018 18:05

..	Rel-15	NR_newRAT-Core			RAN action requested; this LSin from RAN1 is providing an input to answer the CEPT ECC PT1 LS in RP-180632	conclusion: no LS answer to RAN1	R1-1807868	RAN	RAN4	RP-180632		5/21/2018 18:05
..	Rel-15	NR_newRAT-Core			RAN action requested	conclusion: NTT DOCOMO drafted a reply LS in RP-181387	R1-1807896	RAN, RAN2, RAN4	RAN3		RP-181484	5/21/2018 18:05
..	Rel-15	NR_newRAT-Core			no RAN action requested	Intel: 2 or 3ms was agreed in RAN4? it is in [ ] RAN chairman: so we will work based on these values Huawei: LS is mixing UE behaviours Qualcomm: time is for switching on antenna panel conclusion: no LS answer	R4-1808542	RAN, RAN1	-			5/21/2018 18:05
..	Rel-15	MCOver			no RAN action requested	RAN chairman: is for information to RAN	S1-181249	SA2, SA3, SA4, SA5, SA6, CT1, CT3, CT4, CT6, RAN1, RAN2, RAN3, RAN4, RAN5, RAN6	SA, CT, RAN			5/21/2018 18:05
..	Rel-15	FS_LTE_NR_V2X_eval			RAN action requested	conclusion: no LS answer to SAE	SAE_C_V2X_TC_LS_180529	RAN, RAN1, SA1	-	R1-1719239 = RP-172155		5/21/2018 18:05
..	Rel-15	NR_newRAT-Core			RAN action requested	conclusion: NTT DOCOMO drafted a reply LS in RP-181387	R2-1809153	RAN	-		RP-181484	5/21/2018 18:05

..	Rel-15	NR_newRAT			RAN action requested; related to LSin RP-180626 from 5GAA	note: There is a related company CR in RP-180782 under AI 9.1.3.1 RAN4 recommends RAN to have a decision on how to proceed the 5GAA request to have 2Rx an exceptional case for vehicle mounted NR UE with following options. •Option1: Rel-15 TEI in Q3 2018 •Option2: Release independent manners from Rel-15 •Option3: Company CR in RAN #80 Telecom Italia: impact on network and device need to be analysed before we take a decision Volkswagen: there is a UE capability that can signal the number of antennas Vodafone: we need some discussion how do we define this device and the relation to GCF testing; how do we guarantee that this is just for car operation? measuring car performance in an anechoic chamber needs to be looked at, it may be possible in other ways to improve performance in a car because power is not such a problem; RAN chair: do we agree that this is an issue that needs to be solved (having 2Rx for vehicular devices)?	R4-1808188	RAN	RAN1			5/21/2018 18:05
..	Rel-15	NR_newRAT			RAN action requested; this LSin from RAN4 is providing an input to answer the CEPT ECC PT1 LS in RP-180632	conclusion: no LS answer to RAN4	R4-1808253	RAN	RAN1	CEPT_ECC_PT1_LS_180420 = RP-180632		5/21/2018 18:05

..	Rel-15	TEI15			no explicit RAN action requested; related to LTE Control Plane latency reduction in order to fulfil the corresponding IMT-2020 requirement in Rel-15	moved from AI 7 to AI 10.3.3 Note: RAN action to RAN1/RAN2 in RP-172840: "RAN2 and RAN1 to check feasibility and values of reduced processing times in RRC Resume procedure and make corresponding spec changes as part of TEI15 by June 2018 to fulfil IMT-2020 requirement" MCC: TEIx CRs are limited to CRs of one WG not exceeding 1 quarter; R1-1805408 is included in CRpack RP-181182; R2-1809183 is included also in CRpack RP-181228; R2-1809184 is included also in discussion Tdoc RP-181271; CRpacks RP-181182 and RP-181228 are approved, the 36.331 CR will be provided for approval in Sep.18 (see currently endorsed RAN2 CR version R2-1809184) as explained in RP-181271 Telecom Italia: self-evaluation SI included a pCR to also address this conclusion: no LS answer from RAN	R2-1809244	RAN	RAN1	RP-172840		5/21/2018 18:05
..	-	-			no RAN action requested; compare RP-180025, RP-180038; R4-1801423 was not sent to/cc RAN ?	RAN chairman: only for information for RAN	R4-1808505	CEPT ECC WG SE	RAN, ETSI TC MSG TFES, CEPT ECC WG SE21			5/21/2018 18:05
..	Rel-15	NR_newRAT-Core			no explicit RAN action requested	conclusion: NTT DOCOMO drafted a reply LS in RP-181387	R4-1808552	RAN	-		RP-181484	5/21/2018 18:05
..	Rel-16	-			AECC = Automotive Edge Computing Consortium; no explicit RAN action requested	moved from AI 9.1 to AI 9.1.5 NTT DOCOMO: SA has a related input on this Huawei: uses cases indicated here are not part of SA1 use cases, use cases based on Uu interface but not clear what to be enhanced; Intel: agrees that this seems to be for information and more for SA than for RAN; conclusion: no LS answer to AECC	AECC_LS_180601	RAN, SA	-			5/21/2018 18:05

..	-	-			no explicit RAN action requested	Qualcomm: this is expected to include the description of the technology? ITU-R ad hoc convener: we could inform them that we intend to extend the technology to NR AT&T: if this is stable, then we do not need to update this ITU-R ad hoc convener: we could indicate the REL-16 reoadmap for V2X but this would be just for information as this would not be put in the recommendation from ITU-R Huawei: we can still inform them later, if the text is stable we can still send an LS later conclusion: no LS answer from RAN	(ITU-R WP5A/TEMP/304	RAN, SA, 5GAA, 79 GHz Project, ARIB, ATIS, AWG, C2C-CC, CCSA, CEPT ECC CPG, CEPT ECC WG FM, C-Roads, ETSI ERM-TG37, ETSI ERM-TGSRR, ETSI ISG MEC, ETSI TC ERM, ETSI TC ITS, ETSI TC MSG, GSA, IEEE, IETF ITS, ISO TC 204, SAE C-	-			5/21/2018 18:05
..	Rel-16	-			RAN action requested	moved from AI 9.1 to AI 9.1.5 Mediatek: a bit worried about the statement "Rel-16 NR V2X should not address use cases already addressed in Rel-14" because of course it will cover these use cases as well Nokia: agrees with Mediatek if we cover enhanced use cases, it is clear that we will cover also the basic use cases, so is this LS rather an encouragement for enhanced used cases or a request to rule out basic use cases; 5GAA: NR REL-16 use cases should be complementary to LTE REL-14 use cases Ericsson: also worried how a system can support higher level use cases if basic use cases are not supported Huawei: LTE V2X and NR V2X are not competing technologies	5GAA_LS_A-180185	RAN, SA	-			5/21/2018 18:05

..	Rel-16	-			RAN action requested	NGMN operators indicated their collectively most preferred (but certainly not necessarily all their important) activities for both NR and LTE: NR: •RAN-centric BigData collection and utilization (SON) •NR V2X •NR URLLC enhancements •Service oriented RAN support of network slicing •NR MIMO enhancements •NR Voice: Voice and multimedia enhancements for NR / RAN2 excluded or deferred functionalities for VoNR •NR Positioning •NR mobility enhancements •NR UE power consumption LTE: •LTE MIMO •LTE URLLC enhancements •LTE-M enhancements •NB-IoT enhancements Telecom Italia: this is a ranked list so first	NGMN_LS_180604	RAN	-			5/21/2018 18:05

..	Rel-16	-	RP-181307			Huawei: RAN1 slide calculation aligned with RAN1 chairman's report? for LTE part it is not following the previous agreement (up to 3 parallel NR and up to 2 parallel sessions for LTE; we were dropping down to 4 but it is proposed here to go further down to 3 sessions) RAN1 chair: in REL-15 we had 4 parallel sessions and we need to reduce to 3 with one session for LTE; chairman + 2 vice-chairmen can not cover 4 sessions on a permanent base Nokia: RAN1 effort needs to be reduced to a level that is manageable Ericsson: another aspect is that we will have a lot of maintenance and then spreading people over too many sessions would be problematic RAN chair: TU reduction is consistence with what we agreed in the past and this proposable is a way forward to come back to a sustainable work load Telecom Italia: do not forget the TUs for self-evaluation as this will take some time Deutsche Telekom: supports to not continue as in REL-15 and RAN1 slide makes sense, just wondering about NB-IOT/eMTC TUs in RAN1; we should see the scope first before we fix the TUs		-	-			5/21/2018 18:05
..	Rel-15	LTE_CA_C_B41_PC2-UEConTest				MCC: target date change (+6 months) conclusion: approved: 5%, Dec.18		-	-			5/24/2018 5:25
..	Rel-13	MCPTT-ConTest				conclusion: approved: 100%, June 18; WI is completed		-	-			5/24/2018 7:03
..	Rel-16	-			The document gives an overview about current trials, tests and project relating to MBMS.			-	-			5/24/2018 7:13
..	Rel-14	MCImp-UEConTest				MCC: target date change (-6 months) conclusion: approved: 5%, Dec.19		-	-			5/24/2018 8:29
..	Rel-16	-			related to email discussion: [IoT_MTC] Email discussion on Rel-16 scope of IoT/MTC, phase 2			-	-			5/24/2018 9:58
2.0.0	Rel-13	MCPTT-ConTest			RAN5 TS 36.579-3 is provided for approval			-	-			5/25/2018 1:40
2.0.0	Rel-13	MCPTT-ConTest			RAN5 TS 36.579-5 is provided for approval			-	-			5/25/2018 1:43

..	Rel-16	-			The motivation of Academy of Broadcasting Science (ABS) to use 5G for mobile and broadcast converged network.			-	-			5/26/2018 1:25
0.4.0	Rel-15	FS_NR_nonterr_nw	RP-181380					-	-			5/26/2018 5:42
..	Rel-15	FS_NR_nonterr_nw	RP-181293		SI is led by RAN	MCC: 50%, June 18 is a request to stop the WI, is this really intended? or is it intended to shift the SI to REL-16, then what is the target date? Thales: expects to complete the SI at RAN #80 with corresponding RAN #80 inputs		-	-			5/26/2018 5:59
0.4.0	Rel-15	FS_NR_nonterr_nw	RP-181381					-	-			5/26/2018 6:04
0.4.0	Rel-15	FS_NR_nonterr_nw				Huawei: one typo (dBM should be dBm) Thales: will fix it in the pCR implementation		-	-			5/26/2018 6:09
..	Rel-16	-	RP-181334					-	-			5/26/2018 6:17
..	Rel-16	-	RP-181301					-	-			5/26/2018 6:22
..	Rel-15	-						-	-			5/26/2018 6:55
0.4.0	Rel-15	FS_NR_nonterr_nw				see RP-181366 instead		-	-			5/26/2018 7:18

..	Rel-16	-				suggested guiding principles to define a Rel-16 "package": - Try to focus on new work areas where (1) we can get to a work item by the end of Rel-16 (2) we believe that work item corresponds to a business opportunity - Ensure adequate time is given to the expansion of cellular to new verticals - Significant interest from various new segments to adopt cellular tech Automotive, Industrial/Production, CableCo, Broadcasters, Public Safety, Utilities - Limited room for "study only" activities (within RAN1, maybe 1 TU) - Rebalance time allocation between NR and LTE (move some time budget from LTE to NR) - More reasonable workload in terms of meeting time Telecom Italia: reducing TUs for LTE would be premature Softbank: has the main concern Vodafone: we should see interest in the topics first before moving any TUs NTT DOCOMO: thinks interest in LTE will reduce so we should be careful to not allocate		-	-			5/28/2018 7:45
..	Rel-16	-						-	-			5/28/2018 7:46
..	Rel-16	-				LTE WI proposal is provided in RP-181322		-	-			5/28/2018 7:46
..	Rel-16	-						-	-			5/28/2018 7:47
..	Rel-16	-						-	-			5/28/2018 7:48
..	Rel-16	-						-	-			5/28/2018 7:50
..	Rel-16	-	RP-181322		compare RP-180668			-	-			5/28/2018 7:50
..	Rel-16	-			moved from AI 9.1.9 to AI 9.2.2			-	-			5/28/2018 10:23

..	Rel-15	FS_NR_unlic			last approved SID: RP-172021;	Huawei: TU budgeting for this WI shouldl be done in conjunction with the approval of the Rel-16 new work/study items and any potential decision on the late Rel-15 drop; MCC: target date change to Dec.18 (i.e. request to shift SI to REL-16); SI completion level 40% is added in Core part line? Qualcomm: we have a related Tdoc in RP-181339 to revise the SID conclusion: approved: 40%, Dec.18; SI is shifted to REL-16		-	-			5/29/2018 2:08
..	Rel-15	NR_newRAT			moved from AI 7 to AI 9.3.1; related to LSin RP-180632 and inputs from RAN1 RP-180634 and RAN4 RP-180641			-	-			5/29/2018 2:08
..	Rel-15	NR_newRAT				Proposal 1: Add UE Capability # 2 for processing time capability indication in the UE feature list. Proposal 2: Unless noted otherwise, the meaning of Type 3 is 'per band per band combination' Proposal 3: For intra-band contiguous DL or UL CA, required support is up to two different CC BWs in the band. Proposal 4: UE is only required to support identical BWP configuration for SCells of equal BW within a band. Proposal 5: Due to the analog beamforming restriction, there is no need to perform individual beam management on each CC in intra-band contiguous CA. Therefore, in the UE capabilities, CCs participating in intra-band contiguous CA should be considered a single beam management entity. Proposal 6: For the A-CSI-RS beam switching timing, adopt Alt. 2. Proposal 7: Capture the changes already agreed in email discussion [92-NR-05] after RAN1 #92 for feature 2-36. Proposal 8: Introduce a capability for number of simultaneous reports in a CC. Proposal 9: Resolve the FFS in 2-35 by		-	-			5/29/2018 2:08

..	Rel-15	NR_newRAT				Proposal: Keep Component 7) (Dynamic UL/DL determination based on L1 scheduling DCI with/without cell specific RRC configured UL/DL assignment) in Feature 5-1 unless a problem with TDD operation without cell-specific DL/UL configuration signaling is identified. Huawei: we were proposing to remove it but admits the forward compatibility issue but has no solution for it CMCC: we can live with it		-	-			5/29/2018 2:08
..	Rel-15	NR_newRAT				Proposal 1: Change RRC to allow signaling DCI to A-CSI-RS delay including up to 24 slots with either adding new values or converting existing values. Proposal 2: Adopt Alt-2 for Feature 2-28: {“14-14”, “28-28”, “48-48”, “14-336”, “28-336”, “48-336”}, where the first threshold corresponding to the case when UE doesn’t activate antenna panel (using same panel to receive DCI and CSI-RS), and the second threshold corresponding to the case when UE may activate antenna panel (other than the panel used to receive DCI) Qualcomm: related LS in RP-180636 RAN chairman: ok, let's see this first and then come back to RP-180678 AT&T: alt2 is providing more information than alt1; but eventually the BS will not know whether switching happened in UE or not Mediatek: prefers alt1 Apple: prefers to not go for alt2 as it could limit implementation Ericsson: prefers alt2 Qualcomm: RAN4 clarified that switching off panels will cost time, there are 2 camps (one which tries to do better, and another one that		-	-			5/29/2018 2:08
..	Rel-15	NR_newRAT	RP-181304					-	-			5/29/2018 2:08
..	Rel-15	NR_newRAT						-	-			5/29/2018 2:08
1.0.0	Rel-15	NR_newRAT-Core			RAN3 TS 38.412 is provided for 1-step approval			-	-			5/29/2018 4:45
1.0.0	Rel-15	NR_newRAT-Core	RP-181276		RAN3 TS 38.422 is provided for 1-step approval	conclusion: revision needed to correct a few mistakes ("NGAP" which should have been "XnAP")		-	-			5/29/2018 4:48

..	Rel-15	FS_NR_CU_DU_LLS				MCC: how were the last 5% completed, there is no CR to TR 38.816? (why was the SI not declared 100% complete 6 months ago?) NTT DOCOMO: no normative continuation is planned RAN chair: we left some time to check last time at previous RAN meeting conclusion: approved: 100%, June 18; SI is completed		-	-			5/29/2018 5:16
..	Rel-15	FS_NR_CU_DU_LLS			last approved SID: RP-172797; approval date of TR38.816 is corrected to RAN#78 (as it was already approved in RAN#78).			-	-			5/29/2018 5:25
..	Rel-14	LTE_eLAA-UEConTest			"85% complete; completion date: Sept 2018"	MCC: target date change conclusion: approved: 85%, Sep.18		-	-			5/29/2018 5:26
..	Rel-14	LTE_UE_cat_1RX-UEConTest				MCC: target date change conclusion: approved: 80%, Sep.18		-	-			5/29/2018 5:43
1.0.0	Rel-15	NR_newRAT-Core			RAN3 TS 38.420 is provided for 1-step approval			-	-			5/29/2018 8:40
..	Rel-15	LTE_PC1_B31_B72			last approved WID: RP-180178; WI completed earlier than planned, so completion dates updated to RP#80 intending to complete this REL-16 WI in REL-15			-	-			5/29/2018 12:57
2.0.0	Rel-15	NR_newRAT-Core			RAN2 TS 38.305 is provided for approval			-	-			5/29/2018 15:08
..	Rel-16	-			USDOT observations on NR V2X study item proposal			-	-			5/29/2018 21:58
2.0.0	Rel-15	NR_newRAT-Core			RAN4 TR 37.863-01-01 is provided for approval			-	-			5/30/2018 3:37
..	Rel-15	LTE_HRLLC				Note: R2-1809211 is the endorsed 36.331 CR (see RP-181271) which is the missing 1% for the Core part; MCC: target date change conclusion: approved: Core: 99%, Sep.18; Perf.: 0%, Dec.18		-	-			5/30/2018 8:08
..	Rel-15	LTE_HRLLC						-	-			5/30/2018 8:11
2.0.0	Rel-15	NR_newRAT-Core			RAN2 TR 38.304 is provided for approval			-	-			5/30/2018 8:37

..	Rel-12	LTE_UTRA_IncMon-UEConTest						-	-			5/30/2018 9:39
..	Rel-13	LTE_CA_Rel13-UEConTest						-	-			5/30/2018 9:39
..	Rel-13	MCPTT-ConTest						-	-			5/30/2018 9:39
..	Rel-13	LTE_IM_DLCCH-UEConTest						-	-			5/30/2018 9:39
..	Rel-14	LTE_CA_R14-UEConTest						-	-			5/30/2018 9:39
..	Rel-14	LTE_SL_V2V-UEConTest						-	-			5/30/2018 9:39
..	Rel-14	LTE_V2X-UEConTest						-	-			5/30/2018 9:39
..	Rel-14	LTE_eLAA-UEConTest						-	-			5/30/2018 9:39
..	Rel-14	LTE_SRS_switch-UEConTest						-	-			5/30/2018 9:39
..	Rel-14	LTE_high_speed-UEConTest						-	-			5/30/2018 9:39
..	Rel-14	LTE_4Rx_AP_DL_CA-UEConTest						-	-			5/30/2018 9:39
..	Rel-14	LTE_UE_cat_1RX-UEConTest						-	-			5/30/2018 9:39
..	Rel-14	LTE_VoLTE_ViLTE_enh-UEConTest						-	-			5/30/2018 9:39
..	Rel-14	NB_IOTenh-UEConTest						-	-			5/30/2018 9:39
..	Rel-14	LTE_feMTC-UEConTest						-	-			5/30/2018 9:39
..	Rel-15	LTE_UL_CAP_enh-UEConTest						-	-			5/30/2018 9:39
..	Rel-15	5GS_NR_LTE-UEConTest						-	-			5/30/2018 9:39
..	Rel-15	LTE_CA_R15-UEConTest						-	-			5/30/2018 9:39

..	Rel-15	LTE_FDD_L_band-UEConTest						-	-			5/30/2018 9:39
..	Rel-15	LTE_bands_R15_M1_NB1-UEConTest						-	-			5/30/2018 9:39
..	Rel-15	LTE_bands_R15_M2_NB2-UEConTest						-	-			5/30/2018 9:39
..	Rel-15	LTE450_Reg3-UEConTest						-	-			5/30/2018 9:39
..	Rel-15	TEI15_Test						-	-			5/30/2018 9:39
..	Rel-15	FS_UE_App_Data_Perf_CA						-	-			5/30/2018 9:39
..	R1999	TEI_Test						-	-			5/30/2018 9:39
..	Rel-8	TEI8_Test						-	-			5/30/2018 9:39
..	Rel-9	TEI9_Test						-	-			5/30/2018 9:39
..	Rel-10	TEI10_Test						-	-			5/30/2018 9:39
..	Rel-11	TEI11_Test						-	-			5/30/2018 9:39
..	Rel-12	TEI12_Test						-	-			5/30/2018 9:39
..	Rel-13	TEI13_Test						-	-			5/30/2018 9:39
..	Rel-14	TEI14_Test						-	-			5/30/2018 9:39
..	Rel-14	TEI11_Test						-	-			5/30/2018 9:39
..	Rel-14	TEI8_Test, TEI11_Test, TEI12_Test						-	-			5/30/2018 9:39
..	Rel-14	-						-	-			5/30/2018 9:39
..	Rel-14	TEI_Test, TEI5_Test, TEI8_Test						-	-			5/30/2018 9:39
..	Rel-14	TEI12_Test						-	-			5/30/2018 9:39

..	Rel-14	TEI7_Test, TEI8_Test, TEI9_Test, TEI10_Test, TEI11_Test, TEI12_Test, TEI13_Test, 5GS_NR_LTE-UEConTest, LTE_UTRA_IncMon-UEConTest						-	-			5/30/2018 9:39
..	Rel-14	-						-	-			5/30/2018 9:39
..	Rel-14	TEI9_Test						-	-			5/30/2018 9:39
..	Rel-15	FS_UE_App_Data_Perf_CA						-	-			5/30/2018 13:52
..	Rel-15	FS_UE_App_Data_Perf_CA				conclusion: approved: 100%, June 18; SI is completed		-	-			5/30/2018 14:56
1.0.0	Rel-15	NR_newRAT-Core			RAN3 TS 38.413 is provided for 1-step approval.			-	-			5/30/2018 16:14
..	Rel-16	LTE_PC1_B31_B72-Core				MCC: target date shift (-6 month) conclusion: approved: Core: 100%, June 18; Core part is completed and shifted back from REL-16 to REL-15		-	-			5/30/2018 16:34
1.0.0	Rel-15	NR_newRAT-Core			RAN3 TS 38.410 is provided for 1-step approval.			-	-			5/30/2018 16:52
1.0.0	Rel-15	NR_newRAT-Core			RAN3 TS 38.415 is provided for 1-step approval.			-	-			5/30/2018 16:55
1.0.0	Rel-15	NR_newRAT-Core						-	-			5/30/2018 17:38
..	Rel-15	LTE_CA_R15_5DL1UL				conclusion: approved: Core: 100%, June 18; Perf.: 100%, June 18; Core & Perf. part WI are completed		-	-			5/30/2018 18:03
..	Rel-15	LTE_CA_R15_5DL1UL			last approved WID: RP-180122			-	-			5/30/2018 18:03
1.0.0	Rel-15	LTE_CA_R15_5DL1UL-Core			RAN4 TR 36.715-05-01 is provided for 1-step approval			-	-			5/30/2018 18:03
..	Rel-16	-	RP-181408					-	-			5/30/2018 18:03

1.0.0	Rel-15	NR_CPUP_Split-Core			RAN3 TS 38.460 is provided for 1-step approval			-	-			5/30/2018 21:36
..	Rel-16	-	RP-181283					-	-			5/30/2018 22:18
..	Rel-16	-	RP-181335			Telecom Italia: study and WI phase: suggests to streamline to have only the WI phase Deutsche Telekom: extreme coverage topic hidden under MTC is not useful Orange: is minor work where it is not necessary to move this into a separate WI Intel, Huawei: "specify MPDCCH performance improvement by using CRS" should be removed Telecom Italia: will object non-backward compatible proposals Qualcomm: adapting radio to 5GCN still needs to be done Ericsson: wants to see outcome of SA2 SI first before adding it Huawei: it may end up with no impact on RAN or with a separate building block WI under the SA WI		-	-			5/30/2018 22:24
..	Rel-16	-	RP-181336			Mediatek: improved UL tx efficiency may be the same as for LTE-M Deutsche Telekom: we are adding complexity on NB-IOT which was supposed to be a low complexity feature Huawei: if there is a request for TDD, it should be added explicitly Novamint: UE power consumption is crucial for the industry Vodafone: load control can be done on a higher level, inter-RAT mobility is possible already today Deutsche Telekom: instead of headlines we should be much more specific about what is intended		-	-			5/30/2018 22:26
..	Rel-16	-						-	-			5/30/2018 22:27
..	Rel-16	-			motivation for new SI proposal			-	-			5/31/2018 1:02
..	Rel-16	-			new SI for approval; leading WG: RAN1;			-	-			5/31/2018 1:04
..	Rel-16	-						-	-			5/31/2018 1:06
..	Rel-16	-			motivation for new SI proposal			-	-			5/31/2018 1:24

1.0.0	Rel-15	NR_newRAT-Core			RAN3 TS 29.413 is provided for 1-step approval			-	-			5/31/2018 3:19
0.0.2	Rel-15	FS_NR_unlic			RAN1 TR 38.889 is provided for information			-	-			5/31/2018 4:29
..	Rel-16	-	RP-181280					-	-			5/31/2018 4:51
..	Rel-16	-						-	-			5/31/2018 4:54
..	Rel-16	-						-	-			5/31/2018 4:56
..	Rel-16	-						-	-			5/31/2018 4:57
..	Rel-16	-						-	-			5/31/2018 4:59
..	Rel-16	-	RP-181337					-	-			5/31/2018 5:01
..	Rel-16	-						-	-			5/31/2018 5:03
..	Rel-16	-	RP-181281					-	-			5/31/2018 5:06
1.0.0	Rel-15	NR_newRAT-Core			RAN4 TR 37.864-11-22 is provided for 1-step approval	MCC: wrong version number (should have been v1.0.0)		-	-			5/31/2018 5:20
..	Rel-16	-	RP-181447					-	-			5/31/2018 5:20
..	Rel-16	-				conclusion: band will be added to REL-15 NR_newRAT exception sheet note: No exception will be made for band combinations		-	-			5/31/2018 5:20
1.0.0	Rel-15	NR_CPUP_Split-Core			RAN3 TS 38.462 is provided for 1-step approval			-	-			5/31/2018 6:33

..	Rel-15	LTE_NW_CRS_IM, LTE_NW_CRS_IM-Core	RP-181314		status report is suggesting Core: 95%, Sep.18; Perf.: 0%, Dec.18	Qualcomm: The completion level of 95% seems excessive, given the open items e.g.: - Only skeleton CR was agreed in last meeting with many of important details left as TBD/FFS. - Number of warm-up subframes required in individual scenarios are all left as TBD and still under discussion. - New scenarios that may require warm-up subframes are still being identified/discussed, e.g., CSIRS/PMCH - Applicability of requirement for TDD/MBSFN scenarios is FFS The request for TU change should be "Yes". MCC: this WI was originally only impacting RAN4 but now it seems RAN2 is involved as well Note: R2-1809181 is the endorsed 36.331 CR (see RP-181271) which together with some RAN4 open issues (see RP-180945) is the missing 5% for the Core part (claimed in the status report); MCC: target date change (for Core part)		-	-			5/31/2018 8:08
..	Rel-15	LTE_CA_R15_xDL2UL			last approved WID: RP-180574; all CA band combos are completed except 3 CA band combinations			-	-			5/31/2018 8:12
..	Rel-15	LTE_NW_CRS_IM	RP-181315		last approved WID: RP-171408	note: 36.331 is added as impacted spec		-	-			5/31/2018 8:13
..	Rel-15	LTE_CA_R15_xDL2UL-Core, LTE_CA_R15_xDL2UL-Perf			We propose the WI completion level is 100% both core and perf. part	conclusion: approved: Core: 100%, June 18; Perf.: 100%, June 18; Core & Perf. part WI are completed		-	-			5/31/2018 8:17
..	Rel-15	LTE_V2X_CA_bands-Core				conclusion: approved: Core: 100%, June 18; Core part WI is completed		-	-			5/31/2018 8:21
1.0.0	Rel-15	LTE_CA_R15_xDL2UL-Core			RAN4 TR 36.715-00-02 is provided for 1-step approval			-	-			5/31/2018 8:24
1.0.0	Rel-15	LTE_V2X_CA_bands-Core			RAN4 TR 36.787 v1.0.0 is provided for 1-step approval			-	-			5/31/2018 8:27
1.0.0	Rel-15	NR_newRAT-Core			RAN4 TR 37.864-41-21 in provided for 1-step approval			-	-			5/31/2018 8:34

..	Rel-16	-			We propose new WID on EN-DC of LTE CA for up to 4 bands DL with 1 band UL + NR CA for 2 bands DL with 1 band UL. It was endorsed in RAN WG4.			-	-			5/31/2018 8:39
..	Rel-16	-			We propose new WID on LTE inter-band CA for x bands DL with 2 bands UL with x=3, 4, 5 in rel-16. It was endorsed in RAN WG4.			-	-			5/31/2018 8:44
..	Rel-15	NR_newRAT-Core	RP-181282		moved from AI 9.3.1.2 to AI 9.3.1; to complete some open issue for vehicle mounted NR UE at FR1; solving the coverage issues based on CAR reference RF architecture	related to LS RP-180640		-	-			5/31/2018 8:56
..	Rel-15	NR_newRAT-Core			moved from AI 9.3.1.2 to AI 9.3.1; addressing the implementation difficulty of 4Rx antenns on vehicle mounted NR UE considering vehicle antenna system and RF baseline architecture.	related to LS RP-180640; see RP-181117 instead		-	-			5/31/2018 9:01
..	Rel-16	-						-	-			5/31/2018 9:02

15.1.0	Rel-15	NR_newRAT-Core			moved from AI 9.3.1.1 to AI 9.3.1; company CR; CR is preparing for option 3 (company CR) of LSin RP-180640 in AI 9.3.1; compare R4-1806681 and approved way forward R4-1808169; CR proposes to add an exceptional REFSENS requirement for NR vehicular UEs in Note1 in Table 7.3-1 as below: -NOTE 1: Four Rx antenna ports shall be the baseline for this operating band. The exception is allowed for vehicle mounted devices in this operating band, for which the requirements with two Rx antenna ports shall be applied.			-	-			5/31/2018 9:07
..	Rel-16	-						-	-			5/31/2018 9:08
..	Rel-16	-						-	-			5/31/2018 9:16
..	Rel-15	FS_NR_NOMA				Huawei: TU budgeting for this WI shouldl be done in conjunction with the approval of the Rel-16 new work/study items and any potential decision on the late Rel-15 drop MCC: target date change Huawei: open issues all RAN1, SI has RAN4 involvement, what is the plan? ZTE: RAN4 has no time to treat this Huawei: then remove RAN4 involvement from the SID conclusion: approved: 40%, Dec.18; SI is shifted to REL-16		-	-			5/31/2018 9:24

..	Rel-16	-				proposal: 1st R16 package approval in June for new proposals: - Only WIs/SIs to be immediately started after June will be approved - TUs for on-going SIs (i.e. NOMA,NR-U and IAB) in 2018 H2 should be considered together - Leave one pool of TUs for potential WIs (as continuation of these 3 on-going SIs) in 2019 - Continue email discussions on other new proposals on RAN draft reflector 2nd R16 package approval in Dec. - To approve WIs for NOMA, NR-U and IAB, based on the conclusion of corresponding SIs - To approve additional NR SIs/WIs, if TUs are available (depending on level of interest, etc.) Other SIs/WIs proposal not covered by 1st and 2nd package could be considered if consensus is achieved among companies Deutsche Telekom: 1 or 2 packages should be discussed right at the beginning Mediatek: does not agree that we should agree already on future WIs that may come out of SIs that we start in June Samsung: NR-NR DC may become a REL-16 RAN2 led WI		-	-			5/31/2018 9:26
1.0.0	Rel-15	NR_newRAT-Core			RAN3 TS 38.414 is provided for 1-step approval			-	-			5/31/2018 9:45
..	Rel-16	-			moved from AI 9.4.5 to AI 9.2.2	RAN chair: SI is still ongoing		-	-			5/31/2018 10:56
..	Rel-16	-			moved from AI 9.4.5 to AI 9.2.2			-	-			5/31/2018 10:56
..	Rel-16	-						-	-			5/31/2018 10:56
..	Rel-16	-						-	-			5/31/2018 10:56
..	Rel-16	-						-	-			5/31/2018 10:56
..	Rel-15	-			moved from AI 9.3.1.2 to AI 9.8	AT&T: by accident RP-180794 was also included in the zip file of RP-180793 but RP-180793 is ok Mediatek: for proposal 4 also frequency band has to be considered		-	-			5/31/2018 10:56
..	Rel-16	-						-	-			5/31/2018 10:56
1.0.0	Rel-15	NR_newRAT-Core			RAN4 TR 38.817-02 is provided for 1-step approval			-	-			5/31/2018 12:25

..	Rel-15	LTE_QMC_Streaming, LTE_QMC_Streaming-Core				Note: R2-1807410 is the endorsed 36.331 CR (see RP-181271) which is the missing 1% for the Core part; MCC: target date change conclusion: approved: 99%, Sep.18		-	-			5/31/2018 12:53
..	Rel-15	LTE_QMC_Streaming, LTE_QMC_Streaming-Core			Work item exception for QMC in E-UTRAN			-	-			5/31/2018 12:58
..	Rel-15	LTE_CA_R15_intra				conclusion: approved: Core: 100%, June 18; Perf.: 100%, June 18; Core & Perf. part WI are completed		-	-			5/31/2018 14:25
..	Rel-15	LTE_CA_R15_4DL1UL				conclusion: approved: Core: 100%, June 18; Perf.: 100%, June 18; Core & Perf. part WI are completed		-	-			5/31/2018 14:25
..	Rel-15	LTE_CA_R15_intra			last approved WID: RP-180243			-	-			5/31/2018 14:25
..	Rel-15	LTE_CA_R15_4DL1UL			last approved WID: RP-180572			-	-			5/31/2018 14:25
1.0.0	Rel-15	LTE_CA_R15_intra-Core			RAN4 TR 36.715-00-00 is provided for 1-step approval			-	-			5/31/2018 14:25
1.0.0	Rel-15	LTE_CA_R15_4DL1UL-Core			RAN4 TR 36.715-04-01 is provided for 1-step approval			-	-			5/31/2018 14:25
1.0.0	Rel-15	NR_newRAT-Core			moved from AI 9.3.1 to AI 9.3.1.2; RAN4 TR 37.865-01-01 is provided for 1-step approval			-	-			5/31/2018 14:25
1.0.0	Rel-15	NR_newRAT-Core			moved from AI 9.3.1 to AI 9.3.1.2; RAN4 TR 37.863-03-01 is provided for 1-step approval			-	-			5/31/2018 14:25
..	Rel-16	-			New WID: Basket WI for LTE Intra-band CA Rel-16	moved from AI 9.2.5 to AI 10.2.5		-	-			5/31/2018 14:25
..	Rel-16	-	RP-181426		New WID: Basket Rel-16 WID NR Intra			-	-			5/31/2018 14:25
..	Rel-16	-	RP-181407		New WID: Basket Rel-16 WID 3 LTE + 1 NR			-	-			5/31/2018 14:25
..	Rel-16	-						-	-			5/31/2018 15:14
..	Rel-16	-						-	-			5/31/2018 15:14
..	Rel-16	-						-	-			5/31/2018 15:14
..	Rel-16	-						-	-			5/31/2018 15:14
..	Rel-16	-						-	-			5/31/2018 15:14

1.0.0	Rel-15	NR_newRAT-Core			RAN3 TS 38.424 is provided for 1-step approval			-	-			5/31/2018 16:10
..	Rel-15	NR_newRAT				Ericsson: this is a detailed version better see RP-180995 for the presentation RAN chairman: RP-180815 will go into the offline discussion on Tue morning		-	-			5/31/2018 16:47
1.0.0	Rel-15	NR_newRAT-Core			RAN3 TR 38.423 is provided for 1-step approval			-	-			5/31/2018 19:47
..	Rel-16	-						-	-			5/31/2018 21:33
1.0.0	Rel-15	NR_newRAT-Core			moved from AI 9.3.1 to AI 9.3.1.2; RAN4 TR 37.866-00-02 is provided for 1-step approval			-	-			5/31/2018 21:35
..	Rel-16	-	RP-181369		Initially proposed at RAN #78 in RP-172315			-	-			5/31/2018 22:16
..	Rel-15	TEI15						-	-			5/31/2018 23:01
..	Rel-15	CIoT_EC_GSM_fenh						-	-			5/31/2018 23:01
..	Rel-15	TEI15						-	-			5/31/2018 23:01
..	Rel-13	CIoT_EC_GSM-Perf						-	-			5/31/2018 23:01
..	Rel-14	CIoT_EC_GSM_radio_enh-Perf						-	-			5/31/2018 23:01
..	Rel-14	TEI14						-	-			5/31/2018 23:01
..	Rel-15	CIoT_EC_GSM_fenh-Core						-	-			5/31/2018 23:01
..	Rel-16	-			Motivation for RP-180819			-	-			5/31/2018 23:23
..	Rel-16	-						-	-			6/1/2018 0:39
..	Rel-16	-						-	-			6/1/2018 0:46
..	Rel-16	-						-	-			6/1/2018 0:48
1.0.0	Rel-15	NR_newRAT-Core			RAN4 TR 38.815 is provided for 1-step approval			-	-			6/1/2018 1:02
..	Rel-16	-			new WI for NR; leading WG: RAN3;			-	-			6/1/2018 1:05
..	Rel-16	-			Tdoc Number f SID :RP-180832			-	-			6/1/2018 1:12

..	Rel-16	-						-	-			6/1/2018 1:19
..	Rel-16	-						-	-			6/1/2018 1:19
..	Rel-16	-						-	-			6/1/2018 1:19
..	Rel-15	NR_newRAT			This contribution is to discuss considerations on UE categories for 5G NR			-	-			6/1/2018 1:31
..	Rel-16	-			This contribution provides an operator's view for new Release-16 WI/SIs	Proposals for NR related WI/SIs: - Unfortunately not all proposed WI/SIs are likely to be approved - However, there are some proposals which may need urgent enhancement for commercial deployments - KT suggests operators to indicate their urgent enhancements for commercial deployment needs - After completing 'Late-Drop' more time budgets will be available - KT suggests NOT to approve any WI/SI which will start after the completion of 'late-drop'		-	-			6/1/2018 1:36
..	Rel-16	-	RP-181347		new WI for approval; leading WG: RAN4;			-	-			6/1/2018 2:25
..	Rel-16	-			Motivation for new WI proposal			-	-			6/1/2018 2:27
..	Rel-16	-			new WI for approval; leading WG: RAN4;	China Telecom: would like to postpone it		-	-			6/1/2018 2:28
..	Rel-16	LTE_TDD_2400_US	RP-181420			Broadcom: further discussion needed on Section 2.1.1 considering the way the study phase for this WI was treated during the previous RAN4 meeting; proposing a way forward in RP-181122;		-	-			6/1/2018 3:06
..	Rel-14	LTE_V2X-UEConTest				MCC: target date change conclusion: approved: 65%, Dec.18		-	-			6/1/2018 3:08
..	Rel-14	LTE_SL_V2V-UEConTest				MCC: target date change conclusion: approved: 98%, Sep.18		-	-			6/1/2018 3:08
..	Rel-13	LTE_CA_enh_b5C_PUCCH-UEConTest				conclusion: approved: 20%, Sep.18		-	-			6/1/2018 3:08
..	Rel-14	LTE_SRS_switch-UEConTest				conclusion: approved: 100%, June 18; WI is completed		-	-			6/1/2018 3:08
..	Rel-14	NB_IOTenh-UEConTest				conclusion: approved: 60%, Dec.18		-	-			6/1/2018 3:08

..	Rel-14	LTE_SRS_switch-UEConTest			last approved WID: RP-170355			-	-			6/1/2018 3:08
..	Rel-15	NB_IOTenh2			status report is suggesting Core: 95%, Sep.18; Perf.: 30%, Dec.18	Note: R2-1809276 (not R2-1809249 as indicated under 2.3.1 of RP-180849) and R2-1809256 are the endorsed 36.331 CRs (see RP-181271) and together with some RAN3/RAN4 open issues (see RP-180850) the missing 5% for the Core part; MCC: target date change (Core part) conclusion: approved: Core: 95%, Sep.18; Perf.: 30%, Dec.18		-	-			6/1/2018 3:10
..	Rel-15	NB_IOTenh2				Ericsson: includes the UE differentiation topic already Nokia: we can address UE differentiation without having a vendor specific container; we should rule out a vendor specific container otherwise RAN3 will rediscuss the same thing again Deutsche Telekom: encourages people to solve UE differentiation without an undefined container otherwise we will discuss the same at RAN #81 RAN3 chairman: afraid that RAN3 may end up in the same discussion		-	-			6/1/2018 3:10
..	Rel-15	NB_IOTenh2						-	-			6/1/2018 3:10
..	Rel-15	LTE_1024QAM_DL				Note: R2-1807712 is the endorsed 36.331 CR (see RP-181271) which is the missing 1% for the Core part; MCC: target date change conclusion: approved: Core: 99%, Sep.18; Perf.: 50%, Dec.18		-	-			6/1/2018 3:10
..	Rel-15	LTE_1024QAM_DL			Exception depends on submission of TS36.331			-	-			6/1/2018 3:10
..	Rel-15	LTE_1024QAM_DL						-	-			6/1/2018 3:10
..	Rel-15	LTE_1024QAM_DL			last approved WID: RP-171738			-	-			6/1/2018 3:10
..	Rel-15	LTE_eV2X				Note: R2-1808917 is the endorsed 36.331 CR (see RP-181271) which is the missing 1% for the Core part MCC: target date change conclusion: approved: Core: 99%, Sep.18; Perf. part: 5%, Dec.18		-	-			6/1/2018 3:10
..	Rel-15	LTE_eV2X			Exception depends on submission of TS36.331	Huawei: RAN2 email was completed and it was decided that the issue can be handled as a later CR if needed		-	-			6/1/2018 3:10

..	Rel-15	LTE_eV2X-Core						-	-			6/1/2018 3:10
..	Rel-15	LTE_5GCN_connect				Note: R2-1809266 is the endorsed 36.331 CR (see RP-181271) which is the missing 1% for the Core part; MCC: target date change conclusion: approved: Core: 99%, Sep.18; Perf.: 0%, Dec.18		-	-			6/1/2018 3:10
..	Rel-15	LTE_5GCN_connect			last approved WID: RP-180064			-	-			6/1/2018 3:10
..	Rel-15	LTE_5GCN_connect						-	-			6/1/2018 3:10
..	Rel-15	LTE_5GCN_connect						-	-			6/1/2018 3:10
..	Rel-16	-			email discussion for RAN-centric Data Collection and Utilization for NR			-	-			6/1/2018 3:12
..	Rel-16	-			Motivation to study RAN-centric Data Collection and Utilization for NR			-	-			6/1/2018 3:12
..	Rel-16	-	RP-181438		New SI Proposal for RAN-centric Data Collection and Utilization for NR	LG: REL-15 topic has still some MDT work to be done, so we wiould like to remove the V2X part Huawei: we can wait with the approval for 1 quarter RAN chair: no [ ] please		-	-			6/1/2018 3:12
..	Rel-15	LTE_MDT_BT_WLAN-Core			related WID: RP-180306	Note: R2-1808795 is the endorsed 36.331 CR (see RP-181271) which is the missing 1% for the Core part; MCC: target date change Huawei: there is a CR for a measurement that is still needed conclusion: approved: Core: 95%, Sep.18		-	-			6/1/2018 3:12
..	Rel-15	LTE_MDT_BT_WLAN-Core			related WID: RP-180306			-	-			6/1/2018 3:12
..	Rel-15	LTE_MDT_BT_WLAN-Core			related WID: RP-180306			-	-			6/1/2018 3:12
..	Rel-15	LTE_ViLTE_enh2-Core			related WID: RP-172726	Note: R2-1808313 is the endorsed 36.331 CR (see RP-181271) which is the missing 1% for the Core part; MCC: target date change conclusion: approved: 99%, Sep.18		-	-			6/1/2018 3:12
..	Rel-15	LTE_ViLTE_enh2-Core			related WID: RP-172726			-	-			6/1/2018 3:12

..	Rel-15	LTE_high_speed-UEConTest			related WID: RP-170367	MCC: target date change conclusion: approved: 95%, Sep.18		-	-			6/1/2018 3:12
..	Rel-16	-	RP-181268	RP-180310				-	-			6/1/2018 3:12
..	Rel-15	NR_newRAT			moved from AI 9.3.1 to AI 9.8			-	-			6/1/2018 3:29
..	Rel-15	NR_newRAT			moved from AI 9.3.1 to AI 9.8	RAN chairman: how should we continue with this? Huawei: email discussion and come back next time Ericsson: a concrete proposal would be easier to discuss Qualcomm: will it be possible that mandatory can become optional and optional can become mandatory?		-	-			6/1/2018 3:29
..	Rel-16	-				proposed principles: - Rel-16 NR should well support the verticals but not limited to verticals and expansion to unlicensed spectrum - Rel-16 eMBBenhancements especially for low frequencies FDD bands are important - Rel-16 should expand/enhance NR in a variety of areas with well-focused work items - A WI is meaningful even if it is focused on its primary objective. Secondary objectives may be nice to have but should not block other meaningful areas of work to be approved - Well-scope WIs are more crucial than limiting the total number of WIs Intel: see some benefit of async use case NOMA Qualcomm: supports Intel Telecom Italia: NOMA had a very wide scope which was problematic so far; supports Huawei's statement that we will need a clear scope; there is a clear market demand for LTE so do not forget this NTT DOCOMO: LTE MIMO not well commercialized at the moment so what is the intention with proposing this for REL-16?		-	-			6/1/2018 3:29
..	Rel-16	-	RP-181294					-	-			6/1/2018 3:29
..	Rel-16	-						-	-			6/1/2018 3:29
..	Rel-16	-						-	-			6/1/2018 3:29

..	Rel-16	-						-	-			6/1/2018 3:29
..	Rel-16	-	RP-181330					-	-			6/1/2018 3:29
..	Rel-16	-						-	-			6/1/2018 3:29
..	Rel-16	-						-	-			6/1/2018 3:29
..	Rel-16	-						-	-			6/1/2018 3:29
..	Rel-16	-						-	-			6/1/2018 3:29
..	Rel-16	-	RP-181295					-	-			6/1/2018 3:29
..	Rel-16	-						-	-			6/1/2018 3:29
..	Rel-16	-						-	-			6/1/2018 3:29
..	Rel-16	-						-	-			6/1/2018 3:29
..	Rel-16	-						-	-			6/1/2018 3:29
..	Rel-16	-						-	-			6/1/2018 3:29
..	Rel-16	-						-	-			6/1/2018 3:29
..	Rel-16	-						-	-			6/1/2018 3:29
..	Rel-16	-						-	-			6/1/2018 3:29
..	Rel-15	NR_newRAT	RP-181389		moved from AI 7 to AI 9.3.1; related to LSin RP-180632 and inputs from RAN1 RP-180634 and RAN4 RP-180641	Qualcomm: we should add that only BS-BS interference was considered problematic		CEPT ECC PT1	RAN1, RAN4			6/1/2018 3:36

..	Rel-15	feCOMP_LTE				MCC: target date change; what is the 36.331 CR that is the pending 1%? R2-1804061 as in the status report or R2-1808946 as referenced in RP-181271? RAN2 chairman: R2-1808946 is correct conclusion: approved: Core: 99%, Sep.18; Perf.: 100%, June 18; Perf. part completed		-	-			6/1/2018 3:57
..	Rel-16	-						-	-			6/1/2018 3:57
..	Rel-16	-	RP-181348			Nokia: a compact WI for PRS for OTDOA could be considered Intel: how could we copy from LTE for OTDOA in FR2? Nokia: we could at least do a WI for FR1 Ericsson: this is not only about OTDOA, so we would like to see the SI more open and we can narrow down in WI later Xiaomi: supporting Intel and Ericsson RAN chairman: intention would be to approve RP-181348 so it you want to support, please contact Intel Telecom Italia: very wide SI is not helping we need to focus Qualcomm: agrees, we discussed here 2 extremes: a wide SI or to start directly with a WI, some way in the middle would be better RAN chair: so still see whether there is a way to streamline the objectives		-	-			6/1/2018 3:57
..	Rel-15	TEI15	RP-181269					-	-			6/1/2018 3:57
..	Rel-15	NR_newRAT						-	-			6/1/2018 3:57
..	Rel-16	-				Huawei: beam management is new for NR, should we wait a bit before making enhancements? RAN chairman: related WID is in RP-180901		-	-			6/1/2018 4:15
..	Rel-16	-	RP-181384			Telecom Italia: suggests to remove the study part because this part would not fit into the TUs Ericsson: PAPR left over issue from REL-15 is missing which is a real issue Samsung: it seems other network verndors do not see it as an issue		-	-			6/1/2018 4:16
..	Rel-16	-						-	-			6/1/2018 4:18
..	Rel-16	-						-	-			6/1/2018 4:20

..	Rel-16	-						-	-			6/1/2018 4:22
..	Rel-15	NR_newRAT-Core	RP-181274		moved from AI 9.3.1 to AI 9.2			-	-			6/1/2018 4:25
..	Rel-16	-						-	-			6/1/2018 4:26
..	Rel-16	-						-	-			6/1/2018 4:29
..	Rel-15	INOBEARRAN-Core	RP-181275					-	-			6/1/2018 4:31
..	Rel-15	FS_LTE_NR_V2X_eval				conclusion: approved: 100%, June 18; SI is completed		-	-			6/1/2018 4:46
1.0.0	Rel-15	FS_LTE_NR_V2X_eval			RAN1 TR 37.885 is provided for 1-step approval			-	-			6/1/2018 4:53
..	Rel-15	LTE_UDC-Core				Note: R2-1806965 is the endorsed 36.331 CR (see RP-181271) which is the missing 1% for the Core part; MCC: target date change conclusion: approved: Core: 99%, Sep.18		-	-			6/1/2018 5:23
..	Rel-15	LTE_UDC-Core			revision of RP-180231			-	-			6/1/2018 5:23
..	Rel-15	LTE_UDC-Core			It requests to extend the completion date to Sep. due to avoiding specification clash.			-	-			6/1/2018 5:23
..	Rel-15	LTE_UDC-Core		RP-172365	last approved WID: RP-172365; updating affected specification, completion date of each specification, changing rapporteur			-	-			6/1/2018 5:23
..	Rel-15	-			Propose to support UDC function in NR in Rel-16			-	-			6/1/2018 5:23
..	Rel-16	-			New WI on UDC in NR			-	-			6/1/2018 5:23
..	Rel-14	LTE_VoLTE_ViLTE_enh-UEConTest				MCC: target date change conclusion: approved: 95%, Sep.18		-	-			6/1/2018 5:23
..	Rel-15	-			new WI for LTE; leading WG: RAN5; tested Core part: REL-15 WI LTE_UDC-Core; WI code to be used: LTE_UDC-UEConTest			-	-			6/1/2018 5:23

..	Rel-15	-			Discussion of CATT's view on new SI proposal of V2X phase 3 based on NR			-	-			6/1/2018 5:23
..	Rel-15	-			Give CATT's views on 256QAM requirements for FR2 in Rel-16			-	-			6/1/2018 5:23
..	Rel-15	-			Discussion on the enhancement for disaggregated Gnb			-	-			6/1/2018 5:23
..	Rel-15	-			Discussion of CATT's view on the scope of UE power saving features SID			-	-			6/1/2018 5:23
..	Rel-16	-				RAN chair: includes a 2nd file which is a WID RAN2 chair: WID objectives are unclear for RAN2 RAN chair: WI needs to be much more focussed as it is too broad (3 bullets for RAN1 and 1 bullet for RAN2 would be more realistic) LG: bullet 3 and 6a are important Qualcomm: connected mode is important and we should focus on this; suggests to remove objective 1 Panasonic: this is rather 3 WIs than 1 Deutsche Telekom: supports to remove objective 1 RAN chair: what is the timeplan for this topic? CATT: 9 months SI and 6 months WI RAN1 chair: for more complex things like this we need at least 9 months WI RAN chair: so let's plan then for a 6 months SI LG: leading WG should be RAN2 and we should rely on existing DRX mechanisms		-	-			6/1/2018 5:23
..	Rel-15	-			Discussion of CATT's view on the scope of NR Positioning study			-	-			6/1/2018 5:23
..	Rel-15	-			Discussion on scope of NR URLLC enhancements in Rel-16			-	-			6/1/2018 5:23
..	Rel-15	LTE_1RX_CRS_IM-Perf				conclusion: Perf.: 100%, June 18; Perf. part WI is completed		-	-			6/1/2018 5:31
..	Rel-15	FS_NR_test_methods				MCC: target date change conclusion: approved: 75%, Sep.18; SI is shifted to REL-16		-	-			6/1/2018 5:31
..	Rel-16	-						-	-			6/1/2018 5:31

..	Rel-16	-						-	-			6/1/2018 5:52
..	Rel-15	FS_5G_eval	RP-181319		SI is led by RAN	Huawei: TU budgeting for this WI shouldl be done in conjunction with the approval of the Rel-16 new work/study items and any potential decision on the late Rel-15 drop MCC: target date change from June 18 to Dec.19 which means a shift to REL-16; ITU-R ad hoc convener: target should be changed to June 19 and TUs above June 19 should be removed ; RAN1/RAN2/RAN4 chairmen need to confirm also the TUs for the self-evaluation RAN2 chairman: thought so far that the evaluation is more an email activity but 0,5 TUs should also be possible to squeeze it in Huawei: in Aug. 18 we will need some TUs in RAN1/2/4 but we will do our best to prepare everything by email to reduce online time; maybe we can have TUs in Aug. and put the TUs after Sep.18 in [ ]		-	-			6/1/2018 5:53
..	Rel-16	-	RP-181362		leading: RAN1			-	-			6/1/2018 5:54
..	Rel-15	FS_5G_eval	RP-181318		last approved SID: RP-171451; moving the SI to Rel-16 with target Dec 2019	MCC: highest target date of new/affected specs determines the closing time of the SI, CRs to the TR are still possible later Huawei: we may get questions after June 19 from external bodies ITU-R ad hoc convener: can be handled by LSs as usual and we will not send the TR to ITU-R but we will copy parts of the TR for ITU-R		-	-			6/1/2018 5:59

..	Rel-15	NR_newRAT-Core			moved from AI 9.3.1.2 to AI 9.3.1.1	Qualcomm: multiband framework will be discussed in RAN4 RAN chair: so this will still be in REL-15 Qualcomm: if in exception sheet RAN chair: So Qualcomm is not a fan of this change Qualcomm: correct Verizon: suggests to discuss this in RAN4 Apple: we brought it to RAN as we are at the REL-freeze Intel: RAN4 did spend much time on multiband so far, we are open to have further discussion in RAN4 and support to capture this in the exception sheet RAN chair: is this the only band case? Qualcomm: if will be difficult to agree on the band in the exception sheet Apple: we want to target n260 and n261 AT&T: worried whether we creating a precedence case for single vs. multi-band conclusion: topic will be captured in open issues in NR_newRAT exception sheet, and RAN4 will take care of this		-	-			6/1/2018 6:02
15.1.0	Rel-15	NR_newRAT-Core			moved from AI 9.3.1.2 to AI 9.3.1.1; company CR; CR was not seen at a RAN4 meeting but is a consequence of a last-minute compromise in RAN4 on spherical coverage in R4-1808546	to be handled in RAN4		-	-			6/1/2018 6:02
15.1.0	Rel-15	NR_newRAT-Core			moved from AI 9.3.1.2 to AI 9.3.1.1; company CR; CR was not seen at a RAN4 meeting but is a consequence of discussions in RAN4 on beam correspondence in R4-1808128	Mediatek: we had a similar input at last RAN meeting; either we agree to this CR or RAN4 will need another quarter to address this (because of this issue no decision about mandatory vs. optional was taken) Qualcomm: this CR was not in line with the latest status in RAN4, so RAN4 should look at it again Apple: for REL-15 this is reflecting the correct status but for REL-16 it could be discussed further conclusion: topic will be captured in NR_newRAT exception sheet and RAN4 will look into this		-	-			6/1/2018 6:02
0.1.0	Rel-15	FS_5G_eval	RP-181309			revised because multiple versions exist of RP-180936		-	-			6/1/2018 6:06

..	Rel-15	FS_5G_eval				Proposal 1: Plan an email discussion in RAN ITU-R Ad-Hoc on preparation of the update of the description template (Including addressing the eleven items that are not included in Feb submission; updating the information of other items if needed; preparing link budget template.) Proposal 2: Plan an email discussion in RAN ITU-R Ad-Hoc on preparation of the compliance template. Proposal 3: ITU-R Ad-Hoc contact person will kick off the scope and timing of the above e-mail discussions in the ITU-R Ad-Hoc mailing list. ITU-R ad hoc convener: there was the proposal on Monday evening to include NR coverage evaluation in the self evaluation Qualcomm: is the scope just link budget? Ericsson: yes, this will anyway be done as part of the link budget evaluation for ITU-R ITU-R ad hoc convener: only 1 WG meeting and just 2 weeks to RAN #81 so not much time to improve the self evaluation documents, proposing to bring pCRs to the WGs in Aug. 2018 (RAN1/2/4) for the corresponding TR and also draft LTI covering points to answer		-	-			6/1/2018 6:10
..	Rel-16	-	RP-181328					-	-			6/1/2018 6:14
..	Rel-16	-	RP-181329					-	-			6/1/2018 6:16
..	Rel-13	LTE_WLAN_radio-UEConTest				conclusion: approved: 58%, Sep.18		-	-			6/1/2018 6:18
..	Rel-13	LTE_IM_DLCCH-UEConTest				conclusion: approved: 84%, Sep.18		-	-			6/1/2018 6:21
..	Rel-13	LTE_WLAN_radio-UEConTest			last approved WID: RP-180175			-	-			6/1/2018 6:24
..	Rel-13	LTE_IM_DLCCH-UEConTest			last approved WID: RP-180176	RAN5 chairman: nothing for this was submitted to RAN5		-	-			6/1/2018 6:26
..	Rel-15	LCS_LTE_acc_enh-Core	RP-181288			MCC: status report claims Core part is 100% complete although acc. to RP-181271 the 36.331 CR R2-1808889 will not be provided to RAN #80 but just to RAN #81		-	-			6/1/2018 6:26

..	Rel-15	LTE_NW_CRS_IM, LTE_NW_CRS_IM-Core			Exception request for Network-based CRS interference mitigation for LTE			-	-			6/1/2018 6:27
..	Rel-15	LTE_unlic	RP-181398			MCC: RRC CR missing		-	-			6/1/2018 6:28
..	Rel-15	LCS_LTE_acc_enh-Core						-	-			6/1/2018 6:29
..	Rel-15	LTE_unlic						-	-			6/1/2018 6:31
2.0.0	Rel-15	NR_newRAT-Core			RAN4 TR 38.817-01 is provided for approval; covers UE RF and common UE/BS aspects			-	-			6/1/2018 6:49
..	Rel-16	-						-	-			6/1/2018 6:50
2.0.0	Rel-15	NR_newRAT-Core			RAN4 TR 38.814 is provided for approval			-	-			6/1/2018 6:51
..	Rel-15	AASenh_BS_LTE_UTRA-Perf				MCC: target date change (+3 months) Note: The Core part of this WI was completed already in Dec.17 and normally we allow the Perf. part to complete just 3-6 months after the Core part. conclusion: approved: Perf.: 50%, Sep.18		-	-			6/1/2018 6:59
..	Rel-15	LTE_4Rx_AP_DL_bands_R15	RP-181354					-	-			6/1/2018 6:59
..	Rel-15	LTE_CA_R15_3DL1UL	RP-181353					-	-			6/1/2018 6:59
..	Rel-15	LTE_CA_R15_3DL1UL			last approved WID: RP-180570			-	-			6/1/2018 6:59
..	Rel-15	LTE_CA_R15_2DL2UL				conclusion: approved: Core: 100%, June 18; Perf.: 100%, June 18; Core & Perf. part WI are completed		-	-			6/1/2018 6:59
..	Rel-15	LTE_CA_R15_2DL2UL			last approved WID: RP-172351			-	-			6/1/2018 6:59
..	Rel-15	LTE_8Rx_AP_DL				conclusion: approved: Core: 100%, June 18; Perf.: 30%, Dec.18; Core part WI is completed		-	-			6/1/2018 6:59
..	Rel-15	LTE_8Rx_AP_DL						-	-			6/1/2018 6:59
..	Rel-15	LTE_8Rx_AP_DL			last approved WID: RP-172842			-	-			6/1/2018 6:59
..	Rel-15	LTE_TDD_HPUE_R15-Core				conclusion: approved: 100%, June 18; Core part WI is completed		-	-			6/1/2018 6:59
..	Rel-15	NR_newRAT			moved from AI 9.5.1 to AI 9.3.1			-	-			6/1/2018 6:59

..	Rel-15	NR_newRAT			moved from AI 9.5.1 to AI 9.3.1			5GAA	-	RP-180626		6/1/2018 6:59
..	Rel-16	-						-	-			6/1/2018 6:59
..	Rel-15	-						-	-			6/1/2018 6:59
..	Rel-16	-	RP-181357					-	-			6/1/2018 6:59
..	Rel-16	-						-	-			6/1/2018 6:59
..	Rel-16	-	RP-181355					-	-			6/1/2018 6:59
..	Rel-16	-	RP-181356					-	-			6/1/2018 6:59
..	Rel-15	NR_newRAT			moved from AI 9.3.1 to AI 9.8; related to RP-181066	proposals: 1) Remove FDM configuration from uplink EN-DC configuration in Rel-15 specification, if the final decision is to remove it from R15 or 2) Create a UE capability for FDM operation, if the final decision is to keep it in R15 so UE can report whether to support as shown in RP-180970 Nokia: in RAN4 we followed the guidance that TDM and FDM based solutions can be considered, no extra capabilities were decided; we would need an exception sheet and missing quite fundamental requirements for this Mediatek: we need a differentiation Intel: supports different capabilities Huawei: forcing UE vendors to implement both is not a good solution; in RAN4: for TDM we provided all information but for FDM only some high level principles were presented; so we are not sure the FDM requirements can be completed in time in the next quarter RAN chairman: we leave this to RAN4 and check in Sep.18? Qualcomm: supports a split and doubts that requirements can be completed by Sep.18		-	-			6/1/2018 6:59
..	Rel-16	-				conclusion: band will be added to REL-15 NR_newRAT exception sheet note: No exception will be made for band combinations		-	-			6/1/2018 6:59
..	Rel-16	-	RP-181367			email discussion will continue		-	-			6/1/2018 6:59
..	Rel-16	-				Ericsson: header compression should be included		-	-			6/1/2018 6:59

..	Rel-16	-			This document captures the technical positions from different companies expressed for the Release 16 NR URLLC related technical items.			-	-			6/1/2018 7:02
..	Rel-16	-	RP-181273		This is the Release 16 NR URLLC study item created by moderator (Antti Toskala, Nokia) based on the email discussion in April-June time frame before RAN#80			-	-			6/1/2018 7:05
..	Rel-16	-			This document presents an overview of the NR Release 16 work and study items	Telecom Italia: slide 4: has large number of RAN1 activities that have impact on RAN2/3/4 Nokia: scoping will be important, some items have not so big impacts on other WGs Huawei: some items do not need a SI before a WI like NR MIMO or URLLC Nokia: if for NR MIMO everything is clear, then no problem to consider a WI; for URLLC thinks that a SI is needed CMCC: NR Remote Interference Management is not necessarily under RAN3, can be also under RAN1 Samsung: we need to see the outcome of the SI		-	-			6/1/2018 7:11
1.0.0	Rel-15	LTE_eV2X-Core			RAN4 TR 36.788 is provided for 1-step approval			-	-			6/1/2018 7:13
1.0.0	Rel-15	LTE_CA_R15_2DL2UL-Core			RAN4 TR 36.715-02-02 is provided for 1-step approval			-	-			6/1/2018 7:16
1.0.0	Rel-15	NR_newRAT-Core			RAN4 TR 37.872 is provided for 1-step approval			-	-			6/1/2018 7:18
..	Rel-16	-			Work item to capture NR-NR dual connectivity, including asynchronous and synchronous operation	conclusion: merged into RP-181372		-	-			6/1/2018 7:18
..	Rel-16	-			This is the NR URLLC Enhancements motivation paper (slides)			-	-			6/1/2018 7:20
1.0.0	Rel-15	NR_newRAT-Core			RAN3 TS 38.421 is provided for 1-step approval			-	-			6/1/2018 7:21

..	Rel-16	-			This covers the motivation slides for the NR-NR Dual connectivity for Release 16			-	-			6/1/2018 7:23
1.0.0	Rel-15	LTE_CA_R15_3DL1UL-Core			RAN4 TR 36.715-03-01 is provided for 1-step approval			-	-			6/1/2018 7:23
1.0.0	Rel-15	NR_newRAT-Core			RAN4 TR 37.863-05-01 is provided for 1-step approval			-	-			6/1/2018 7:25
1.0.0	Rel-15	NR_newRAT-Core			RAN3 TS 38.411 is provided for 1-step approval			-	-			6/1/2018 7:30
..	Rel-15	NR_newRAT-Core						-	-			6/1/2018 7:30
1.0.0	Rel-15	NR_newRAT-Core			RAN4 TS 38.307 is provided for 1-step approval			-	-			6/1/2018 7:31
..	Rel-15	NR_newRAT	RP-181278			MCC: late submission Huawei: TU budgeting for this WI shouldl be done in conjunction with the approval of the Rel-16 new work/study items and any potential decision on the late Rel-15 drop MCC: Tdoc says: Core: 92%, June 18; Perf. part: 20%, Dec.18; however 92% and June 18 would mean that the WI is stopped and there is no late drop which is certainly not intended; in addition Tdoc says RAN1 Core part is 100% complete which is in contradiction to the exception request RP-180991 which claims that RAN1 has to still work on option 4;			-	-			6/1/2018 7:33
..	Rel-15	NR_newRAT	RP-181378			Note: This is a first version with focus is on NSA NR, and future updates for SA and the late drop of REL-15 are planned.			-	-			6/1/2018 7:33
..	Rel-15	NR_newRAT	RP-181377			covering NR-NR DC for option 2 (details to be discussed at RAN #80, option 4 series m option 7 series			-	-			6/1/2018 7:33
..	Rel-15	NR_newRAT	RP-181474		last approved WID: RP-180536				-	-			6/1/2018 7:33
..	Rel-16	-							-	-			6/1/2018 7:33
..	Rel-15	-			moved from AI 9.3.1.2 to AI 9.8				-	-			6/1/2018 7:33
..	Rel-15	NR_newRAT				RAN chairman: this is becoming a RAN1 discussion Qualcomm: long warm up time will have impact also on RAN4 RAN chairman: RP-180995 will go into the offline discussion on Tue morning			-	-			6/1/2018 7:36

1.0.0	Rel-15	NR_CPUP_Split-Core			RAN3 TS 38.461 is provided for 1-step approval			-	-			6/1/2018 7:43
..	Rel-16	-			new WI proposal on EN-DC basket with 5 LTE bands +1 NR band			-	-			6/1/2018 7:46
1.0.0	Rel-15	NR_newRAT-Core			RAN4 TS 37.863-04-01 is provided for 1-step approval			-	-			6/1/2018 7:52
..	Rel-16	-						-	-			6/1/2018 7:55
..	Rel-16	-	RP-181345		new SI for approval; leading WG: RAN1;			-	-			6/1/2018 7:55
..	Rel-16	-			Purpose of this WI •is to specify the band-combination specific RF requirements for EN-DC configurations consisting of 5 different bands DL with 2 different bands UL (4 different LTE bands and 1 NR band)			-	-			6/1/2018 8:01
..	Rel-15	NR_newRAT			Information on the details of 5G spectrum status in the Republic of Korea			-	-			6/1/2018 8:31
..	Rel-15	CIoT_EC_GSM_fenh				MCC: target date change, exception request conclusion: approved: Core: 80%, Sep.18; Perf.: 80%, Sep.18		-	-			6/1/2018 8:37
..	Rel-15	LTE_bands_R15_M1_NB1				conclusion: Core: 100%, June 18; Perf.: 100%, June 18; Core & Perf. part WI are completed		-	-			6/1/2018 8:40
..	Rel-15	LTE_bands_R15_M2_NB2-Core				conclusion: Core: 100%, June 18; Core part is completed		-	-			6/1/2018 8:40
..	Rel-16	-			this paper provide new WID Additional LTE bands for UE category M1 and_or NB1 in Rel-16			-	-			6/1/2018 8:40
..	Rel-16	-			this paper provide new WID Additional LTE bands for UE category M2 and_or NB2 in Rel-16			-	-			6/1/2018 8:40
..	Rel-15	LTE_sTTIandPT			reviision of a previous version: RP-172747			-	-			6/1/2018 8:44

..	Rel-15	LTE_CA_R15_xDL3UL			moved from AI 10.4.8 to AI 10.4.9; this Tdoc is reporting: Core: 100%, June 18; Perf.: 100%, June 18	MCC: RAN #79 approved the new WI RP-180573 where the Perf. part box was ticked for feature LTE_CA_R15_xDL3UL but no new/affected spec was dedicated to the Perf. part with the consequence that this WI has no Perf. part so far; this status report is reporting about a 100% completed Perf. part and CRpack RP-181095 is about Core part CRs only; do we need to create a Perf. part or not and if yes, where is the Perf. part CR? MCC: Perf. part was created with RP-181311 now and a 36.307 CR is in RP-181095 conclusion: approved: Core: 100%, June 18; Perf.: 100%, June 18; Core & Perf. part WI are completed		-	-			6/1/2018 8:56
..	Rel-15	-						-	-			6/1/2018 8:58
..	Rel-15	NR_newRAT				Proposal 1. Introduce IOdT bits for all channel bandwidths in FR1 and FR2 is explicit signalling of supported channel bandwidths for each band is not defined. Proposal 2. Introduce IOdT bits for mandatory SCS for FR1 and FR2. Proposal 3. Introduce IOdT bits for PI/2 BPSK if it is mandatory. Vodafone: proposal 1 is in contrast to a previous agreement; why IOdT is required and RF profile is not enough Nokia: these are additional bits? Qualcomm: yes RAN chairman: it seems people are fearing that this could be misused as a capability signalling so some more discussion seems to be needed; so either this or nothing but not on a per band basis		-	-			6/1/2018 9:00
..	Rel-15	LTE_CA_R15_2DL1UL				MCC: late submission conclusion: approved: Core: 100%, June 18; Perf.: 100%, June 18; Core & Perf. part WI are completed		-	-			6/1/2018 9:04
..	Rel-15	LTE_CA_R15_2DL1UL			last approved WID: RP-180575			-	-			6/1/2018 9:06
..	Rel-15	LTE_CA_R15_xDL1UL				MCC: target date change for Perf. part (+6 months) conclusion: approved: Core: 100%, June 18; Perf.: 50%, Dec.18; Core part WI is completed		-	-			6/1/2018 9:13

..	Rel-15	LTE_CA_R15_xDL1UL	RP-181442		last approved WID: RP-180250	NEC: no revision marks		-	-			6/1/2018 9:15
..	Rel-16	-						-	-			6/1/2018 9:16
..	Rel-15	FS_6GHz_LTE_NR			This document is a discussion paper providing an overview of the status of coexistence studies being carried out in US between RLANs and primary incumbents in 6 GHz frequency range.			-	-			6/1/2018 9:23
0.2.0	Rel-15	FS_6GHz_LTE_NR			This document is a Text Proposal providing corrections to Table 4.1.1.3-1 in Europe Unlicensed Operations section of TR 37.890.			-	-			6/1/2018 9:23
..	Rel-15	FS_6GHz_LTE_NR			last approved SID: RP-180168; proposing extension of the deadline from June 2018 (RAN #80) till December 2018 (RAN#82), since in CEPT coexistence studies are just started and in US the Notice of Proposed Rulemaking is expected in Q4 2018. Supported companies also updated.			-	-			6/1/2018 9:23
..	Rel-15	FS_6GHz_LTE_NR			SI is led by RAN	conclusion: approved: 30%, Dec.18; SI is shifted to REL-16		-	-			6/1/2018 9:23
0.3.0	Rel-15	FS_6GHz_LTE_NR			Draft TR 37.890 including new approved TP(s) of RAN #80			-	-			6/1/2018 9:23
..	Rel-16	-						-	-			6/1/2018 9:23
..	Rel-15	LTE_sTTIandPT	RP-181287			MCC: wrong Core part target date (Dec.17) for a WI that is just 99% complete; 60% complete and June 18 for Perf. part means the Perf. part WI is stopped; history table is wrong; endorsed RRC CR is not referenced		-	-			6/1/2018 9:29

..	Rel-16	-			Motivation for new SI proposal			-	-			6/1/2018 9:30
..	Rel-16	-	RP-181409		New WID on Band 65 for New Radio for Region 1			-	-			6/1/2018 9:31
..	Rel-16	-	RP-181325		new SI for NR MIMO OTA TestMethods; leading WG: RAN4;			-	-			6/1/2018 9:33
..	Rel-15	FS_NR_IAB	RP-181267			note: proposals for new WIs in RP-180788 and RP-181029 under AI 9.2.2; Huawei: TU budgeting for this WI shouldl be done in conjunction with the approval of the Rel-16 new work/study items and any potential decision on the late Rel-15 drop		-	-			6/1/2018 9:34
..	Rel-15	FS_NR_IAB	RP-181349		last approved SID: RP-172290; rapportuer and completion date change	note: proposals for new WIs in RP-180788 and RP-181029 under AI 9.2.2		-	-			6/1/2018 9:34
..	Rel-16	-			New WI for NR; leading WG: RAN2. Related to ongoing SI on integrated access and backhaul for NR.			-	-			6/1/2018 9:34
1.0.0	Rel-15	LTE_unlic-Core			RAN4 TR 37.106 is provided for 1-step approval			-	-			6/1/2018 9:37
..	Rel-15	LTE_HRLLC			moved from AI 10.3.1 to AI 10.1.1			-	-			6/1/2018 9:38
..	Rel-15	-			new WI for NR; leading WG: RAN5; tested: non-3GPP Access part of REL-15 WI 5GS_Ph1-CT (note: 3GPP Access part of 5GS_Ph1-CT is already covered in REL-15 WI 5GS_NR_LTE-UEConTest); WI code to be used: 5GS_Ph1-CT_n3GPPA-UEConTest			-	-			6/1/2018 9:58
0.4.0	Rel-15	FS_NR_nonterr_nw	RP-181383					-	-			6/1/2018 10:04
..	Rel-15	LTE_QMC_Streaming-UEConTest				MCC: Core part aspects should not be shown in this testing status report conclusion: approved: 5%, Dec.18		-	-			6/1/2018 10:11
1.0.0	Rel-15	LTE_NR_arch_evo-Core						-	-			6/1/2018 10:17
1.0.0	Rel-15	LTE_NR_arch_evo-Core			RAN3 TS 37.470 is provided for 1-step approval			-	-			6/1/2018 10:17

1.0.0	Rel-15	LTE_NR_arch_evo-Core						-	-			6/1/2018 10:24
1.0.0	Rel-15	LTE_NR_arch_evo-Core			RAN3 TS 37.471 is provided for 1-step approval			-	-			6/1/2018 10:24
1.0.0	Rel-15	LTE_NR_arch_evo-Core			RAN3 TS 37.472 is provided for 1-step approval			-	-			6/1/2018 10:27
..	Rel-15	LTE450_Reg3-UEConTest			last approved WID: RP-180214			-	-			6/1/2018 10:31
0.4.0	Rel-15	FS_NR_nonterr_nw	RP-181382					-	-			6/1/2018 10:32
1.0.0	Rel-15	LTE_NR_arch_evo-Core			RAN3 TS 37.473 is provided for 1-step approval			-	-			6/1/2018 10:32
..	Rel-15	LTE_Aerial-Core	RP-181296			MCC: without 36.331 CR the WI cannot be 100% complete		-	-			6/1/2018 10:32
..	Rel-15	LTE450_Reg3-UEConTest				MCC: Core and Perf. part aspects should not be shown in this testing status report conclusion: approved: 5%, March 19		-	-			6/1/2018 10:34
..	Rel-15	LTE_Aerial-Core						-	-			6/1/2018 10:34
..	Rel-16	-						-	-			6/1/2018 10:39
..	Rel-15	NR_newRAT	RP-181299					-	-			6/1/2018 10:39
..	Rel-15	LTE_NR_arch_evo	RP-181375	RP-180531	last approved WID: RP-180531			-	-			6/1/2018 10:40
..	Rel-16	-						-	-			6/1/2018 10:41
..	Rel-15	LTE_NR_arch_evo	RP-181285			MCC: TU change claimed but Excel sheet not attached		-	-			6/1/2018 10:47
..	Rel-15	LTE_NR_arch_evo-Core						-	-			6/1/2018 10:53
..	Rel-15	LTE_NR_arch_evo-Core						-	-			6/1/2018 10:53
..	Rel-16	-						-	-			6/1/2018 11:00
..	Rel-16	-		RP-180391				-	-			6/1/2018 11:06
..	Rel-16	-		RP-180392	WID in RP-181054			-	-			6/1/2018 11:08

15.1.0	Rel-15	NR_newRAT-Core			see RP-181059 instead			-	-			6/1/2018 11:10
..	Rel-16	-	RP-181290					-	-			6/1/2018 11:12
..	Rel-16	-			WID in RP-181057			-	-			6/1/2018 11:13
15.1.0	Rel-15	NR_newRAT-Core	RP-181331		company CR; this CR is a revision of R4-1808183 discussed in RAN4 (which had a lack of consensus on the definition and implementation of negative MPR for pi/2 BPSK); RAN decision is requested as Pi/2 BPSK is an important feature for enhancing coverage in an IMT-2020 rural usage scenario like LMLC; CR provides a complete solution for the inclusion of this feature in FR1			-	-			6/1/2018 11:17
..	Rel-16	-	RP-181289	RP-180397				-	-			6/1/2018 11:21
..	Rel-16	-		RP-180347	new SI for NR; leading WG: RAN2			-	-			6/1/2018 11:23
..	Rel-16	-			New WI on NR UE MPR requirements for features supported already in NR Rel-15 but no UE requirements are specified yet.			-	-			6/1/2018 11:25
..	Rel-16	-				Telecom Italia: band in 5.9GHz? we expect impact on coexistience work Vodafone: could be a regulatory/regional discussion, no co-channel coexistence may be assumed		-	-			6/1/2018 11:34

..	Rel-16	-	RP-181346			AT&T: does not agree to "frequency of sidelink below 10GHz", would prefer to go up to 52,6GHz as higher frequencies would help to localize traffic Vodafone: of course this would increase the scope and cost more effort RAN chair: you may say focus is on below 10GHz but higher frequencies not excluded Vodafone: in any case this would cost more effort Deutsche Telekom: what does "in the cellular network connectivity" mean under bullet 3? we would like to remove it or rephrase it Ericsson: replace "connectivity" by "coverage" then it is clear Volkswagen: objective 6: worried that co-channel coexistence is not considered, would like to add this as well; there are urban rail, toll systems, other RATs so we need to be more specific what sort of coexistence is to be considered Huawei, Intel: even in regulatory bodies it is unclear which rules should be applied on other technologies so not sure what 3GPP can do here Intel: note under objective 4 is unclear US Dep. of Commerce: requirements for public		-	-			6/1/2018 11:35
..	Rel-16	-			Motivation document for New WID on NR UE MPR requirements			-	-			6/1/2018 11:38
15.1.0	Rel-15	NR_newRAT-Core			moved from AI 9.3.1.1 to AI 9.8; related to RP-180970; company CR; no related RAN2 CR for this so far	Note: It turned out that such a CR needs to be based on the CR resulting from an ongoing RAN2 email discussion [102#04] that will produce a 38.331 REL-15 CR in R2-1809240 on Miscellaneous EN-DC corrections. In order to simplify the explanation of the change for "UE capability signaling for ULSUP to differentiate TDM and FDM" it is explained in discussion Tdoc RP-180970 and RP-181066 is withdrawn.		-	-			6/1/2018 11:51
..	Rel-15	LTE_euCA-Core	RP-181279			Qualcomm: TU change indicated with Yes but Excel list missing		-	-			6/1/2018 11:54
..	Rel-15	LTE_euCA-Core						-	-			6/1/2018 11:54
..	Rel-15	LTE_euCA-Core						-	-			6/1/2018 11:54
..	Rel-16	-						-	-			6/1/2018 11:58

..	Rel-16	-						-	-			6/1/2018 11:59
..	Rel-15	NR_newRAT			The document discusses remaining open items in the Rel-15 features and UE capability signaling and proposes way forward.			-	-			6/1/2018 12:04
..	Rel-15	-			moved from AI 9.3.1 to AI 9.8; the document discusses how to handle NR UE requirements for features supported in Rel-15 NR specifications but UE requirements are not completed.			-	-			6/1/2018 12:10
1.0.0	Rel-15	LTE_CA_R15_xDL1UL-Core			RAN4 TR 36.715-00-01 is provided for 1-step approval			-	-			6/1/2018 12:11
..	Rel-15	NR_newRAT						-	-			6/1/2018 12:18
..	Rel-15	NR_newRAT						-	-			6/1/2018 12:18
..	Rel-15	LTE_sTTIandPT						-	-			6/1/2018 12:18
..	Rel-15	feCOMP_LTE-Perf						-	-			6/1/2018 12:18
..	Rel-15	LTE_eV2X						-	-			6/1/2018 12:18
..	Rel-15	LTE_1024QAM_DL						-	-			6/1/2018 12:18
..	Rel-15	LTE_unlic-Core						-	-			6/1/2018 12:18
..	Rel-15	LTE_5GCN_connect-Core						-	-			6/1/2018 12:18
..	Rel-15	LTE_eMTC4-Core						-	-			6/1/2018 12:18
..	Rel-15	NB_IOTenh2						-	-			6/1/2018 12:18
..	Rel-15	LTE_NW_CRS_IM-Core						-	-			6/1/2018 12:18
..	Rel-15	LTE_1RX_CRS_IM						-	-			6/1/2018 12:18
..	Rel-15	LTE_8Rx_AP_DL						-	-			6/1/2018 12:18
..	Rel-15	LTE_CA_R15_intra-Core						-	-			6/1/2018 12:18

..	Rel-15	LTE_CA_R15_2DL1UL						-	-			6/1/2018 12:18
..	Rel-15	LTE_CA_R15_3DL1UL						-	-			6/1/2018 12:18
..	Rel-15	LTE_CA_R15_4DL1UL						-	-			6/1/2018 12:18
..	Rel-15	LTE_CA_R15_5DL1UL						-	-			6/1/2018 12:18
..	Rel-15	LTE_CA_R15_xDL1UL						-	-			6/1/2018 12:18
..	Rel-15	LTE_CA_R15_xDL2UL-Core						-	-			6/1/2018 12:18
..	Rel-15	LTE_CA_R15_xDL3UL-Core, TEI12						-	-			6/1/2018 12:18
..	Rel-15	LTE_V2X_CA_bands						-	-			6/1/2018 12:18
..	Rel-15	LTE_4Rx_AP_DL_bands_R15						-	-			6/1/2018 12:18
..	Rel-15	LTE_TDD_HPUE_R15-Core						-	-			6/1/2018 12:18
..	Rel-15	AASenh_BS_LTE_UTRA-Perf				Note: TS 37.145-1 exists not yet in REL-15 (but only in REL-13 and REL-14). MCC: All CRs in this CRpack use wrong WI codes; 37.105 is only impacted by the Core part WI AASenh_BS_LTE_UTRA-Core; a REL-15 WI cannot modify REL-13/REL-14 specs so corresponding CRs should be corrections of the REL-13 WI AAS_BS_LTE_UTRA; finally it was spotted that the WID of the REL-15 WI AASenh_BS_LTE_UTRA is referring to a withdrawn spec TS 37.145 so a WID revision is required		-	-			6/1/2018 12:18
..	Rel-15	TEI15						-	-			6/1/2018 12:18
..	Rel-15	LTE_PC1_B31_B72-Core						-	-			6/1/2018 12:18
..	Rel-15	LTE_IC_BS-Perf						-	-			6/1/2018 12:18
..	Rel-15	LTE_TDD_L_Band-Core						-	-			6/1/2018 12:18
..	Rel-15	LTE600_US						-	-			6/1/2018 12:18
..	Rel-10	LTE-RF, TEI10						-	-			6/1/2018 12:18
..	Rel-10	TEI10						-	-			6/1/2018 12:19

..	Rel-11	TEI11						-	-			6/1/2018 12:19
..	Rel-12	LTE_CA_B26_B41_B41-Core, TEI12						-	-			6/1/2018 12:19
..	Rel-13	AAS_BS_LTE_UTRA						-	-			6/1/2018 12:19
..	Rel-13	LTE_LAA-Perf, TEI14						-	-			6/1/2018 12:19
..	Rel-13	LTE_AWS_EXT, LTE_MTCe2_L1						-	-			6/1/2018 12:19
..	Rel-13	NB_IOT						-	-			6/1/2018 12:19
..	Rel-13	LTE_4Rx_AP_DL-Perf, TEI13						-	-			6/1/2018 12:19
..	Rel-14	LTE_eCRSIM_eSUMIMO, LTE_eLAA, LTE_feMTC						-	-			6/1/2018 12:19
..	Rel-14	LTE_MIMO_OTA-Core, LTE_SRS_switch-Core, LTE_UL_CAP_enh, LTE_V2X, NB_IOTenh-Perf						-	-			6/1/2018 12:19
..	Rel-14	LTE_CA_Rel14, LTE_CA_R14_2DL1UL-Core, TEI14						-	-			6/1/2018 12:19
..	Rel-15	-			moved from AI 9.3.1.2 to AI 9.3.1			-	-			6/1/2018 12:27

..	Rel-15	NR_newRAT				T-Mobile: sees no reason to discuss a technical solution in standards for marketing purposes Vodafone: we noticed that it is very difficult to define something useful, we can rely on the UE capabilities NTT DOCOMO: supports T-Mobile and Vodafone KT, CMCC: to avoid too many categories, it would be better to define something in 3GPP RAN chairman: for now we can not yet conclude, so if there is more interest then we can come back to this Telecom Italia: there is not so much interest in this		-	-			6/1/2018 12:32
..	Rel-15	LTE_FDD_L_band-UEConTest				MCC: target date change (+3 months) conclusion: approved: 60%, Sep.18		-	-			6/1/2018 12:34
..	Rel-16	-				Samsung: no LTE MIMO Telecom Italia: these are the top priorities that we listed NTT DOCOMO: timing of 5G core network? Telecom Italia: connecting LTE to 5G core network is high priority as well Deutsche Telekom: there is an LS from NGMN which has a consolidated operator's view, it would be easier to look at this		-	-			6/1/2018 12:34
..	Rel-16	-			Summary of Rel16 band combination basket WIs.			-	-			6/1/2018 12:36

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..	Rel-16	-				proposals: - No WID work on the proposed Global LTE TDD 2.4 GHz band will start, without the proper completion of the coexistence SID. - The WID will address the conclusions of the SID. - The SID completion will be tracked via the status reports presented to the RAN Plenary Broadcom: SI part of the WI was supposed to complete at last RAN4 meeting but Globalstar was not present Broadcom: there was also not much time allocated in RAN4 for coexistence analysis Globalstar: it will be a sequential process RAN chair: SI phase was supposed to be completed by June 18 and we need to shift it to Sep.18 conclusion: study part will continue also in the next quarter		-	-			6/1/2018 12:38
1.0.0	Rel-15	NR_newRAT-Core			RAN4 TR 37.863-02-01 is provided for 1-step approval			-	-			6/1/2018 12:40
..	Rel-15	-						-	-			6/1/2018 12:40
..	Rel-15	-			Summary of worklaod reduction activity due to band combinations is provided.			-	-			6/1/2018 12:40
..	Rel-16	-			WF to reduce further TPs due to band combination in RAN4 is provided.	RAN chair: as RAN4 did not discuss this, RAN4 should conclude on this RAN4 vice-chairman: we have reviewed this by email and comments from Nokia were included		-	-			6/1/2018 12:45
..	Rel-16	-	RP-181441		moved from AI 9.2.5 to AI 10.2.5			-	-			6/1/2018 12:47
..	Rel-16	-		RP-180346				-	-			6/1/2018 13:20

..	Rel-16	-				Summary: - The need for OTA requirements and validation has been steadily growing since the early days of 3G - The 3GPP OTA requirements have not kept up with the growing sophistication of the air interface, which increasingly relies on exploiting the spatial domain - At FR1, the opportunity is to specify requirements that demonstrate the OTA performance and value of the many new features introduced since |release 8 - At FR2 the big new issue is the spatial domain - Signals will have very narrow beamwidth, and spatial dynamics due to movement in the network will make establishing and maintaining a reliable link much harder than was ever the case @ FR1 - For FR2 mobile communications to be reliable, this new spatial environment needs to be sufficiently specified and tested or the result will be poor user experience Keysight: we had to reply to TFES that 3GPP gave up on specifying antenna performance Deutsche Telekom: we encourage 3GPP working on this		-	-			6/1/2018 13:21
..	Rel-16	LTE_TDD_2400_US	RP-181419	RP-180583	last approved WID: RP-180583	CableLabs: we want to make sure that work item phase will only start when study phase is over RAN4 vice-chair (NTT DOCOMO): at last RAN4 meeting only 2 Tdocs were submitted and only a few number of people were involved in this discussion; so target date needs to be shifted as well Nokia: still thinks that completion by Dec.18 may be possible RAN chairman: discuss this offline and come back with the agreement		-	-			6/1/2018 13:23
..	Rel-16	-	RP-181321					-	-			6/1/2018 13:38
1.0.0	Rel-15	LTE_unlic-Core			RAN4 TS 37.107 is provided for 1-step approval			-	-			6/1/2018 13:44
..	Rel-16	-	RP-181263					-	-			6/1/2018 13:48
1.0.0	Rel-15	LTE_CA_R15_2DL1UL-Core			RAN4 TR 36.715-02-01 is provided for 1-step approval			-	-			6/1/2018 13:52
..	Rel-16	-						-	-			6/1/2018 13:54

..	Rel-16	-						-	-			6/1/2018 14:10
..	Rel-16	-						-	-			6/1/2018 14:10
..	Rel-16	-						-	-			6/1/2018 14:10
..	-	-				Huawei: protocol IE was requested from IANA of IETF but rejected RAN chairman: this is a serious problem Huawei: this is a 3GPP wide problem as this is also impacting CT1; on a long term basis we need to find a 3GPP wider solution but on a short term we need to ask IANA to provide the IEs RAN chair: long term issue can be led by CT RAN3 chair: solution could be dynamic allocation etc. a SI on this would be useful RAN chair: SI can be under CT		-	-			6/1/2018 14:10
..	-	-						-	-			6/1/2018 14:13
..	Rel-16	-						-	-			6/1/2018 14:15
15.1.0	Rel-15	NB_IOTenh2-Core		R3-183471	company CR; resubmission of R3-183471 which was not agreed in RAN3; note: LS R3-182509 was sent to SA2 and feedback to RAN #80 is expected;			-	-			6/1/2018 14:15
..	Rel-16	-						-	-			6/1/2018 14:17

..	Rel-15	NR_newRAT				Proposal: Given the above, it is proposed that the following be subject to optional UE support: -UE support for EPS NAS -UE support for 5GS NAS -UE support for a given RAT (standalone) under a supported given NAS -UE support for Dual Connectivity between E-UTRA and NR and if so which flavor (i.e. anchor RAT vs. secondary RAT), under a supported given NAS Deutsche Telekom: applicable forever or just for early implementation? Mediatek: would be forever Deutsche Telekom: fine for REL-15 but for REL-16 we need to review this Vodafone: the legacy NAS should be mandatory otherwise you will get problems for roaming Deutsche Telekom: similar view as Vodafone, REL-15 UE must support EPS NAS Mediatek: it should be possible to have an option 5 only UE Orange:agrees with Vodafone and Deutsche Telekom that it is too early to not support EPS NAS		-	-			6/1/2018 14:21
15.1.0	Rel-15	NB_IOTenh2-Core		R3-183508	company CR; resubmission of R3-183508 which was not agreed in RAN3; note: LS R3-182509 was sent to SA2 and feedback to RAN #80 is expected;			-	-			6/1/2018 14:22

..	Rel-15	NR_newRAT			moved from AI 9.3.1 to AI 9.8	Proposal 1: Sufficient time need to be made available in RAN2 for discussions on Rel-16 UE Capability ID and coordination with SA2. RAN chairman: having an SA WI with a RAN component would be the right approach Deutsche Telekom: who will take the lead? RAN2 or SA2 Mediatek: SA2 will have a SI until Sep. and RAN2 could take the lead Deutsche Telekom: having the discussion in the joint RAN-SA session on Wed would be our preference RAN chairman: would require a clear input from our side conclusion: further offline discussion (rapporteur: Mediatek)		-	-			6/1/2018 14:25
1.0.0	Rel-15	NR_newRAT-Core			RAN3 TS 38.455 is provided for 1-step approval			-	-			6/1/2018 14:28
..	Rel-15	NR_CPUP_Split-Core				conclusion: approved: Core: 100%, June 18; Core part is completed (there is no related Perf. part)		-	-			6/1/2018 14:28
..	Rel-15	NR_CPUP_Split-Core						-	-			6/1/2018 14:28

15.1.0	Rel-15	NB_IOTenh2-Core			company CR; resubmission of 36.300 draftCR R3-182624 of RAN3 #100 which was not endorsed by RAN3	Huawei: there was an LS send from RAN3 to SA2 but SA2 did not reply; concern that the container may contain proprietary information Nokia: CR is suggesting a proprietary container which is critical for the openness of the interface Deutsche Telekom: has the same view as Nokia Vodafone: we have vendor specific containers over X2 so does not see the technical problem; RAN2 agreed this and asked RAN3 Huawei: we could add this topic in the exception and give some time to discuss this in RAN3 Deutsche Telekom: insists to have a RAN decision Nokia: this container is a blank cheque for MME-NodeB interface to send whatever Mediatek: RAN2 discussions on this were diffcult and did not really converge NEC: we were also concerned, intending all RAN3 meetings in the past, we have never seen a container with undefined contents Vodafone: but over X2 we have vendor specific containers RAN chair: but this is one reason why X2 does not work properly in inter-vendor cases RAN chair: it is clear that we will not reach		-	-			6/1/2018 14:28
..	-	-			moved from AI 9.3.1 to AI 5.5	Mediatek: topic was addressed by the RAN5 chairman's presentation		-	-			6/1/2018 14:28
..	Rel-15	-						-	-			6/1/2018 14:30
..	Rel-16	-						-	-			6/1/2018 14:33
1.0.0	Rel-15	NR_CPUP_Split-Core			RAN3 TS 38.463 is provided for 1-step approval			-	-			6/1/2018 14:34
..	Rel-16	-						-	-			6/1/2018 14:35
..	Rel-16	-			Attempt to summarise all future work-related email discussions on the RAN_DRAFTS reflector since last plenary, taking into account the moderators' outputs, and including identification, both of points where there seems to be largely agreement, and points where there still seems to be contention.			-	-			6/1/2018 14:36

..	Rel-16	-	RP-181284					-	-			6/1/2018 14:37
..	Rel-16	-	RP-181344		RAN2 lead WID proposal for Rel-16			-	-			6/1/2018 14:37
..	Rel-16	-						-	-			6/1/2018 14:37
..	Rel-15	NR_newRAT			moved from AI 9.3.1.2 to AI 9.3.1			-	-			6/1/2018 14:37
..	Rel-14	LTE_UL_CAP_enh-Core						-	-			6/1/2018 14:38
..	Rel-13	LTE_CA_enh_b5C-Core						-	-			6/1/2018 14:38
..	Rel-14	LTE_eFDMIMO-Core						-	-			6/1/2018 14:38
..	Rel-13	LTE_MTCe2_L1-Core						-	-			6/1/2018 14:38
..	Rel-14	LTE_feMTC-Core						-	-			6/1/2018 14:38
..	Rel-15	NB_IOTenh2-Core						-	-			6/1/2018 14:38
..	Rel-13	LTE_EBF_FDMIMO-Core						-	-			6/1/2018 14:38
..	Rel-15	feCOMP_LTE-Core						-	-			6/1/2018 14:38
..	Rel-14	LTE_VoLTE_ViLTE_enh-Core						-	-			6/1/2018 14:38
..	Rel-15	LTE_sTTIandPT-Core						-	-			6/1/2018 14:38
..	Rel-14	NB_IOT-Core, TEI14			moved from AI 14.1.7 to AI 14.1.8			-	-			6/1/2018 14:38
..	Rel-15	NR_newRAT-Core						-	-			6/1/2018 14:38
..	Rel-15	LTE_1024QAM_DL-Core						-	-			6/1/2018 14:38
..	Rel-15	LTE_eMTC4-Core						-	-			6/1/2018 14:38
..	Rel-15	LTE_euCA-Core						-	-			6/1/2018 14:38
..	Rel-15	LTE_eV2X-Core						-	-			6/1/2018 14:38
..	Rel-15	LTE_HRLLC-Core						-	-			6/1/2018 14:38
..	Rel-14	LTE_MTCe2_L1-Core, TEI14						-	-			6/1/2018 14:38

..	Rel-14	LTE_SRS_switch-Core						-	-			6/1/2018 14:38
..	Rel-15	LTE_unlic-Core						-	-			6/1/2018 14:38
..	Rel-14	NB_IOTenh-Core						-	-			6/1/2018 14:38
..	Rel-15	TEI15						-	-			6/1/2018 14:38
..	Rel-15	NR_newRAT			Based on RAN4 discussion about vehicular NR UEs having relaxation in terms of number of Rx antennas supported.			-	-			6/1/2018 14:47
..	Rel-16	-			Motivation for new WI on URLLC			-	-			6/1/2018 14:51
..	Rel-16	-			WID for eURLLC for LTE			-	-			6/1/2018 14:52
..	-	-						-	-			6/1/2018 14:53
..	-	-						-	-			6/1/2018 14:53
..	Rel-15	NR_newRAT			moved from AI 9.3.1 to AI 9.8			-	-			6/1/2018 14:54
..	-	-						-	-			6/1/2018 14:55
..	Rel-16	-						-	-			6/1/2018 14:56
..	Rel-16	-						-	-			6/1/2018 14:57
..	-	LTE_eMTC4				Note: R2-1809256 and R2-1809257 are the endorsed 36.331 CRs (see RP-181271) and together with some RAN4 open issues the missing 3% for the Core part; MCC: target date change conclusion: approved: Core: 97%, Sep.18; Perf.: 50%, Dec.18		-	-			6/1/2018 14:59
..	-	LTE_eMTC4						-	-			6/1/2018 15:01
..	Rel-12	LTE_UTRA_IncMon-UEConTest				MCC: target date change conclusion: approved: 35%, Sep.18		-	-			6/1/2018 15:02

..	Rel-13	LTE_CA_Rel13-UEConTest			includes all Rel-13 CA configurations associated with the RAN4 Rel-13 CA WIs. The completion per CA configuration is provided by the attached RAN5 work plan attached to the SR (75 CA configurations completed). Completion decreased due to 12 additionla CA configurations have been added to the work plan.	MCC: target date change conclusion: approved: 62%, Dec.18		-	-			6/1/2018 15:02
..	Rel-13	LTE_EBF_FD MIMO-UEConTest				MCC: target date change conclusion: approved: 10%, Dec.18		-	-			6/1/2018 15:02
..	Rel-14	LTE_CA_R14-UEConTest			includes all Rel-14 CA associated with the RAN4 Rel-14 bucket CA WIs . The completion per CA configuration is provided by the attached RAN5 work plan attached to the SR (69 Rel-14 CA configurations completed).	conclusion: approved: 20%, Dec.18		-	-			6/1/2018 15:02
..	Rel-14	LTE_4Rx_AP_DL_CA-UEConTest				MCC: target date change (+3 months) conclusion: approved: 90%, Sep.18		-	-			6/1/2018 15:02
..	Rel-14	LTE_feMTC-UEConTest				MCC: target date change (+3 months) conclusion: approved: 26%, Sep.18		-	-			6/1/2018 15:02
..	Rel-14	LTE_UL_CAP_enh-UEConTest				conclusion: approved: 35%, Dec.18		-	-			6/1/2018 15:02
..	Rel-15	LTE_CA_R15-UEConTest			includes all Rel-15 CA associated with the RAN4 Rel-15 bucket CA WIs . The completion per CA configuration is provided by the attached RAN5 work plan attached to the SR (13 Rel-15 CA configurations completed).	conclusion: approved: 9%, June 19		-	-			6/1/2018 15:02

..	Rel-15	LTE_CA_R15-UEConTest			last approved WID: RP-180420			-	-			6/1/2018 15:02
..	Rel-15	LTE_bands_R15_M1_NB1-UEConTest				conclusion: approved: 100%, June 18; WI is completed		-	-			6/1/2018 15:02
..	Rel-15	LTE_bands_R15_M2_NB2-UEConTest				MCC: target date change (+6 months) conclusion: approved: 20%, Dec.18		-	-			6/1/2018 15:02
..	Rel-15	5GS_NR_LTE-UEConTest				conclusion: approved: 15%, Dec.18		-	-			6/1/2018 15:02
..	Rel-15	5GS_NR_LTE-UEConTest			last approved WID: RP-180418; aligning titles of the new TS s and TRs introduced by the WI ; note: Spme of those specs (TS 38.508-1, TS 38.508-2, TS 38.509, TS 38.523-1, TS 38.523-2 and TS 38.523-3) are also submitted for 1-step approval to RAN #80 with these new titles.	RAN5 chairman: spec titles aligned		-	-			6/1/2018 15:02
1.0.0	Rel-15	5GS_NR_LTE-UEConTest			RAN5 TS 38.508-1 is provided for 1-step approval			-	-			6/1/2018 15:02
1.0.0	Rel-15	5GS_NR_LTE-UEConTest			RAN5 TS 38.508-2 is provided for 1-step approval			-	-			6/1/2018 15:02
1.0.0	Rel-15	5GS_NR_LTE-UEConTest			RAN5 TS 38.509 is provided for 1-step approval			-	-			6/1/2018 15:02
1.0.0	Rel-15	5GS_NR_LTE-UEConTest			RAN5 TS 38.523-1 is provided for 1-step approval			-	-			6/1/2018 15:02
1.0.0	Rel-15	5GS_NR_LTE-UEConTest			RAN5 TS 38.523-2 is provided for 1-step approval			-	-			6/1/2018 15:02
1.0.0	Rel-15	5GS_NR_LTE-UEConTest			RAN5 TS 38.523-3 is provided for 1-step approval			-	-			6/1/2018 15:02
..	Rel-15	LTE_eMTC4						-	-			6/1/2018 15:02
..	Rel-15	NR_newRAT-Core			moved from AI 9.3.1 to AI 9.3.1.1	Note: It turned out that R2-1809230 of RP-181223 should have been rather packed into this CRpack.		-	-			6/1/2018 15:05
..	Rel-15	NR_newRAT-Core			moved from AI 9.3.1 to AI 9.3.1.1			-	-			6/1/2018 15:05

..	Rel-15	NR_newRAT-Core			moved from AI 9.3.1 to AI 9.3.1.1	non backwards compatible ASN.1 change(s) for NSA NR in R2-1809047		-	-			6/1/2018 15:05
..	Rel-15	NR_newRAT-Core			moved from AI 9.3.1 to AI 9.3.1.1	non backwards compatible ASN.1 change(s) for NSA NR in R2-1809300 MCC: company CR in RP-181326 for a smaller ASN.1 addition to R2-1809300 which could not be handled separately conclusion: all CRs of RP-181217 are approved except R2-1809300 which is revised in RP-181326		-	-			6/1/2018 15:05
..	Rel-15	LTE_sTTIandPT						-	-			6/1/2018 15:05
..	Rel-15	LCS_LTE_acc_enh						-	-			6/1/2018 15:05
..	Rel-15	LTE_1024QAM_DL						-	-			6/1/2018 15:05
..	Rel-15	LTE_ViLTE_enh2-Core						-	-			6/1/2018 15:05
..	Rel-15	LTE_QMC_Streaming-Core						-	-			6/1/2018 15:05
..	Rel-15	LTE_5GCN_connect				note: It turned out after RAN #80 that the 36.306 CR R2-1809230 is packed here in the wrong CRpack as it belongs to WI NR_newRAT.		-	-			6/1/2018 15:05
..	Rel-15	LTE_eMTC4			R2-1808859 in RP-181224 is linked to C1-182744 in CP-181076			-	-			6/1/2018 15:05
..	Rel-15	LTE_NW_CRS_IM				MCC: Neither acc. to the last approved WID RP-18171408 (only RAN4 impacted), neither acc. to the revised WID RP-180771 are the specs 36.304 and 36.306 impacted, so what is this CRpack for? RAN chair: impacted specs are added in RP-181315		-	-			6/1/2018 15:05
..	Rel-15	LTE_UDC-Core						-	-			6/1/2018 15:05
..	Rel-15	LTE_MDT_BT_WLAN-Core						-	-			6/1/2018 15:05
..	Rel-15	TEI15						-	-			6/1/2018 15:05
..	Rel-15	LTE_CA_C_B41_PC2-Core						-	-			6/1/2018 15:05

..	Rel-11	LTE_CA_enh-Core, TEI11, eICIC_enh_LTE-Core, SPIA_IDC_LTE-Core						-	-			6/1/2018 15:05
..	Rel-12	LTE_CA_TDD_FDD-Core, TEI12						-	-			6/1/2018 15:05
..	Rel-13	LTE_CA_enh_b5C-Core, LTE_eFDMIMO-Core, LTE_MTCe2_L1-Core, NB_IOT-Core, TEI13						-	-			6/1/2018 15:05
..	Rel-14	LTE_eMob-Core, LTE_feMTC-Core, LTE_LATRED_L2-Core, LTE_SRS_switch-Core, LTE-L23, LTE_eMob, MBMS_LTE_enh2-Core						-	-			6/1/2018 15:05
..	Rel-14	LTE_V2X-Core						-	-			6/1/2018 15:05
..	Rel-14	NB_IOTenh-Core				MCC: 5 CRs of this CRpack are already submitted in RP-181171 and have to be withdrawn conclusion: RP-181235 is partially approved, i.e. all CRs of this CRpack are approved apart from the following 5 CRs R2-1807090, R2-1807092, R2-1808841, R2-1808842, R2-1808843 which are withdrawn because they were submitted in the RAN1/RAN2 linked CRpack RP-181171			-	-			6/1/2018 15:05

..	Rel-14	TEI14				MCC: 1 CR of this CRpack ia already submitted in RP-181171 and has to be withdrawn conclusion: RP-181236 is partially approved, i.e. all CRs of this CRpack are approved apart from the following CR R2-1807089 which is withdrawn because it was submitted in the RAN1/RAN2 linked CRpack RP-181171		-	-			6/1/2018 15:05
..	Rel-15	NR_newRAT-Core						-	-			6/1/2018 19:42
..	Rel-15	NR_newRAT-Core, TEI15				MCC: company CR in RP-181410 to replace R3-182480 (note: R3-182480 of the RAN3 bis meeting was superseded by R3-183364 but as this was using type "other" this was not spotted in time; conclusion: all CRs of CRpack RP-181238 are approved except R3-182480 which was revised in RP-181410		-	-			6/1/2018 19:42
..	Rel-15	NR_newRAT-Core, TEI15						-	-			6/1/2018 19:42
..	Rel-15	NR_CPUP_Split-Core						-	-			6/1/2018 19:42
..	Rel-15	TEI15, EQoE_MTSI, USOS						-	-			6/1/2018 19:42
..	Rel-15	NB_IOTenh2-Core, LTE_eMTC4-Core						-	-			6/1/2018 19:42
..	Rel-15	LTE_Aerial-Core			linked CT CR in C4-184461 in CP-181122			-	-			6/1/2018 19:42
..	Rel-13	TEI13						-	-			6/1/2018 19:42
..	Rel-14	TEI14						-	-			6/1/2018 19:42
..	Rel-15	NR_newRAT-Core			moved from AI 9.3.1 to AI 9.3.1.1	MCC: CRs are only provided for information; see RP-181270 under AI 5.2		-	-			6/1/2018 23:31
..	Rel-15	LTE_HRLLC-Core						-	-			6/1/2018 23:31
..	Rel-15	LTE_eV2X-Core						-	-			6/1/2018 23:31
..	Rel-15	LTE_unlic-Core						-	-			6/1/2018 23:31
..	Rel-15	LTE_euCA-Core						-	-			6/1/2018 23:31

..	Rel-15	LTE_5GCN_connect-Core				MCC: CRs are only provided for information		-	-			6/1/2018 23:31
..	Rel-15	NB_IOTenh2-Core						-	-			6/1/2018 23:31
..	Rel-15	LTE_Aerial-Core						-	-			6/1/2018 23:31
..	Rel-15	INOBEARRAN-Core						-	-			6/1/2018 23:31
..	Rel-10	TEI10						-	-			6/1/2018 23:31
2.0.1	Rel-15	NR_newRAT-Core	RP-181266		RAN2 TS 37.324 is provided for approval	conclusion: revision needed as 2 Tdocs with RP-181256 exist		-	-			6/3/2018 14:14
..	Rel-15	NR_newRAT-Core						-	-	-	-	6/3/2018 15:01
..	Rel-15	LTE_NR_arch_evo-Core				MCC: exception sheets are normally only granting 3 months, this exception request is going until Dec.18		-	-			6/4/2018 2:19
..	Rel-15	LTE_HRLLC			last approved WID: RP-172845			-	-			6/4/2018 14:16
..	Rel-15	NR_newRAT-Core						-	-			6/4/2018 20:26
15.1.0	Rel-15	NR_newRAT-Core			company CR; CR is adding a table element that was missed in RAN4 agreed CR R4-1808532 included in RP-181262			-	-			6/5/2018 0:01
..	Rel-15	NR_newRAT-Core				all CRs of RP-181262 are approved except R4-1808532 which is revised in RP-181374		-	-			6/5/2018 10:31
..	Rel-16	-	RP-181333	RP-181133				-	-	-	-	6/5/2018 11:11
1.0.0	Rel-15	LTE_unlic-Core			RAN1 TS 37.213 is provided for 1-step approval	late Tdoc request		-	-			6/6/2018 14:14
..	-	-						-	-			6/6/2018 16:07
2.0.2	Rel-15	NR_newRAT-Core		RP-181256	RAN2 TS 37.324 is provided for approval			-	-	-	-	6/6/2018 16:14
..	Rel-15	FS_NR_IAB		RP-181027		Huawei: TU budgeting for this WI shouldl be done in conjunction with the approval of the Rel-16 new work/study items and any potential decision on the late Rel-15 drop MCC: target date change conclusion: approved: 50%, Dec.18; SI is shifted to REL-16		-	-	-	-	6/6/2018 23:46
..	Rel-16	-		RP-180872				-	-	-	-	6/6/2018 23:50

..	Rel-15	TEI15		RP-180898		Proposal: Introduce new Rel-15 UL categories for LTE with data rates 0.4-0.8 Gbps corresponding to aggregated 4-8 MIMO layers across all CCs and 256QAM support - Inform RAN2 regarding RAN plenary decision and task RAN2 to update the relevant specification(s) Mediatek: deployments? RAN chairman: some operators supported this RAN chairman: do we need an LS to inform RAN2? RAN2 chairman: no LS needed conclusion: proposal is endorsed		-	-	-	-	6/7/2018 0:28
..	Rel-15	NR_newRAT-Core						-	-			6/7/2018 0:38
..	Rel-15	LTE_sTTIandPT-Core, LTE_ViLTE_enh2-Core, LTE_QMC_Streaming-Core, LTE_5GCN_connect-Core, LCS_LTE_acc_enh-Core, LTE_euCA-Core, LTE_eV2X-Core, LTE_1024QAM_DL-Core, LTE_unlic-Core, LTE_eMTC4-Core, NB_IOTenh2-Core, LTE_eMTC4-Core,				R2-1806965 RAN2 CRs for all specifications apart from 36.331 are provided to RAN#80 for approval. The following RAN2 CRs to 36.331 are complete and have been endorsed but not provided to RAN for approval: R2-1807410, R2-1807712, R2-1808246, R2-1808313, R2-1808795, R2-1808802, R2-1808889, R2-1808917, R2-1808930, R2-1808946, R2-1809181, R2-1809184, R2-1809202, R2-1809211, R2-1809214, R2-1809223, R2-1809233, R2-1809256, R2-1809257, R2-1809260, R2-1809266, R2-1809270, R2-1809276 Reason: The ASN.1 from the LTE WIs and NR SA will only be 'frozen quality' after the ASN.1 review (i.e. in September 2018).		-	-			6/7/2018 0:41
15.1.0	Rel-15	NR_newRAT-Core			RAN3 email discussion on this CR started on Thu before RAN #80	MCC: late submission (after Sat noon CEST before RAN)		-	-			6/7/2018 11:17
..	Rel-16	-	RP-181359	RP-180975		Nokia: is a 9 months SI proposal Intel: NOMA would be a better place to study 2-step RACH Ericsson: scope should be reduced		-	-	-	-	6/7/2018 14:15

..	Rel-15	NR_newRAT-Core		RP-180905	moved from AI 9.3.1 to AI 9.2	Huawei: spec impacts for sync and async need to be understood Nokia: difference is small, we would like to cover sync and async at the same time (avoiding differences later) NTT DOCOMO: impact on RAN1 is not clear Samsung: on RAN1 we see no real impacts (i.e. could be done under maintenance) Qualcomm: also hardware impact on REL-15 needs to be considered Deutsche Telekom: when do we stop adding things on REL-15? RAN1 chairman: power mode 2 is very complex (~20 pages in 38.213 spec) so would like to avoid the effort RAN chair: so sync case in REL-15 or sync & async in REL-16 together is the question again RAN chair: support for adding NR-NR DC in REL-15 seems to be not as huge as for the option 4/7 we added last time Samsung: would not agree to this		-	-	-	-	6/7/2018 14:40
..	Rel-15	INOBEARRAN-Core		RP-180908		MCC: late submission, target date change Note: R2-1809260 is the endorsed 36.331 CR (see RP-181271) which is the missing 1% for the Core part; conclusion: approved: Core part: 99%, Sep.18		-	-	-	-	6/7/2018 14:40
1.0.1	Rel-15	NR_newRAT-Core		RP-180682	RAN3 TS 38.422 is provided for 1-step approval			-	-	-	-	6/7/2018 15:36
..	Rel-15	LTE_Aerial-Core						-	-			6/7/2018 16:56
..	Rel-15	NR_newRAT		RP-180989		conclusion: approved: Core: 92%, Dec.18; Perf.: 20%, June 19 (WI will be kept in REL-15 for the "late drop")		-	-	-	-	6/7/2018 18:06
..	Rel-15	LTE_euCA-Core		RP-181067		Note: R2-1809270 is the endorsed 36.331 CR (see RP-181271) and together with some RAN4 open issues the missing 10% for the Core part; MCC: late submission conclusion: approved: Core: 90%, Sep.18; Perf.: 20%, Dec.18		-	-	-	-	6/8/2018 11:44
..	Rel-16	-		RP-180757				-	-	-	-	6/8/2018 12:35

..	Rel-16	-	RP-181365	RP-180764				-	-	-	-	6/8/2018 12:35
..	Rel-15	NR_newRAT-Core		RP-180779				-	-	-	-	6/8/2018 12:42
..	Rel-16	-		RP-180747		Proposal 1Proceed in the following way for IoT in NR in Rel-16 •move forward with the industrial IoT topics within the URLLC related work item(s) •UE categories can be discussed as normal in RAN and working groups without the need for a study/work item •Discuss during RAN#80 what to study regarding NR coexistence with NB-IoT and LTE-MTC in Rel-16 Proposal 2: Agree on the scope of Rel-16 LTE IoT based on the draft work items in RP-180748 (LTE-MTC) and RP-180749 (NB-IoT) Proposal 3: Define a Rel-16 study item on relaying for LTE-MTC and NB-IoT T-Mobile: proposal 1: study will be included in another work? There was quite some interest in this in the email discussion; Ericsson: yes. forgot to update the conclusion proposals (correct proposals are in sections 2 and 3); may be handled in RAN4 related SI from Huawei		-	-	-	-	6/8/2018 12:51
..	Rel-16	-		RP-181157				-	-	-	-	6/8/2018 14:26
..	Rel-15	LTE_NR_arch_evo		RP-181050		MCC: late submission conclusion: approved: Core: 15%, Dec.19; SI is shifted into REL-16		-	-	-	-	6/8/2018 14:37
0.1.0	Rel-15	-						-	-			6/8/2018 15:53
..	Rel-15	LTE_sTTIandPT		RP-181023		MCC: late submission; target date change Note: R2-1809214 is the endorsed 36.331 CR (see RP-181271) which is the missing 1% for the Core part; conclusion: approved: Core: 99%, Sep.18; Perf.: 60%, Sep.18		-	-	-	-	6/9/2018 20:54
..	Rel-15	LCS_LTE_acc_enh-Core		RP-180944		MCC: target date change conclusion: approved: Core: 99%, Sep.18; Perf.: 100%, June 18; Perf. part is completed		-	-	-	-	6/9/2018 21:39
..	Rel-16	-		RP-181060				-	-	-	-	6/10/2018 3:49

..	Rel-16	-		RP-181057				-	-	-	-	6/10/2018 3:52
..	Rel-15	NB_IOTenh2-Core, LTE_eMTC4-Core				MCC: late submission (after Sat noon CEST before RAN); company CR in RP-181313 to replace R3-183576 of RP-181291		-	-			6/10/2018 12:51
..	Rel-15	LCS_LTE_acc_enh-Core	RP-181341			MCC: late submission (after Sat noon CEST before RAN), error on cover of CRpack: CR is for 36.455 and not 38.455		-	-			6/10/2018 12:52
..	Rel-15	FS_NR_nonterr_nw		RP-180659	SI is led by RAN, status after RAN #80	conclusion: approved: 100%, June 18, SI is completed		-	-	-	-	6/10/2018 14:11
..	Rel-16	-		RP-180876		proposal 1: discuss the approval of some or all of the objectives above, as captured in the corresponding WID RP-181295 proposal 2: discuss the support of SDL+SUL in Rel-15 at RAN#80, and task WGs to complete the basic support for SDL+SUL in Rel-15 including the UE behavior to prevent UE initiated PRACH transmissions on the SDL carrier, in order to allow the release-independent definition of corresponding band combinations for Rel-15 and later UEs. Huawei: something missing in terms of UE behaviour Orange: agrees that signalling is in place and a clarification should be added to the RAN2 specs Deutsche Telekom: we should not allow the combination of an SUL and an SDL band to an FDD case, this may even have legal implications		-	-	-	-	6/10/2018 16:26
..	Rel-16	-		RP-180885				-	-	-	-	6/10/2018 16:27
..	Rel-15	LTE_Aerial-Core		RP-181043		MCC: late submission, target date change Note: R2-1809202 is the endorsed 36.331 CR (see RP-181271) which is the missing 1% for the Core part; conclusion: approved: Core: 99%, Sep.18		-	-	-	-	6/10/2018 23:45
..	Rel-15	AASenh_BS_LTE_UTRA			last approved WID: RP-171745; correction of affected specs and target dates			-	-			6/11/2018 14:43
..	Rel-15	LCS_LTE_acc_enh			last approved WID: RP-172313			-	-			6/11/2018 15:34
..	Rel-15	NR_newRAT		RP-181047				-	-	-	-	6/11/2018 15:40
..	-	-		RP-180601				-	-	-	-	6/11/2018 18:20
..	Rel-16	-		RP-180663		Ericsson: channel raster: what are the concerns? Thales: We do not yet know and need to study		-	-	-	-	6/11/2018 18:21
..	Rel-16	-						-	-			6/11/2018 18:47

..	Rel-16	-						-	-			6/11/2018 19:13
..	Rel-15	NR_newRAT		RP-180679		Qualcomm: still looking for some RAN guidance whether topic should be taken up in RAN1 or RAN4 Nokia: Mediatek propoposal on RAN_DRAFTS reflector to continue in WGs, there was a RAN4 LS to RAN1 T-Mobile: no decision needed at RAN, WGs can continue Qualcomm: if it is clear that RAN1 will work on this, it is fine for us Mediatek: RAN1 has an email discussion how to reply to RAN4 LS, so no need to take a decision in RAN Sprint: supports to continue discussion in WGs Qualcomm: is expecting that we will come back to this in 3 months conclusion: RAN1 will send a reply to the RAN4 LS		-	-	-	-	6/11/2018 20:12
0.1.0	Rel-15	FS_5G_eval	RP-181317			MCC: abbreviations should be explained in the TR conclusion: 2 tables need to be revised		-	-			6/11/2018 20:39
..	Rel-15	FS_5G_eval				proposal: The self evaluation of LTE targets at least Urban Macro – mMTC and Rural – eMBB test environment towards 3GPP Updated Submission in September 2018. Best effort for further results. Huawei: Tdoc is also supported by ZTE ITU-R ad hoc convener: self evaluation in June/July 2019 will still cover all cases? Huawei: correct ITU-R ad hoc convener: requests that companies also contribute to LTE evaluation and not just to NR evaluation conclusion: proposal is endorsed		-	-			6/11/2018 20:40

..	Rel-16	-	RP-181327	RP-180649	update including results of offline discussion of Mon evening	Thales: would like to add the option that a WI can start at RAN #82 already RAN2 chair: there is one error on the RAN2 slide: SON is missing but was taken into account in TUs RAN3 chair: a lot of topics which impact RAN3 have no RAN3 TU numbers, so they will not be taken into account if there are no numbers; interested people should join in an offline discussion (in Tue afternoon coffee break) to fix it Ericsson: network synchronisation is to be discussed as well Huawei: let's treat this also in the RAN3 offline discussion		-	-	-	-	6/11/2018 21:13
..	Rel-16	-			related to RP-181303			-	-			6/11/2018 21:31
0.1.0	Rel-15	FS_5G_eval		RP-180936		see RP-181305 instead		-	-	-	-	6/11/2018 21:56
..	Rel-15	LTE_Aerial			last approved WID: RP-172826	Ericsson: it turned out that there is no impact to 36.302, 36.304, and 36.321, hence they are removed from the WID, RAN #81 will have CRs for 36.331 and, to add corresponding capability-bits, for 36.306		-	-			6/11/2018 22:05
..	Rel-15	LTE_CA_R15_xDL3UL			last approved WID: RP-180573	Note: This revised WID introduced a new Perf. part at RAN #80. With CRpack RP-181095 this Perf. part is completed at RAN #80.		-	-			6/11/2018 22:24
..	-	-	RP-181324					-	-			6/11/2018 23:23
14.4.0	Rel-15	NB_IOTenh2-Core			company CR; trying to replace the CR R3-183576 in CRpack RP-181291	note: R3-183576 in RP-181291 was actually already rev 2 and not rev 1 as shown in R3-183576 and the cover of RP-181291.		-	-			6/11/2018 23:34
..	Rel-15	LTE_NW_CRS_IM, LTE_NW_CRS_IM-Core		RP-180769		MCC: late submission conclusion: approved: Core: 85%, Sep.18; Perf.: 0%, Dec.18		-	-	-	-	6/12/2018 0:07
..	Rel-15	LTE_NW_CRS_IM		RP-180771	last approved WID: RP-171408	note: 36.304, 36.306, 36.331 added as affected specs to the WID		-	-	-	-	6/12/2018 0:08
..	-	-			LS was only received on Thu of RAN #80 (as the LS was not provided to 3GPPLiaison@etsi.org but just to the RAN chairman)		CEPT_ECC_PT1_LS_180420	-	-		RP-181422	6/12/2018 17:10
0.1.0	Rel-15	FS_5G_eval		RP-181305				-	-	-	-	6/12/2018 17:31

..	Rel-15	FS_5G_eval		RP-180932	last approved SID: RP-171451			-	-	-	-	6/12/2018 17:44
..	Rel-15	FS_5G_eval		RP-180930		Telecom Italia: some TUs were also reserved also in WG concliusion: approved: 35%, June 19; SI is shifted to REL-16		-	-	-	-	6/12/2018 17:50
0.2.0	Rel-15	FS_5G_eval						-	-			6/12/2018 17:54
..	-	-		RP-181131		Deutsche Telekom: NB-IOT networks are rolling out, some doubts whether the claim here is really applicable Vodafone: too early to say that there a problems, one point of NB-IOT was cost efficiency, adding relays will impact this; what we did in the past on relays was not successful; Ericsson: smart meters in basement was the target before, a container talking to a satellite in maybe no longer the considered NB-IOT use case we had in mind AT&T: maybe solutions exist already, UE-UE relay would also involve security aspects BT: we are interested in studying the topic Orange: we know that there will be coverage issues so we need to do something; we could focus on UE relay instead of network relay that will hit the market in 2021 Vodafone: thinks this would mean a new LPWA solution which is against an agreement of the last RAN meeting Deutsche Telekom: we should understand the problem before discussing the solution Sequans: current solutions are developped outside of 3GPP Blackberry: supports Sequans we should take		-	-	-	-	6/12/2018 18:00
..	Rel-16	-	RP-181342	RP-180672	compare RP-180668	Telecom Italia: SID sounds like a blank cheque RNA chairman: this is a SI not a WI, please pay attention what you request next time		-	-	-	-	6/12/2018 18:35
..	Rel-16	-				Ericsson: 2nd opjective is too wide for the planned time interval Qualcomm: no new UE RF requirements are planned, this should be clarified Huawei: first 2 bullets for same operator, same carrier? LG: yes Nokia: it is too early that there will be no RF requirements AT&T: wants to consider also IOB		-	-			6/12/2018 18:38
..	-	-	RP-181397	RP-181312				-	-	-	-	6/12/2018 18:40
..	Rel-16	-	RP-181402	RP-181026				-	-	-	-	6/12/2018 19:02

15.1.0	Rel-15	NR_newRAT-Core			company CR; adding an ASN.1 change on top of R2-1809300 of RP-181217	Ericsson: will come on Thu of RAN #80 On Thu: Was reviewed on RAN2 reflector		-	-			6/12/2018 19:13
..	Rel-16	-		RP-181307		RAN chairman: will reflect the outcome in the chairman's summary after the meeting		-	-	-	-	6/12/2018 19:22
..	Rel-16	-		RP-180938				-	-	-	-	6/12/2018 19:22
..	Rel-16	-	RP-181351	RP-180939				-	-	-	-	6/12/2018 19:23
..	Rel-16	-	RP-181446	RP-180880				-	-	-	-	6/12/2018 19:24
15.1.0	Rel-15	NR_newRAT-Core		RP-181059		Intel: suggests further discussion in RAN4 Nokia: for MPR we have a lot of tbds so we need to take a decision in RAN Intel: this is a new way of defining MRP which we did not have before and which we did not see before; -2.8 is a huge difference and we cannot agree this here Nokia: tbd or 0 were the only values were so far agreed in RAN4 Intel: one thing is the value and the other thing this is the methodology Huawei: can UE go above max. 23? IIT: no Huawei: this is not the way we interpret this RAN chair: we have this on the table now for a couple of months but it seems this is not yet fully done in RAN4; can we endorse the principle and tasking RAN4 to solve the details? Qualcomm: it is good to let RAN4 look at the values Nokia: so far only tbd or zero gain was considered, so RAN should endorse the value and let RAN4 check the correctness of the CR Qualcomm: in FR1 and FR2 the limiting factors for MPRs are different so we cannot simply agree on 3dB		-	-	-	-	6/12/2018 19:24

..	Rel-16	-	RP-181418		compare RP-180620 (LS from SA2) and RP-181146 and RP-181307 (which includes the request to draft this SI); new SI for NR; leading WG: ?; WI code to be used: FS_RACS_RAN; note: There is a related SA2 REL-16 SI SP-180504 (FS_RACS) in SA #80 for approval			-	-			6/12/2018 19:29
..	Rel-16	-	RP-181371	RP-181263				-	-	-	-	6/12/2018 20:04
..	Rel-16	-	RP-181370	RP-180662		Ericsson: channel raster should be removed RAN chair: untick Core/Perf., new TR 38.8XX missing, target date missing Thales: target date is end of REL-16 RAN chairman: so Dec.19 Ericsson: what are the start dates in the WGs? RAN chair: RAN1: March 19, RAN3: now, RAN2: Q4/2018		-	-	-	-	6/12/2018 20:10
..	Rel-16	-	RP-181450	RP-180748				-	-	-	-	6/12/2018 21:03
..	Rel-16	-	RP-181451	RP-180749				-	-	-	-	6/12/2018 21:18
..	Rel-16	-	RP-181475	RP-180762				-	-	-	-	6/12/2018 21:46
..	Rel-16	-			result of action from RP-181307 page 12 on Spectrum aggregation enhancements			-	-			6/12/2018 21:49
..	Rel-15	FS_NR_unlic			last approved SID: RP-172021			-	-			6/12/2018 21:57
..	-	-	RP-181464	RP-180607		Tdoc number was misused by another company, so duplicated RP-181340 exist		-	-	-	-	6/12/2018 22:20
..	Rel-15	LCS_LTE_acc_enh-Core		RP-181292		MCC: late submission		-	-	-	-	6/12/2018 22:21
..	Rel-16	-		RP-181322		conclusion: approved unseen (rapporteur can still add furtehr supporting companies, if any)		-	-	-	-	6/12/2018 23:44
..	Rel-15	NR_newRAT	RP-181421		related Tdoc in RP-181139	RAN chairman: contact should be CT chairman		IETF, IANA	SA, CT, RAN3, CT1			6/12/2018 23:52

..	Rel-16	-	RP-181372	RP-181158		RAN chair: is a merge of MR-DC and NR-NR DC in one WI Samsung: NR-NR DC sync will complete when? Noikia: intention to do physical changes in the late drop of REL-15? Samsung: no, there is no intention to have L1 changes in the late drop RAN chair: it seems the situation has not changed compared to Monday, NR-NR DC in sync/async should be done in REL-16 Verizon, KT: would like to have NR-NR DC in REL-15 RAN chair: is it worth to endanger the late drop for this? Vodafone: agrees that this would be problematic Huawei: there is no consensus to include also CA enhancements in the objectives AT&T: the title of the WI is on MR DC only, it should be more generic Ericsson: triple connection is not intended Qualcomm: there is no definition of MR DC which should be considered; also RAN1 needs to be included Huawei: we need to clarify whether there is impact on RAN3, work only on Xn or architecture impact, assumes no architecture		-	-	-	-	6/13/2018 0:02
..	Rel-16	-	RP-181396	RP-181000		Nokia: we cannot give tasks to SA3 in a RAN WI LG: should say SA5 but we can remove this Qualcomm: UE to UE more important than remote BS RAN chairman: 3 months SI for RIM (remote interference management) and in 3 months we will do a WI for RIM and cross link interference, this was the plan Qualcomm: plan to approve the WI now already? RAN chairman: yes Qualcomm: but then we should see the WI already Huawei: supports Qualcomm		-	-	-	-	6/13/2018 0:03

..	Rel-16	-	RP-181429	RP-181064		Nokia: amount of the work is larged in this SID compared to the TUs Deutsche Telekom: we could not agree to remove LTE Uu AT&T: we should give it a try to look at FR2 as well Ericsson: in RAN1/RAN2 it is still frequency agnostic (for RAN4 is matters), as this SI is mainly RAN1/RAN2 we could put the limit to 52GHz Samsung: we think the scope should be reduced by removing LTE or FR2 RAN chair: for frequency bands there is no restriction but the scope is still too wide RAN1 chair: with this scope I am concerned about the in time completion of the SI, scope is too wide Deutsche Telekom: we should indicate that this is below 50GHz so that noone is coming with 60GHz proposals		-	-	-	-	6/13/2018 0:41
..	Rel-16	-		RP-180839				-	-	-	-	6/13/2018 1:46
..	Rel-16	-	RP-181399	RP-180897		Deutsche Telekom: we seem to approve everything and in the end we will exceed the TUs we planned for Ericsson: keeping the text is restricting the scope better than just having the main bullets Telecom Italia: we have to make sure that we do not approve more than what we can really achieve Huawei: is fine with the scope of this SI now RAN chair: so WG chairmen are still requested to check the TUs MCC: reason for external TR? Intel: of interest for regulatory purposes		-	-	-	-	6/13/2018 1:59
..	Rel-15	FS_NR_IAB		RP-181028	last approved SID: RP-172290			-	-	-	-	6/13/2018 2:14
..	Rel-16	-	RP-181400			RAN chairman: 6 months WI starting in Sep.18 with limited scope MCC: RAN4 specs missing, RAN3 responsibility missiing LG: RAN4 affected RAN4 specs not yet clear RAN chair: target date should be about RAN not RAN1 Huawei: completion of RAN1 aspects in 1 meeting is not realistic RAN3 chair: 0.5TU or 1 TU? LG: 1 TU		-	-			6/13/2018 2:31

..	Rel-16	-	RP-181360	RP-181329		Qualcomm: we need to explain what dual connectivity means in this context Samsung: we should avoid ambiguity in WIDs Intel: NOMA intrafrequency dual connectivity is not meant here		-	-	-	-	6/13/2018 2:38
..	Rel-16	-	RP-181401			LG: RAN2 should be included in first bullet; RRC state transition is a big feature which we cannot complete in 1TU as requested by RAN2 chairman Nokia: we would like to keep bullet 3b Ericsson: agrees that state transitions take a lot of time in RAN2 CATT: we may include RAN4 later MCC: Tdoc number was misused so that multiple versions exist		-	-	-	-	6/13/2018 2:58
..	Rel-15	LTE_CA_R15_3DL1UL		RP-180954		MCC: late submission conclusion: approved: Core: 100%, June 18; Perf.: 100%, June 18; Core & Perf. part WI are completed		-	-	-	-	6/13/2018 3:19
..	Rel-15	LTE_4Rx_AP_DL_bands_R15		RP-180953		MCC: target date change for Perf. part, late submission conclusion: approved: Core: 100%, June 18; Perf.: 100%, June 18; Core part & Perf. part WI is completed		-	-	-	-	6/13/2018 3:21
..	Rel-16	-	RP-181436	RP-180968				-	-	-	-	6/13/2018 3:26
..	Rel-16	-		RP-180969				-	-	-	-	6/13/2018 3:26
..	Rel-16	-		RP-180966				-	-	-	-	6/13/2018 3:26
..	Rel-16	-				RAN4 vice-chairman: we can directly go to the WIDs		-	-			6/13/2018 3:27
..	Rel-16	-	RP-181390	RP-181273		mulitiple versions of the document were published		-	-	-	-	6/13/2018 3:32
..	Rel-16	-	RP-181433	RP-181351		MCC: Perf. part not ticked and for each spec Core or Perf. part needs to be indicated		-	-	-	-	6/13/2018 3:53
..	Rel-16	-	RP-181465			Qualcomm: does not agree with the proposal Huawei: and if we remove the first main bullet? Qualcomm: we still need to indicate the 2 RAN4 option		-	-			6/13/2018 4:08
..	Rel-16	-	RP-181364	RP-180931	leading: RAN			-	-	-	-	6/13/2018 4:33
..	Rel-16	-						-	-			6/13/2018 17:10

..	Rel-16	-	RP-181368	RP-181362		Huawei: "study" should rather say "identify" use cases; prefers to simplify targets Nokia: list or potential candidate waveforms can be removed as RAN will not do simulations Ericsson: we need to clarify which requirements RAN has to look at (PA efficiency and phase noise) Deutsche Telekom: upper frequency limit is missing, we think this should be 100GHz		-	-	-	-	6/13/2018 17:22
..	Rel-16	-	RP-181428	RP-181281				-	-	-	-	6/13/2018 17:27
0.4.0	Rel-15	FS_NR_nonterr_nw						-	-	-	-	6/13/2018 17:28
..	Rel-16	-		RP-180972				-	-	-	-	6/13/2018 17:32
..	Rel-16	-	RP-181417	RP-181364				-	-	-	-	6/13/2018 17:38
..	Rel-16	-	RP-181376	RP-180819				-	-	-	-	6/13/2018 17:45
..	Rel-16	-		RP-181334		Qualcomm: why RAN3 as leading WG MCC: as the topic is starting in RAN3 and they need to start a TR, RAN3 as leading WG makes sense, leading WG can be changed during the SI		-	-	-	-	6/13/2018 17:50
..	Rel-16	-	RP-181391	RP-181333				-	-	-	-	6/13/2018 18:03
..	Rel-16	-	RP-181440	RP-181344		RAN chair: concerns to move NR-NR DC sync back into REL-15 late drop? ATT, Nokia: concerned that sync and async may not end up with a common solution RAN chair: so NR-NR DC sync will be moved back into the late drop of REL-15 Ericsson: so which work do we take out of Q3 and Q4/2018? proponents should come up with a proposal conclusion: offline discussion regarding moving NR-NR DC sync case back to REL-15 late drop After offline discussion: conclusion: NR-NR DC sync case (FR1+FR2) will be moved back to REL-15 late drop (assuming a common higer layer for sync & async) and NR REL-15 exception request will be updated accordingly		-	-	-	-	6/13/2018 18:20

..	Rel-15	NR_newRAT-Core			missing CR R3-182015 detected on Wed of RAN #80			-	-			6/13/2018 20:09
15.1.0	Rel-15	NR_newRAT-Core			company CR; replacing R4-1808532 of RP-181262			-	-			6/13/2018 20:52
..	Rel-15	LTE_NR_arch_evo		RP-181048	last approved WID: RP-180531			-	-	-	-	6/13/2018 21:16
..	Rel-16	-	RP-181460	RP-181369		MCC: Core/Perf. part info missing for affected specs RAN4 vice-chair: scope is wide and in Aug. we should focus on A-MPR		-	-	-	-	6/13/2018 21:18
..	Rel-15	NR_newRAT	RP-181473	RP-180991		Ericsson: also asnchronous? RAN chair: for higher layer they have to cover sync and async Ericsson: anyway transparent for RAN2 Nokia: pi/2 BPSK is at the wrong place RAN4 vice-chairman (Huawei): exception sheet is only for Core part, so measurement accuracies should be removed but they will be addressed in July ad hoc		-	-	-	-	6/13/2018 21:20
..	Rel-15	NR_newRAT	RP-181466	RP-180990				-	-	-	-	6/13/2018 21:21
..	Rel-15	-	RP-181472		related to LSin RP-180644; this is a report of 2 offline discussions	will be also attached to RP-181387 conclusion: was endorsed but multiple versions of RP-181379 exist		-	-			6/13/2018 21:29
0.4.0	Rel-15	FS_NR_nonterr_nw	RP-181394	RP-180658		Huawei: channel models were taken into account? Thales: yes Huawei: would like to check this RAN chair:ok, we will come back to this Huawei: table 7.3.5.1-4 for SCS recommendation should be removed, actually the whole section could be removed KT: the section is just informative MCC: also check table numbering		-	-	-	-	6/13/2018 21:37
0.4.0	Rel-15	FS_NR_nonterr_nw		RP-180660				-	-	-	-	6/13/2018 21:37
0.4.0	Rel-15	FS_NR_nonterr_nw		RP-181041				-	-	-	-	6/13/2018 21:38
0.4.0	Rel-15	FS_NR_nonterr_nw		RP-181033				-	-	-	-	6/13/2018 21:38
..	Rel-16	-	RP-181404	RP-180901				-	-	-	-	6/13/2018 21:58

..	Rel-16	-			input for joined RAN/SA session, also in SP-180581	This Tdoc was handled in a joined RAN-SA session on Wed evening 19:30-20:30: SA areas/Name/RAN area/Action: FS_5G_URLLC, FS_Vertical_LAN, cyberCAV: Enhancement of URLLC supporting in 5G, 5GS Enhanced support of Vertical and LAN Services eURLLC, NR-U, Industrial IoT? Coordination needed FS_eNA: Enablers for Network Automation Architecture for 5G RAN-centric Data Connection? Alignment as needed FS_5WWC: Study on the Wireless and Wireline Convergence Enhancement for the 5G system architecture None Alignment as needed FS_CIoT_5G: Study on Cellular IoT support and evolution for		-	-			6/13/2018 22:57
..	Rel-15	NR_newRAT-Core	RP-181449					-	-			6/13/2018 23:20
..	Rel-15	NR_newRAT-Core	RP-181484					RAN1, RAN2, RAN4	RAN3			6/13/2018 23:21
..	Rel-15	-	RP-181458		related to RP-180640; RAN4 led SI			-	-			6/14/2018 0:03
..	Rel-15	NR_newRAT		RP-180894				CEPT ECC PT1	RAN1, RAN4	CEPT_ECC_PT1_LS_180420 = RP-180632	-	6/14/2018 0:22

..	Rel-16	-	RP-181454	RP-181359		Nokia: we will split the SI into 2 SIs (RAN1 led and RAN2 led) Qualcomm: complaining about the transparency of the way forward (an offline discussion was planned over lunch which did not happen and now a split proposal is popping up after 6 months of discussion) RAN1 chair: is against splitting this topic into 2 SIs Qualcomm: multiplexing part should have been done in REL-15 Mediatek: we see limited benefit in "Enhanced multiplexing considering different latency and reliability requirement" LG: and this is RAN2 scope		-	-	-	-	6/14/2018 1:16
..	Rel-16	-		RP-181371		RAN3 chairman: * means RAN3 led (disaggregated gNB is missing a *) Intel: NR positioning may require some TUs RAN3 chairman: we have them in last 2 quarters of 2019 Intel: but we will need some time also in SI RAN3 chairman: normally we are not involved in positioning SI Ericsson: LTE HLS is shifted to REL-16 and we can reduce this Orange: this was a REL-15 WI for which we agreed to get it shifted in REL-16 instead of considering an exception but 0,5 TU is needed Samsung: agrees with Ericsson that we should focus on SA corrections and late drop Nokia: we have a big backlog of REL-15 Huawei: there is still 1 TU available for corrections RAN chair: let's keep the 0,5 TU but if corrections for REL-15 will need more time then this topic is the first topic that get's postponed conclusion: LTE HLS 0,5 TU is kept but will be best effort (i.e. RAN3 leadership to decide; REL-15 has higher priority); green part of the slide is endorsed;		-	-	-	-	6/14/2018 1:29
0.4.0	Rel-15	FS_NR_nonterr_nw			based on LSin RP-180633			-	-			6/14/2018 1:57
1.0.0	Rel-15	FS_NR_nonterr_nw			RAN TR is provided for 1-step approval			-	-			6/14/2018 2:08
0.4.0	Rel-15	FS_NR_nonterr_nw		RP-181380				-	-	-	-	6/14/2018 2:12

..	Rel-15	FS_NR_NOMA	RP-181403		last approved SID: RP-171043	NEC: does not have revision marked version		-	-			6/14/2018 2:24
..	Rel-16	-	RP-181430	RP-181345		LG: wants to add supporting companies		-	-	-	-	6/14/2018 2:34
..	-	-		RP-181324		will be also attached to RP-181387		-	-	-	-	6/14/2018 2:51
..	Rel-15	LTE_unlic		RP-180946		Note: R2-1808930 is the endorsed 36.331 CR (see RP-181271) which is the missing 1% for the Core part; MCC: target date change, late submission conclusion: approved: Core: 99%, Sep.18; Perf.: 0%, Dec.18;		-	-	-	-	6/14/2018 3:40
..	Rel-16	-		RP-181348				-	-	-	-	6/14/2018 3:55
..	Rel-16	-	RP-181431	RP-181350		RAN chair: link to the SI should be added, rapporteur MCC: Remarks for affected specs have to clarify Core or Perf. part Huawei: Huawei and HiSilican are also supporting		-	-	-	-	6/14/2018 4:05
..	Rel-16	-	RP-181432	RP-181352				-	-	-	-	6/14/2018 4:11
..	Rel-16	-		RP-181325		Keysight: has a related Tdoc in RP-181129		-	-	-	-	6/14/2018 4:15
..	Rel-15	FS_NR_NOMA		RP-181395	last approved SID: RP-171043	conclusion: approved unseen		-	-	-	-	6/14/2018 4:17
..	Rel-16	-	RP-181425	RP-181384		Huawei: DL throughput is also important, not just overhead reduction Ericsson, Intel: no real need to capture this, RAN1 will of course also consider the DL performance Hauwei: Core part objective "•Specify enhancement to allow full power transmission in case of uplink transmission with multiple power amplifiers (assume no change on UE power class)" will need RAN4 involvement and should be under Perf. part CATT: for this sort of UEs this is just a RAN1 issue RAN chair: did RAN1 chair check the scope and TUs? RAN1 chair: scope is a bit challenging for RAN1 but it improved a lot and seems feasible now		-	-	-	-	6/14/2018 4:20
..	Rel-15	NR_newRAT	RP-181448		related to RP-180676	RAN chair: this is one open issue of the feature list discussion China Unicom: inter-band CR case included Qualcomm: yes Intel: single CC for standalone case intended? aggregated BW: NR and LTE has to be considered conclusion: further offline discussion needed		-	-			6/14/2018 6:43

..	Rel-15	NR_newRAT			related to RP-181304			-	-			6/14/2018 6:44
..	Rel-16	-		RP-180808				-	-	-	-	6/14/2018 6:50
..	Rel-16	-		RP-180745				-	-	-	-	6/14/2018 6:52
..	Rel-16	-	RP-181445	RP-181025				-	-	-	-	6/14/2018 6:53
15.1.0	Rel-15	NR_newRAT-Core			company CR; replacing R3-182480 of RP-181238 which was superseded by R3-183364 but which was spotted too late			-	-			6/14/2018 7:05
10.21.0	Rel-10	TEI10			company CR; revision of R2-1808933 which was postponed in RAN2	Ericsson: SIB1 is broken and this is to fix it; one company not happy with the change Mediatek: we may have a backwards compatibility issue, wants to check until end of Thu of RAN #80 RAN chairman: exceptionally: email approval until Monday after RAN 23:55 CEST		-	-			6/14/2018 15:51
11.18.0	Rel-11	TEI10			company CR; revision of R2-1808934 which was postponed in RAN2	RAN chairman: exceptionally: email approval until Monday after RAN 23:55 CEST		-	-	-	-	6/14/2018 15:54
12.16.0	Rel-12	TEI10			company CR; revision of R2-1808935 which was postponed in RAN2	RAN chairman: exceptionally: email approval until Monday after RAN 23:55 CEST		-	-	-	-	6/14/2018 15:54
13.9.1	Rel-13	TEI10			company CR; revision of R2-1808936 which was postponed in RAN2	RAN chairman: exceptionally: email approval until Monday after RAN 23:55 CEST		-	-	-	-	6/14/2018 15:55
14.6.2	Rel-14	TEI10			company CR; revision of R2-1808937 which was postponed in RAN2	RAN chairman: exceptionally: email approval until Monday after RAN 23:55 CEST		-	-	-	-	6/14/2018 15:56
15.1.0	Rel-15	TEI10			company CR; revision of R2-1808938 which was postponed in RAN2	RAN chairman: exceptionally: email approval until Monday after RAN 23:55 CEST		-	-	-	-	6/14/2018 15:56
..	Rel-16	-	RP-181435	RP-181368		KDDI, Sierra Wireless also supporting		-	-	-	-	6/14/2018 16:04
..	Rel-16	-	RP-181459	RP-181332		MCC: would recommend to take a 37 series TR		-	-	-	-	6/14/2018 16:04
..	Rel-16	LTE_TDD_2400_US		RP-181130	last approved WID: RP-180583			-	-	-	-	6/14/2018 16:41
..	Rel-16	LTE_TDD_2400_US		RP-180842		conclusion: approved: Core: 0%, Dec.18; Perf.: 0%, Dec.18		-	-	-	-	6/14/2018 16:43
..	Rel-15	NR_newRAT		RP-181343				IETF, IANA	SA, CT, RAN3, CT1	-	-	6/14/2018 17:09

..	-	-	RP-181470					CEPT ECC PT1	-	RP-181316		6/14/2018 17:30
..	Rel-15	NR_newRAT-Core				Option 1: Put all the values that are not agreed TBD (or a range of values) and finish it in the September drop. Option 2: Put in a square bracket on the proposed values and finalise in the September drop No consensus; Suggestion to kick the can down to release 16 is not acceptable to IITM, IITH and CEWiT. Qualcomm: put it in the exception sheet, discuss in RAN4 Nokia: just sending to RAN4 without guidance would not be acceptable RAN chair: we can task RAN4 to come up with values: RAN4 is requested to come up with CRs with the exact MPR values Nokia: it will take up a lot of RAN4 time and we may end up with tbd again conclusion: RAN4 task will be captured in the NR_newRAT exception sheet for REL-15		-	-			6/14/2018 17:40
..	Rel-15	LTE_UTRA_TRP_TRS-Core				Note: RAN #80 did not have time to come back on this draft LSout but the RAN chairman informed the ETSI TC MSG TFES chairman/contacts of LSin RP-180631 in an email 18.06.2018 that RAN #78 stopped the corresponding RAN4 WI (LTE_UTRA_TRP_TRS-Core) and has no plans to resume the work.		ETSI TC MSG TFES	RAN4, RAN5	RP-180631		6/14/2018 17:46
..	Rel-16	-	RP-181453	RP-181404		Apple: RAN4 TUs? RAN chair: will be handled in Sep.18		-	-	-	-	6/14/2018 17:59
..	Rel-16	-		RP-180807				-	-	-	-	6/14/2018 18:04
..	-	-			related to RP-181321			-	-	-	-	6/14/2018 18:15
..	Rel-16	-	RP-181478	RP-181365		RAN1 chair: no RAN1 impact at the moment Samsung: you can define requirements in RAN4 but not enhancements		-	-	-	-	6/14/2018 18:21
..	Rel-16	-	RP-181480	RP-181346		RAN1 chair: very disappointed about the work load, so this work cannot be done; I will use chairman's discretion to prioritize the work myself so do not complain		-	-	-	-	6/14/2018 18:22
..	Rel-16	-		RP-181396		conclusion: approved unseen		-	-	-	-	6/14/2018 18:28
..	Rel-16	-		RP-181400				-	-	-	-	6/14/2018 18:33
..	Rel-16	-	RP-181463	RP-181401		was approved before and then supporting companies were added		-	-	-	-	6/14/2018 18:43
..	Rel-16	-		RP-181360				-	-	-	-	6/14/2018 18:47

..	Rel-16	-	RP-181452					-	-			6/14/2018 18:50
..	Rel-16	-		RP-181417				-	-	-	-	6/14/2018 18:51
..	Rel-16	-		RP-181355				-	-	-	-	6/14/2018 18:58
..	Rel-16	-			related to RP-180964	RAN chair: so we ask RAN4 to come up with a scope; RAN4 leadership will decide what the limit is for the TUs Orange: is an important activity for operators Samsung: relation of this way forward and the REL-16 WI we have approved which has a coexistence objective Huawei: from REL-16 WI RAN4 people will not detect the urgency of this topic Samsung: so double allocation of TUs for the same topic? RAN4 vice-chairman (NTT DOCOMO): highest priority is on exception sheet		-	-			6/14/2018 18:59
..	Rel-16	-	RP-181456	RP-180865				-	-	-	-	6/14/2018 19:02
..	Rel-15	-			related to RP-181386			-	-			6/14/2018 19:15
..	Rel-16	-	RP-181457	RP-181372		RAN chair: FR1-FR1 sync is not part of the late drop MCC: title unclear, Core/Perf. for specs to be indicated, overall rapporteur unclear		-	-	-	-	6/14/2018 19:18
..	Rel-16	-		RP-181127				-	-	-	-	6/14/2018 19:31
..	Rel-15	LTE_CA_R15_xDL1UL		RP-181015	last approved WID: RP-180250			-	-	-	-	6/14/2018 19:33
..	Rel-15	-			related to RP-181011			-	-			6/14/2018 19:36
..	Rel-15	NR_newRAT	RP-181468			Samsung: related SI is in RP-181388 Deutsche Telekom: 2nd sentence is unclear RAN chair: attach RP-181467 instead of the current attachment		5GAA WG2	-	RP-180626		6/14/2018 19:39
..	Rel-16	-		RP-181409	title updated			-	-	-	-	6/14/2018 20:01
..	Rel-16	-	RP-181471	RP-181330		Nokia: first RAN1 objective not in line with the summary Telecom Italia: we should keep it; RAN1 chairman said that the work can be done and we should not accept that all LTE improvements are blocked Huawei: only companies interested in LTE MIMO discussed it but we had several offline discussions on NR MIMO		-	-	-	-	6/14/2018 20:18
..	Rel-16	-		RP-180766				-	-	-	-	6/14/2018 20:38
..	Rel-15	NR_newRAT		RP-181405				-	-	-	-	6/14/2018 21:12
..	Rel-15	NR_newRAT-Core	RP-181483	RP-181386				-	-	-	-	6/14/2018 21:35

..	Rel-16	-		RP-181335				-	-	-	-	6/14/2018 21:45
..	Rel-16	-		RP-181336				-	-	-	-	6/14/2018 21:46
..	Rel-16	-	RP-181462	RP-181434				-	-	-	-	6/14/2018 23:18
..	Rel-16	-		RP-181425				-	-	-	-	6/14/2018 23:22
..	Rel-16	-	RP-181477	RP-181390	RAN1 led SI			-	-	-	-	6/14/2018 23:27
..	Rel-16	-	RP-181476		RAN2 led SI	RAN1 chairman: it does not make any sense to split the topic into 2 SIs; we will not allocate more RAN1 TUs for 2 SIs compared to the previous 1 SI; it will be handled in RAN1 under 1 agenda item; Vodafone: wants to add a note RAN1 chair: note means no action for RAN1		-	-			6/14/2018 23:35
..	Rel-16	-		RP-181438				-	-	-	-	6/14/2018 23:37
..	Rel-16	-	RP-181469	RP-181440		Panasonic: "late release" is not well explained RAN chairman: "late release" is the "late REL-15 drop" RAN3 chairman: RAN3 TU allocation missing		-	-	-	-	6/14/2018 23:49
..	Rel-15	-	RP-181461	RP-181388		Qualcomm: what is the expectation from objective 1? Ericsson: do not think there would be time in Aug. RF session for this RAN chair: please revise TUs to what is realistic Qualcomm: RAN4 usually does not look at system level impacts		-	-	-	-	6/14/2018 23:55
..	Rel-16	-		RP-181418				-	-	-	-	6/14/2018 23:57
..	Rel-16	-		RP-181376				-	-	-	-	6/15/2018 0:09
..	Rel-15	-	RP-181467	RP-181458				-	-	-	-	6/15/2018 0:15
..	Rel-16	-		RP-181452		see RP-181486		-	-	-	-	6/15/2018 0:15
..	Rel-16	-		RP-181432				-	-	-	-	6/15/2018 0:17
..	-	-		RP-181340				-	-	-	-	6/15/2018 0:28
..	Rel-16	-		RP-181361				-	-	-	-	6/15/2018 1:14
..	Rel-15	NR_newRAT		RP-181378				-	-	-	-	6/15/2018 1:19
..	Rel-15	-		RP-181461				-	-	-	-	6/15/2018 1:23
..	Rel-15	NR_newRAT		RP-181444				5GAA, 5GAA WG2	RAN1, RAN4	RP-180626	-	6/15/2018 1:25
..	Rel-16	-		RP-181457				-	-	-	-	6/15/2018 1:27
..	-	-		RP-181422				CEPT ECC PT1	-	RP-181316	-	6/15/2018 1:29

..	Rel-16	-	RP-181481	RP-181446		Nokia: further enhancing a feature that was already further enhanced but still not deployed is not a good approach Samsung: similar view Huawei: we have a number of operators who are interested in this		-	-	-	-	6/15/2018 1:33
..	Rel-15	-		RP-181379				-	-	-	-	6/15/2018 1:38
..	Rel-15	NR_newRAT		RP-181377				-	-	-	-	6/15/2018 2:00
..	Rel-15	NR_newRAT		RP-180992	last approved WID: RP-180536			-	-	-	-	6/15/2018 2:05
..	Rel-16	-		RP-181337				-	-	-	-	6/15/2018 2:07
..	Rel-16	-	RP-181479	RP-181455				-	-	-	-	6/15/2018 2:18
..	Rel-16	-		RP-181454				-	-	-	-	6/15/2018 2:23
..	Rel-16	-	RP-181482	RP-181428		Nokia: wondering why 2 rapporteurs are needed		-	-	-	-	6/15/2018 2:32
..	Rel-16	-		RP-181476				-	-	-	-	6/15/2018 2:36
..	Rel-16	-		RP-181429		Note: Wrong Tdoc number shown on Tdoc RP-181480.		-	-	-	-	6/15/2018 2:43
..	Rel-16	-	RP-181485	RP-181471				-	-	-	-	6/15/2018 2:48
..	Rel-16	-		RP-181478				-	-	-	-	6/15/2018 2:51
..	Rel-15	NR_newRAT-Core		RP-181449				-	-	-	-	6/15/2018 3:07
..	Rel-15	NR_newRAT-Core		RP-181387				RAN1, RAN2, RAN4	RAN3	R1-1807896 = RP-180635, R2-1809153 = RP-180639, R4-1808552 = RP-180644	-	6/15/2018 3:10
..	Rel-16	-		RP-181481		Huawei: first bullet to be discussed at RAN #81 Samsung: not happy about this RAN chairman: proponents can bring in WID revisions in the future as usual		-	-	-	-	6/15/2018 3:12
..	-	-				conlcusion:1 week email discussion		-	-			6/15/2018 3:27

AvailabilityDate	CRpack	Contact	ContactID	Order-within-agenda-item	Done	Withdrawn	Doc-for
5/23/2018 7:57		Joern Krause	12578	6000	Yes	No	Approval
6/9/2018 15:31		Joern Krause	12578	6010	Yes	No	Approval
6/10/2018 12:41		Joern Krause	12578	6020	Yes	No	
6/8/2018 10:59		Joern Krause	12578	6030	Yes	No	Information

6/12/2018 0:38		Joern Krause	12578	6040	Yes	No	
6/8/2018 10:59		Joern Krause	12578	6050	Yes	No	Information
6/8/2018 18:14		Joern Krause	12578	6060	Yes	No	
6/10/2018 19:38		Joern Krause	12578	6070	Yes	No	Information
6/11/2018 15:52		Joern Krause	12578	6080	Yes	No	
6/7/2018 17:05		Joern Krause	12578	6090	Yes	No	Information

6/9/2018 8:17		Joern Krause	12578	6100	Yes	No	
6/14/2018 17:53		Joern Krause	12578	6120	Yes	No	Information
6/10/2018 12:41		Joern Krause	12578	6110	Yes	No	Approval
6/8/2018 18:14		Joern Krause	12578	6130	Yes	No	
6/5/2018 0:57		Joern Krause	12578	6140	Yes	No	Information
6/7/2018 17:05		Joern Krause	12578	6150	Yes	No	
6/12/2018 0:38		Joern Krause	12578	6160	Yes	No	
6/8/2018 10:59		Joern Krause	12578	6170	Yes	No	
6/15/2018 7:23		Joern Krause	12578	6180	Yes	No	Information
5/21/2018 18:09		Joern Krause	12578	6190	Yes	No	
5/21/2018 18:09		Joern Krause	12578	11180	Yes	No	
5/21/2018 18:09		Joern Krause	12578	6210	Yes	No	
5/21/2018 18:09		Joern Krause	12578	6220	Yes	No	

5/21/2018 18:09		Joern Krause	12578	6230	Yes	No	
5/21/2018 18:09		Joern Krause	12578	6240	Yes	No	
5/21/2018 18:09		Joern Krause	12578	6250	Yes	No	
5/21/2018 18:09		Joern Krause	12578	6260	Yes	No	
5/21/2018 18:09		Joern Krause	12578	6270	Yes	No	

5/21/2018 18:09		Joern Krause	12578	6280	Yes	No	
5/21/2018 18:09		Joern Krause	12578	6730	Yes	No	
5/21/2018 18:09		Joern Krause	12578	6300	Yes	No	
5/21/2018 18:09		Joern Krause	12578	6310	Yes	No	
5/21/2018 18:09		Joern Krause	12578	7800	Yes	No	
6/2/2018 0:41		Joern Krause	12578	6330	Yes	No	

6/2/2018 0:41		Joern Krause	12578	7870	Yes	No	
6/2/2018 0:41		Joern Krause	12578	6200	Yes	No	
6/2/2018 0:41		Joern Krause	12578	9700	Yes	No	
6/2/2018 0:41		Joern Krause	12578	6370	Yes	No	
6/2/2018 0:41		Joern Krause	12578	6380	Yes	No	
6/2/2018 0:41		Joern Krause	12578	6350	Yes	No	

6/2/2018 0:41		Joern Krause	12578	6261	Yes	No	
6/2/2018 0:41		Joern Krause	12578	8730	Yes	No	

6/9/2018 14:44		Joern Krause	12578	6420	Yes	No	
6/9/2018 14:44		Joern Krause	12578	6430	Yes	No	
6/9/2018 14:44		Joern Krause	12578	6390	Yes	No	
6/9/2018 14:44		Joern Krause	12578	6450	Yes	No	

6/9/2018 14:44		Joern Krause	12578	6460	Yes	No	
6/9/2018 14:44		Joern Krause	12578	6700	Yes	No	

6/9/2018 14:44		Joern Krause	12578	8750	Yes	No	

6/9/2018 8:17		Joern Krause	12578	11910	Yes	No	
5/25/2018 5:20		Scott Probasco	17698	6500	Yes	No	Information
5/31/2018 22:12		Jason Kahn	75979	6510	Yes	No	
6/1/2018 11:59		Roland Beutler	63720	6670	Yes	No	Information
5/31/2018 22:12		Jason Kahn	75979	6530	Yes	No	
6/5/2018 0:57		Lujuan Ma	72260	11870	Yes	No	
6/1/2018 15:31		Jason Kahn	75979	6560	Yes	No	Approval
6/1/2018 15:31		Jason Kahn	75979	6970	Yes	No	Approval

6/2/2018 13:22		Yu ZHANG	77103	6680	Yes	No	Presentation
6/5/2018 0:57		Nicolas Chuberre	21633	6581	Yes	No	Approval
6/5/2018 0:57		Nicolas Chuberre	21633	139200	Yes	No	
6/5/2018 0:57		Nicolas Chuberre	21633	6595	Yes	No	Approval
6/5/2018 0:57		Nicolas Chuberre	21633	6610	Yes	No	Approval
6/5/2018 0:57		Nicolas Chuberre	21633	6630	Yes	No	Approval
6/1/2018 10:46		Nicolas Chuberre	21633	6620	Yes	No	Decision
6/5/2018 0:57		Nicolas Chuberre	21633	6640	Yes	No	Information
6/5/2018 0:57		Nicolas Chuberre	21633	6641	Yes	Yes	Approval

6/2/2018 4:11		Lorenzo Casaccia	58149	6470	Yes	No	
		Lorenzo Casaccia	58149	6570	Yes	Yes	
6/2/2018 4:10		Lorenzo Casaccia	58149	6520	Yes	No	
6/2/2018 4:11		Lorenzo Casaccia	58149	10220	Yes	No	
6/2/2018 4:11		Lorenzo Casaccia	58149	6900	Yes	No	
6/2/2018 4:12		Lorenzo Casaccia	58149	7910	Yes	No	
6/2/2018 4:11		Lorenzo Casaccia	58149	6720	Yes	No	
6/2/2018 4:11		Lorenzo Casaccia	58149	9160	Yes	No	

6/5/2018 0:57		Peter Gaal	57198	6740	Yes	No	Approval
6/7/2018 17:05		Peter Gaal	57198	9050	Yes	No	Decision
6/5/2018 0:57		Peter Gaal	57198	6440	Yes	No	Decision

6/5/2018 0:57		Peter Gaal	57198	6760	Yes	No	Decision
6/5/2018 0:57		Peter Gaal	57198	6770	Yes	No	Decision
6/5/2018 0:57		Peter Gaal	57198	9890	Yes	No	Decision
6/5/2018 0:57		Peter Gaal	57198	9900	Yes	No	Decision
6/5/2018 0:57		Anil Umesh	62439	6940	Yes	No	Approval
6/5/2018 0:57		Anil Umesh	62439	7650	Yes	No	Approval

6/5/2018 0:57		Anil Umesh	62439	6830	Yes	No	
6/5/2018 0:57		Anil Umesh	62439	6840	Yes	No	Approval
6/5/2018 0:57		Francesco Pica	57089	6850	Yes	No	
6/5/2018 0:57		Francesco Pica	57089	6860	Yes	No	
6/5/2018 0:57		Luis Lopes	47178	7410	Yes	No	Approval
6/2/2018 13:22		Eric Georgeaux	38175	11010	Yes	No	Approval
6/5/2018 0:57		Sven Fischer	20628	6820	Yes	No	Approval
5/29/2018 21:59		Andrew Thiessen	76740	6710	Yes	No	Agreement
6/1/2018 7:06		Kei Ando	57164	9510	Yes	No	Approval
6/5/2018 0:57		Laetitia Falconetti	63379	6920	Yes	No	
6/5/2018 0:57		Laetitia Falconetti	63379	125900	Yes	No	Information
6/5/2018 0:57		Ozcan Ozturk	42607	6810	Yes	No	Approval

6/7/2018 11:31		Ingbert Sigovich	28887	11940	Yes	No	Approval
6/7/2018 11:31		Ingbert Sigovich	28887	11950	Yes	No	Approval
6/7/2018 11:31		Ingbert Sigovich	28887	6550	Yes	No	Approval
6/7/2018 11:31		Ingbert Sigovich	28887	9410	Yes	No	Approval
6/7/2018 11:31		Ingbert Sigovich	28887	11970	Yes	No	Approval
6/7/2018 11:31		Ingbert Sigovich	28887	8440	Yes	No	Approval
6/7/2018 11:31		Ingbert Sigovich	28887	8430	Yes	No	Approval
6/7/2018 11:31		Ingbert Sigovich	28887	7020	Yes	No	Approval
6/7/2018 11:31		Ingbert Sigovich	28887	8460	Yes	No	Approval
6/7/2018 11:31		Ingbert Sigovich	28887	8710	Yes	No	Approval
6/7/2018 11:31		Ingbert Sigovich	28887	11980	Yes	No	Approval
6/7/2018 11:31		Ingbert Sigovich	28887	7060	Yes	No	Approval
6/7/2018 11:31		Ingbert Sigovich	28887	9170	Yes	No	Approval
6/7/2018 11:31		Ingbert Sigovich	28887	8470	Yes	No	Approval
6/7/2018 11:31		Ingbert Sigovich	28887	11990	Yes	No	Approval
6/7/2018 11:31		Ingbert Sigovich	28887	12000	Yes	No	Approval
6/7/2018 11:31		Ingbert Sigovich	28887	12050	Yes	No	Approval
6/7/2018 11:31		Ingbert Sigovich	28887	12010	Yes	No	Approval

6/7/2018 11:31		Ingbert Sigovich	28887	11190	Yes	No	Approval
6/7/2018 11:31		Ingbert Sigovich	28887	12030	Yes	No	Approval
6/7/2018 11:31		Ingbert Sigovich	28887	12040	Yes	No	Approval
6/7/2018 11:31		Ingbert Sigovich	28887	10400	Yes	No	Approval
6/7/2018 11:31		Ingbert Sigovich	28887	7170	Yes	No	Approval
6/7/2018 11:31		Ingbert Sigovich	28887	7360	Yes	No	Approval
6/7/2018 11:31		Ingbert Sigovich	28887	7190	Yes	No	Approval
6/7/2018 11:31		Ingbert Sigovich	28887	7200	Yes	No	Approval
6/7/2018 11:31		Ingbert Sigovich	28887	7210	Yes	No	Approval
6/7/2018 11:31		Ingbert Sigovich	28887	7220	Yes	No	Approval
6/7/2018 11:31		Ingbert Sigovich	28887	7230	Yes	No	Approval
6/7/2018 11:31		Ingbert Sigovich	28887	7240	Yes	No	Approval
6/7/2018 11:31		Ingbert Sigovich	28887	7250	Yes	No	Approval
6/7/2018 11:31		Ingbert Sigovich	28887	7260	Yes	No	Approval
6/7/2018 11:31		Ingbert Sigovich	28887	7270	Yes	No	Approval
6/7/2018 11:31		Ingbert Sigovich	28887	7280	Yes	No	Approval
		Ingbert Sigovich	28887	7290	Yes	Yes	Approval
6/7/2018 11:31		Ingbert Sigovich	28887	7300	Yes	No	Approval
6/7/2018 17:05		Ingbert Sigovich	28887	7310	Yes	No	Approval

6/7/2018 11:31		Ingbert Sigovich	28887	7320	Yes	No	Approval
		Ingbert Sigovich	28887	7330	Yes	Yes	Approval
6/7/2018 11:31		Ingbert Sigovich	28887	7340	Yes	No	Approval
5/30/2018 14:53		Ronald Borsato	66645	7180	Yes	Yes	
5/30/2018 15:00		Ronald Borsato	66645	7350	Yes	No	
6/5/2018 0:57		Sean Kelley	70295	7370	Yes	No	Approval
6/2/2018 13:22		Eric Georgeaux	38175	6880	Yes	No	
6/5/2018 0:57		Philippe Godin	68843	6890	Yes	No	Approval
6/5/2018 0:57		Philippe Godin	68843	7400	Yes	No	Approval
		Alexander Vesely	10078	7760	Yes	Yes	Approval
6/5/2018 0:57		Iwajlo Angelow	68260	7420	Yes	No	Approval
6/5/2018 0:57		Iwajlo Angelow	68260	10920	Yes	No	Approval
6/5/2018 0:57		Iwajlo Angelow	68260	7440	Yes	No	Approval
6/5/2018 0:57		Iwajlo Angelow	68260	9680	Yes	No	Approval

6/5/2018 0:57		Tsunehiko Chiba	70296	7680	Yes	No	Approval
6/5/2018 0:57		Asbjorn Grovlen	45069	7470	Yes	No	Decision
6/5/2018 0:57		Asbjorn Grovlen	45069	7480	Yes	No	Approval
6/5/2018 0:57		Asbjorn Grovlen	45069	7490	Yes	No	Approval
6/5/2018 0:57		Asbjorn Grovlen	45069	11310	Yes	No	Approval
6/5/2018 0:57		Xiaoming She	46899	7520	Yes	No	Discussion
6/5/2018 0:57		Xiaoming She	46899	7530	Yes	No	Approval
6/5/2018 0:57		Xiaoming She	46899	7510	Yes	No	Discussion
6/5/2018 0:57		Xiaoming She	46899	11370	Yes	No	Discussion

6/5/2018 0:57		Steven Xu	70303	8050	Yes	No	Approval
		Peter Gaal	57198	7560	Yes	Yes	Information
6/7/2018 1:03		Yosuke Akimoto	59235	7570	Yes	No	Discussion
6/7/2018 1:03		Yosuke Akimoto	59235	7580	Yes	No	Discussion
6/7/2018 1:03		Yosuke Akimoto	59235	7590	Yes	No	Discussion
6/7/2018 1:03		Yosuke Akimoto	59235	7600	Yes	No	Discussion
6/7/2018 1:03		Yosuke Akimoto	59235	7620	Yes	No	Approval
6/7/2018 1:03		Yosuke Akimoto	59235	8790	Yes	No	Approval
6/7/2018 1:03		Yosuke Akimoto	59235	7640	Yes	No	Approval
6/7/2018 1:03		Yosuke Akimoto	59235	8820	Yes	No	Approval
6/5/2018 0:57		Yuta Oguma	74145	9880	Yes	No	Approval
6/5/2018 0:57		Yuta Oguma	74145	7660	Yes	No	Approval
6/5/2018 0:57		Yuta Oguma	74145	9660	Yes	Yes	Approval
6/5/2018 0:57		Xudong Yang	47264	11480	Yes	No	Approval

6/5/2018 0:57		Iana Siomina	42857	7690	Yes	No	Approval
6/4/2018 0:37		Suhwan Lim	46654	10940	Yes	No	Approval
6/5/2018 0:57		Iana Siomina	42857	7710	Yes	No	Approval
6/4/2018 0:37		Suhwan Lim	46654	7700	Yes	No	Approval
6/4/2018 0:37		Suhwan Lim	46654	7730	Yes	No	Approval
6/4/2018 0:37		Suhwan Lim	46654	7740	Yes	No	Approval
6/4/2018 0:37		Suhwan Lim	46654	10960	Yes	No	Approval
6/4/2018 0:37		Suhwan Lim	46654	9980	Yes	No	Approval

6/5/2018 0:57		Suhwan Lim	46654	8170	Yes	No	Approval
6/5/2018 0:57		Suhwan Lim	46654	10060	Yes	No	Approval
6/5/2018 0:57		Suhwan Lim	46654	6320	Yes	No	Approval
		Suhwan Lim	46654	6410	Yes	Yes	Approval
6/7/2018 1:03		Youngdae Lee	33638	7810	Yes	No	

6/5/2018 0:57		Suhwan Lim	46654	6750	Yes	No	Approval
6/7/2018 1:03		Youngdae Lee	33638	8770	Yes	No	
6/7/2018 1:03		Youngdae Lee	33638	7840	Yes	No	
6/5/2018 0:57		Zhongda Du	38890	7850	Yes	No	

6/5/2018 0:57		Zhongda Du	38890	6480	Yes	No	Decision
6/2/2018 13:22		Li Yang	43509	7390	Yes	No	Approval
		Marc Grant	16986	11580	Yes	Yes	Decision
6/5/2018 0:57		Marc Grant	16986	11575	Yes	No	Decision
6/5/2018 0:57		Marc Grant	16986	8090	Yes	No	Decision
6/5/2018 0:57		Marc Grant	16986	8900	Yes	No	Decision
6/5/2018 0:57		Marc Grant	16986	8890	Yes	No	Decision
6/5/2018 0:57		Marc Grant	16986	8150	Yes	No	Decision
6/5/2018 0:57		Marc Grant	16986	8860	Yes	No	Decision
6/5/2018 0:57		Johan Skold	10425	9490	Yes	No	Approval

6/5/2018 0:57		RONG HUANG	72184	7960	Yes	No	Approval
		RONG HUANG	72184	12220	Yes	Yes	Approval
6/5/2018 0:57		Per Lindell	56972	7980	Yes	No	Approval
6/5/2018 0:57		Per Lindell	56972	7990	Yes	No	Approval
6/5/2018 0:57		Per Lindell	56972	10880	Yes	No	Approval
6/5/2018 0:57		Per Lindell	56972	10910	Yes	No	Approval
6/5/2018 0:57		Per Lindell	56972	8020	Yes	No	Approval
6/5/2018 0:57		Per Lindell	56972	8030	Yes	No	Approval
6/5/2018 0:57		Per Lindell	56972	11230	Yes	No	Approval
6/5/2018 0:57		Per Lindell	56972	9820	Yes	No	Approval
6/5/2018 0:57		Per Lindell	56972	7450	Yes	No	Approval
6/5/2018 0:57		Per Lindell	56972	8270	Yes	No	Approval
6/5/2018 0:57		Per Lindell	56972	7770	Yes	No	Approval
6/5/2018 0:57		Xueming Pan	72721	8920	Yes	No	Decision
6/5/2018 0:57		Xueming Pan	72721	8340	Yes	No	Decision
6/5/2018 0:57		Xueming Pan	72721	9250	Yes	No	Decision
6/5/2018 0:57		Xueming Pan	72721	9380	Yes	No	Decision
6/5/2018 0:57		Xueming Pan	72721	7920	Yes	No	Decision

6/5/2018 0:57		Hervé Bonneville	28400	7930	Yes	No	Approval
6/5/2018 0:57		Daniel Larsson	39861	6780	Yes	No	Decision
6/7/2018 1:03		Alexander Vesely	10078	7790	Yes	No	Approval
6/5/2018 0:57		Aijun Cao	77081	8410	Yes	No	Approval
6/5/2018 0:57		Aijun Cao	77081	11470	Yes	No	Approval
6/5/2018 0:57		Bill Shvodian	74082	10010	Yes	No	Approval
6/5/2018 0:57		Paolino Usai	3209	8200	Yes	No	Approval
6/5/2018 0:57		Paolino Usai	3209	8260	Yes	No	Approval
6/5/2018 0:57		Paolino Usai	3209	8220	Yes	No	Approval
6/5/2018 0:57		Paolino Usai	3209	8230	Yes	No	Approval
6/5/2018 0:57		Paolino Usai	3209	8240	Yes	No	Approval
6/5/2018 0:57		Paolino Usai	3209	8250	Yes	No	Approval
6/5/2018 0:57		Paolino Usai	3209	10030	Yes	No	Approval
6/5/2018 0:57		Bill Shvodian	74082	9970	Yes	No	Discussion
6/5/2018 0:57		SeungJun e Yi	20814	10530	Yes	No	
6/5/2018 0:57		SeungJun e Yi	20814	8300	Yes	No	
6/5/2018 0:57		SeungJun e Yi	20814	9030	Yes	No	
6/5/2018 0:57		Taekhoon KIM	71310	8180	Yes	No	Approval
6/5/2018 0:57		Sen Xu	56667	8330	Yes	No	Approval
6/5/2018 0:57		Sen Xu	56667	7540	Yes	No	Discussion

6/5/2018 0:57		Yang Ning	62986	8930	Yes	No	Agreement
6/5/2018 0:57		Yang Ning	62986	9730	Yes	No	Agreement
6/5/2018 0:57		Yang Ning	62986	9930	Yes	No	Agreement
6/5/2018 0:57		Chungwoo Hwang	55545	126000	Yes	No	Discussion
6/5/2018 0:57		Chungwoo Hwang	55545	6490	Yes	No	Discussion
6/5/2018 0:57		Xiaoming She	46899	9200	Yes	No	Approval
6/5/2018 0:57		Xiaoming She	46899	8390	Yes	No	Discussion
6/5/2018 0:57		Xiaoming She	46899	10250	Yes	No	Approval
6/5/2018 0:57		John Dooley	74855	8420	Yes	No	
6/5/2018 0:57		David Mazzarese	44044	7010	Yes	No	Approval
6/5/2018 0:57		David Mazzarese	44044	7000	Yes	No	Approval
6/5/2018 0:57		David Mazzarese	44044	8450	Yes	No	Approval
6/5/2018 0:57		David Mazzarese	44044	7030	Yes	No	Approval
6/5/2018 0:57		David Mazzarese	44044	7080	Yes	No	Approval

6/5/2018 0:57		David Mazzarese	44044	8480	Yes	No	Approval
6/5/2018 0:57		David Mazzarese	44044	8490	Yes	No	Approval
6/5/2018 0:57		David Mazzarese	44044	129100	Yes	No	Approval
6/5/2018 0:57		David Mazzarese	44044	131300	Yes	No	Information
6/5/2018 0:57		David Mazzarese	44044	8520	Yes	No	Approval
		David Mazzarese	44044	11730	Yes	Yes	Approval
6/5/2018 0:57		David Mazzarese	44044	12200	Yes	No	Information
		David Mazzarese	44044	10800	Yes	Yes	Approval
6/5/2018 0:57		David Mazzarese	44044	8560	Yes	No	Approval
6/5/2018 0:57		David Mazzarese	44044	11760	Yes	Yes	Approval

6/5/2018 0:57		David Mazzarese	44044	12480	Yes	No	Information
6/5/2018 0:57		David Mazzarese	44044	8590	Yes	No	Approval
6/5/2018 0:57		David Mazzarese	44044	10820	Yes	No	Approval
		David Mazzarese	44044	12230	Yes	Yes	Approval
6/5/2018 0:57		David Mazzarese	44044	12510	Yes	No	Information
6/5/2018 0:57		Ningyu Chen	62843	8630	Yes	No	
6/5/2018 0:57		Ningyu Chen	62843	8640	Yes	No	
6/5/2018 0:57		Ningyu Chen	62843	8650	Yes	No	
6/5/2018 0:57		Ningyu Chen	62843	8660	Yes	No	
6/5/2018 0:57		Ningyu Chen	62843	12270	Yes	No	Information
6/5/2018 0:57		Ningyu Chen	62843	8680	Yes	No	Approval
6/5/2018 0:57		Ningyu Chen	62843	8690	Yes	No	
		Ningyu Chen	62843	12210	Yes	Yes	Approval

6/5/2018 0:57		Ningyu Chen	62843	7040	Yes	No	
6/5/2018 0:57		Ningyu Chen	62843	8910	Yes	No	
6/5/2018 0:57		David Mazzarese	44044	8940	Yes	No	Discussion
6/5/2018 0:57		David Mazzarese	44044	8990	Yes	No	Discussion
6/5/2018 0:57		David Mazzarese	44044	6660	Yes	No	Discussion
6/5/2018 0:57		David Mazzarese	44044	7940	Yes	No	Discussion
6/5/2018 0:57		David Mazzarese	44044	8780	Yes	No	Discussion
6/5/2018 0:57		David Mazzarese	44044	7500	Yes	No	Discussion

6/5/2018 0:57		David Mazzarese	44044	7610	Yes	No	Discussion
6/5/2018 0:57		David Mazzarese	44044	9070	Yes	No	Approval
6/5/2018 0:57		David Mazzarese	44044	9060	Yes	No	Discussion
6/5/2018 0:57		David Mazzarese	44044	9280	Yes	No	Approval
6/5/2018 0:57		David Mazzarese	44044	8830	Yes	No	Discussion
6/5/2018 0:57		David Mazzarese	44044	11860	Yes	No	Discussion
6/5/2018 0:57		David Mazzarese	44044	133800	Yes	No	Approval
		David Mazzarese	44044	11241	Yes	Yes	Discussion
6/5/2018 0:57		David Mazzarese	44044	8880	Yes	No	Approval
6/5/2018 0:57		David Mazzarese	44044	8870	Yes	No	Discussion
6/5/2018 0:57		David Mazzarese	44044	9740	Yes	No	Discussion
6/5/2018 0:57		David Mazzarese	44044	9190	Yes	No	Discussion
6/5/2018 0:57		David Mazzarese	44044	9990	Yes	No	Discussion
6/5/2018 0:57		David Mazzarese	44044	9000	Yes	No	Discussion
6/5/2018 0:57		David Mazzarese	44044	9220	Yes	No	Discussion
6/5/2018 0:57		David Mazzarese	44044	9630	Yes	No	Approval

6/5/2018 0:57		Seunghee Han	47329	8950	Yes	No	Approval
6/5/2018 0:57		Seunghee Han	47329	8960	Yes	No	Discussion
6/5/2018 0:57		Seunghee Han	47329	9240	Yes	No	Approval
6/5/2018 0:57		Seunghee Han	47329	8980	Yes	No	Approval
6/5/2018 0:57		Seunghee Han	47329	8370	Yes	No	Discussion
6/10/2018 12:41		Alexander Sayenko	47308	7900	Yes	No	
6/10/2018 12:41		Alexander Sayenko	47308	9010	Yes	No	
6/5/2018 0:57		Alexander Sayenko	47308	9020	Yes	No	
		Alexander Sayenko	47308	9040	Yes	Yes	

		Alexander Sayenko	47308	9150	Yes	Yes	
6/5/2018 0:57		Alexander Sayenko	47308	9800	Yes	No	
6/10/2018 12:41		Alexander Sayenko	47308	8800	Yes	No	
6/10/2018 12:41		Alexander Sayenko	47308	8810	Yes	No	
6/7/2018 1:03		Alexander Sayenko	47308	9080	Yes	No	
6/5/2018 0:57		Hanbyul Seo	57341	9090	Yes	No	
6/5/2018 0:57		Hanbyul Seo	57341	9100	Yes	No	Approval
6/5/2018 0:57		Haiyang Quan	35212	9110	Yes	No	Approval
6/5/2018 0:57		Haiyang Quan	35212	12260	Yes	No	Information
		Haiyang Quan	35212	9140	Yes	Yes	Approval
6/5/2018 0:57		Haiyang Quan	35212	9130	Yes	No	Approval
6/5/2018 0:57		Haiyang Quan	35212	10290	Yes	No	Discussion
6/5/2018 0:57		Haiyang Quan	35212	10540	Yes	No	Information
6/5/2018 0:57		Haiyang Quan	35212	7070	Yes	No	Approval
6/5/2018 0:57		Haiyang Quan	35212	9180	Yes	No	Approval

6/5/2018 0:57		Haiyang Quan	35212	9500	Yes	No	Discussion
6/5/2018 0:57		Haiyang Quan	35212	8400	Yes	No	Discussion
6/5/2018 0:57		Haiyang Quan	35212	8320	Yes	No	Discussion
6/5/2018 0:57		Haiyang Quan	35212	11550	Yes	No	Discussion
6/5/2018 0:57		Haiyang Quan	35212	8100	Yes	No	Discussion
6/5/2018 0:57		Haiyang Quan	35212	8970	Yes	No	Discussion
6/5/2018 0:57		Haiyang Quan	35212	9750	Yes	No	Discussion
6/5/2018 0:57		Yang Tang	56725	9260	Yes	No	Approval
6/5/2018 0:57		Yang Tang	56725	9270	Yes	No	Approval
6/5/2018 0:57		Yang Tang	56725	7630	Yes	No	Discussion

6/5/2018 0:57		Eddy Kwon	60306	9290	Yes	No	Discussion
6/5/2018 0:57		David Mazzarese	44044	130600	Yes	No	
6/5/2018 0:57		Eddy Kwon	60306	9310	Yes	No	Approval
6/5/2018 0:57		David Mazzarese	44044	130500	Yes	No	Approval

6/5/2018 0:57		Anatoliy Ioffe	76818	9330	Yes	No	Discussion
6/5/2018 0:57		Anatoliy Ioffe	76818	9340	Yes	No	Approval
6/5/2018 0:57		Anatoliy Ioffe	76818	9350	Yes	No	Approval
6/5/2018 0:57		David Mazzarese	44044	9300	Yes	No	

6/5/2018 0:57		David Mazzarese	44044	9320	Yes	No	
6/5/2018 0:57		Youn hyoung Heo	47007	8120	Yes	No	
6/5/2018 0:57		Youn hyoung Heo	47007	9390	Yes	No	
6/5/2018 0:57		Hassan Yaghoobi	34546	9400	Yes	No	Information
6/5/2018 0:57		Hassan Yaghoobi	34546	6980	Yes	No	Information
6/5/2018 0:57		Hassan Yaghoobi	34546	9420	Yes	No	Approval
		Hassan Yaghoobi	34546	9430	Yes	Yes	Approval
6/5/2018 0:57		Manivannan Thyagarajan	68484	9440	Yes	No	

6/5/2018 0:57		Iana Siomina	42857	12250	Yes	No	Approval
6/5/2018 0:57		Timo Lunttila	69949	9460	Yes	No	
6/5/2018 0:57		Manivannan Thyagarajan	68484	129800	Yes	No	Information
6/5/2018 0:57		Timo Lunttila	69949	126400	Yes	No	Information
6/5/2018 0:57		Yousuke Sano	73341	8310	Yes	No	Approval
6/5/2018 0:57		Hanbyul Seo	57341	10630	Yes	No	
6/5/2018 0:57		Yousuke Sano	73341	8160	Yes	No	Approval
6/5/2018 0:57		Dai Xizeng	41503	9520	Yes	No	Approval
6/5/2018 0:57		Dai Xizeng	41503	9530	Yes	No	Approval
6/5/2018 0:57		Dai Xizeng	41503	9540	Yes	No	Approval
6/5/2018 0:57		Dai Xizeng	41503	10900	Yes	No	Approval
6/5/2018 0:57		Dai Xizeng	41503	9560	Yes	No	Approval
6/5/2018 0:57		Dai Xizeng	41503	9780	Yes	No	Approval
6/5/2018 0:57		Dai Xizeng	41503	9580	Yes	No	Approval
6/5/2018 0:57		Dai Xizeng	41503	10870	Yes	No	Information
6/5/2018 0:57		Dai Xizeng	41503	9600	Yes	No	Approval
6/5/2018 0:57		Dai Xizeng	41503	9610	Yes	No	Approval
6/5/2018 0:57		Dai Xizeng	41503	6341	Yes	No	Discussion

6/5/2018 0:57		Dai Xizeng	41503	6790	Yes	Yes	Approval
6/5/2018 0:57		Dai Xizeng	41503	9650	Yes	No	Discussion
6/5/2018 0:57		Dai Xizeng	41503	9640	Yes	No	Discussion
6/5/2018 0:57		Dai Xizeng	41503	7670	Yes	No	Approval
6/5/2018 0:57		Dai Xizeng	41503	8190	Yes	No	Approval
6/5/2018 0:57		Dai Xizeng	41503	8060	Yes	No	Approval
6/5/2018 0:57		Dai Xizeng	41503	9690	Yes	No	Approval
6/5/2018 0:57		Dai Xizeng	41503	10470	Yes	No	Discussion
6/5/2018 0:57		Dai Xizeng	41503	9670	Yes	Yes	Approval
6/5/2018 0:57		Antti Immonen	70951	9720	Yes	No	
6/5/2018 0:57		Antti Toskala	69921	8110	Yes	No	Discussion

6/5/2018 0:57		Antti Toskala	69921	8350	Yes	No	Information
6/5/2018 0:57		Antti Toskala	69921	11351	Yes	No	Approval
6/5/2018 0:57		Antti Toskala	69921	7860	Yes	No	Agreement
6/5/2018 0:57		Ye Liu	57639	10790	Yes	No	Approval
6/5/2018 0:57		Ye Liu	57639	9570	Yes	No	Approval
6/5/2018 0:57		Ye Liu	57639	125600	Yes	No	Approval
6/5/2018 0:57		Antti Toskala	69921	9620	Yes	No	
6/5/2018 0:57		Antti Toskala	69921	11350	Yes	No	Information
6/5/2018 0:57		Aijuan Liu	43714	7550	Yes	No	Approval

6/5/2018 0:57		Antti Toskala	69921	9621	Yes	No	Information
6/5/2018 0:57		Qian Zhang	73473	9840	Yes	No	Approval
6/5/2018 0:57		Yankun Li	66748	9860	Yes	No	Approval
6/5/2018 0:57		Jian (James) XU	49608	6910	Yes	No	Approval
		Daniel Larsson	39861	9910	Yes	Yes	Decision
6/5/2018 0:57		Petri Vasenkari	69954	8140	Yes	No	Approval
6/8/2018 10:59		Kazuaki Takeda	43136	11510	Yes	No	
6/8/2018 10:59		Kazuaki Takeda	43136	12460	Yes	No	Information
6/8/2018 10:59		Kazuaki Takeda	43136	12150	Yes	No	Approval
6/15/2018 2:09		Kazuaki Takeda	43136	11830	Yes	No	Approval
6/5/2018 0:57		Kazuaki Takeda	43136	8360	Yes	No	Decision
6/5/2018 0:57		Kazuaki Takeda	43136	9940	Yes	No	
6/5/2018 0:57		Daniel Larsson	39861	7950	Yes	No	Decision

6/1/2018 7:48		Sasha Sirotkin	76792	9960	Yes	No	Approval
6/5/2018 0:57		Yankun Li	66748	8080	Yes	No	Approval
6/5/2018 0:57		Petri Vasenkari	69954	9850	Yes	No	Approval
6/12/2018 0:38		Youngwoo Yun	45048	8720	Yes	No	Discussion
6/12/2018 0:38		Youngwoo Yun	45048	10000	Yes	No	Approval
6/5/2018 0:57		Petri Vasenkari	69954	8070	Yes	No	Approval
6/5/2018 0:57		Hyeyoung Esthel Lee	56649	10730	Yes	No	Information
6/5/2018 0:57		Juergen Hofmann	68332	8210	Yes	No	Approval
6/5/2018 0:57		Chunhui Zhang	71195	10040	Yes	No	Approval
6/5/2018 0:57		Chunhui Zhang	71195	10050	Yes	No	Approval
6/5/2018 0:57		Chunhui Zhang	71195	10070	Yes	No	Approval
6/5/2018 0:57		Chunhui Zhang	71195	11270	Yes	No	Approval
6/5/2018 0:57		Florent Munier	46491	11700	Yes	No	Information

6/5/2018 0:57		Masaaki Obara	46347	10090	Yes	No	
6/5/2018 0:57		Nicolas Chuberre	21633	10410	Yes	No	Presentation
6/5/2018 0:57		Valentin Gheorghiu	43117	11520	Yes	No	Approval
6/12/2018 0:38		Valentin Gheorghiu	43117	10120	Yes	No	Approval
6/15/2018 2:09		Valentin Gheorghiu	43117	11340	Yes	No	Approval
6/5/2018 0:57		Valentin Gheorghiu	43117	10140	Yes	No	Approval

6/5/2018 0:57		Valentin Gheorghiu	43117	10930	Yes	No	Approval
		Alex Bladenis	63950	10160	Yes	Yes	Discussion
6/1/2018 9:51		Patrizia Testa	66129	10180	Yes	No	Discussion
6/1/2018 9:55		Patrizia Testa	66129	10170	Yes	No	Approval
6/1/2018 10:11		Patrizia Testa	66129	10200	Yes	No	Approval
6/14/2018 3:44		Patrizia Testa	66129	10210	Yes	No	Approval
6/14/2018 3:44		Patrizia Testa	66129	10190	Yes	No	Agreement
6/5/2018 0:57		Alex Bladenis	63950	6690	Yes	No	Discussion
6/5/2018 0:57		Florent Munier	46491	10080	Yes	No	

6/5/2018 0:57		Ruixin Wang	64036	10240	Yes	No	Discussion
6/4/2018 0:37		Jussi Kuusisto	39729	9710	Yes	No	Approval
6/5/2018 0:57		Ruixin Wang	64036	10260	Yes	No	Approval
6/4/2018 3:21		Masato Kitazoe	29801	10270	Yes	No	Approval
6/4/2018 3:21		Masato Kitazoe	29801	10280	Yes	No	Approval
6/4/2018 3:21		Masato Kitazoe	29801	11590	Yes	No	Discussion
6/5/2018 0:57		Ye Liu	57639	11320	Yes	No	Approval
6/5/2018 0:57		Florent Munier	46491	12180	Yes	No	Discussion
6/4/2018 0:37		Abdul Rasheed Mohammed	29230	10320	Yes	No	Approval
6/5/2018 0:57		Nicolas Chuberre	21633	6651	Yes	No	Approval
6/5/2018 0:57		Xiao Han	46713	10340	Yes	No	Approval
		Gen Cao	58500	10360	Yes	Yes	Approval
		Gen Cao	58500	10370	Yes	Yes	Approval

		Gen Cao	58500	10380	Yes	Yes	Approval
		Gen Cao	58500	10390	Yes	Yes	Approval
		Gen Cao	58500	10420	Yes	Yes	Approval
6/5/2018 0:57		Xiao Han	46713	10440	Yes	No	Approval
6/5/2018 0:57		Nicolas Chuberre	21633	10101	Yes	No	Approval
		Gen Cao	58500	10480	Yes	Yes	Approval
6/5/2018 0:57		Mattias Bergstrom	46046	10430	Yes	No	
6/5/2018 0:57		Xiao Han	46713	7160	Yes	No	
6/5/2018 0:57		Mattias Bergstrom	46046	131000	Yes	No	Information
6/5/2018 0:57		Mattias Bergstrom	46046	10490	Yes	No	
6/5/2018 0:57		Xiao Han	46713	8740	Yes	No	
6/5/2018 0:57		Gen Cao	58500	10520	Yes	No	Approval
6/5/2018 0:57		Mattias Bergstrom	46046	10460	Yes	No	
6/5/2018 0:57		Gen Cao	58500	10350	Yes	No	Approval
		Gen Cao	58500	10500	Yes	Yes	Approval
6/5/2018 0:57		Gen Cao	58500	10510	Yes	Yes	Approval
6/5/2018 0:57		Simone Provvedi	36483	8280	Yes	No	
6/5/2018 0:57		Simone Provvedi	36483	10700	Yes	No	Approval
6/5/2018 0:57		Simone Provvedi	36483	10550	Yes	No	Discussion

		Radha Krishna Ganti	66582	11250	Yes	Yes	
6/5/2018 0:57		Simone Provvedi	36483	10580	Yes	No	Approval
6/5/2018 0:57		Simone Provvedi	36483	10570	Yes	No	
6/5/2018 0:57		Radha Krishna Ganti	66582	11260	Yes	No	Approval
6/5/2018 0:57		Simone Provvedi	36483	11280	Yes	No	Approval
6/5/2018 0:57		Simone Provvedi	36483	10610	Yes	No	Approval
6/5/2018 0:57		Sari Nielsen	69936	11290	Yes	No	Approval
6/5/2018 0:57		Siva Subramani	61870	6290	Yes	No	Discussion

6/5/2018 0:57		Siva Subramani	61870	10640	Yes	No	Approval
6/5/2018 0:57		Sari Nielsen	69936	10650	Yes	No	Discussion
		Simone Provvedi	36483	10720	Yes	Yes	Approval
6/7/2018 1:03		Tero Henttonen	69943	10670	Yes	No	Approval
6/7/2018 1:03		Tero Henttonen	69943	11750	Yes	No	Approval
6/7/2018 1:03		Tero Henttonen	69943	12500	Yes	No	Information
6/5/2018 0:57		Mattias Bergstrom	46046	11570	Yes	No	

6/5/2018 0:57		Mattias Bergstrom	46046	10710	Yes	No	
6/5/2018 0:57		Sari Nielsen	69936	11460	Yes	No	Approval
		Sari Nielsen	69936	10110	Yes	Yes	Approval
6/5/2018 0:57		Bin Han	75122	10740	Yes	No	Approval
6/7/2018 11:31		Kyoungseok Oh	66120	12380	Yes	No	Approval
6/7/2018 11:31		Kyoungseok Oh	66120	12390	Yes	No	Approval
6/7/2018 11:31		Kyoungseok Oh	66120	10770	Yes	No	Approval
6/7/2018 11:31		Kyoungseok Oh	66120	11680	Yes	No	Approval
6/7/2018 11:31		Kyoungseok Oh	66120	9770	Yes	No	Approval
6/7/2018 11:31		Kyoungseok Oh	66120	8550	Yes	No	Approval
6/7/2018 11:31		Kyoungseok Oh	66120	10810	Yes	No	Approval
6/7/2018 11:31		Kyoungseok Oh	66120	8620	Yes	No	Approval
6/7/2018 11:31		Kyoungseok Oh	66120	11930	Yes	No	Approval
6/7/2018 11:31		Kyoungseok Oh	66120	11500	Yes	No	Approval
6/7/2018 11:31		Kyoungseok Oh	66120	10850	Yes	No	Approval
6/7/2018 11:31		Kyoungseok Oh	66120	10860	Yes	No	Approval
6/7/2018 11:31		Kyoungseok Oh	66120	9590	Yes	No	Approval
6/7/2018 11:31		Kyoungseok Oh	66120	8000	Yes	No	Approval

6/7/2018 11:31		Kyoungseok Oh	66120	10130	Yes	No	Approval
6/7/2018 11:31		Kyoungseok Oh	66120	9550	Yes	No	Approval
6/7/2018 11:31		Kyoungseok Oh	66120	8010	Yes	No	Approval
6/7/2018 11:31		Kyoungseok Oh	66120	7430	Yes	No	Approval
6/7/2018 11:31		Kyoungseok Oh	66120	10150	Yes	No	Approval
6/7/2018 11:31		Kyoungseok Oh	66120	7720	Yes	No	Approval
6/7/2018 11:31		Kyoungseok Oh	66120	10950	Yes	No	Approval
6/7/2018 11:31		Kyoungseok Oh	66120	7750	Yes	No	Approval
6/7/2018 11:31		Kyoungseok Oh	66120	10970	Yes	No	Approval
6/7/2018 11:31		Kyoungseok Oh	66120	10980	Yes	No	Approval
6/7/2018 11:31		Kyoungseok Oh	66120	10990	Yes	No	Approval
6/7/2018 11:31		Kyoungseok Oh	66120	12280	Yes	No	Approval
6/7/2018 11:31		Kyoungseok Oh	66120	7380	Yes	No	Approval
6/7/2018 11:31		Kyoungseok Oh	66120	11020	Yes	No	Approval
6/7/2018 11:31		Kyoungseok Oh	66120	11030	Yes	No	Approval
6/7/2018 11:31		Kyoungseok Oh	66120	11040	Yes	No	Approval
6/7/2018 11:31		Kyoungseok Oh	66120	11050	Yes	No	Approval
6/7/2018 11:31		Kyoungseok Oh	66120	11060	Yes	No	Approval

6/7/2018 11:31		Kyoungseok Oh	66120	11070	Yes	No	Approval
6/7/2018 11:31		Kyoungseok Oh	66120	11080	Yes	No	Approval
6/7/2018 11:31		Kyoungseok Oh	66120	11090	Yes	No	Approval
6/7/2018 11:31		Kyoungseok Oh	66120	11100	Yes	No	Approval
6/7/2018 11:31		Kyoungseok Oh	66120	11110	Yes	No	Approval
6/7/2018 11:31		Kyoungseok Oh	66120	11120	Yes	No	Approval
6/7/2018 11:31		Kyoungseok Oh	66120	11130	Yes	No	Approval
6/7/2018 11:31		Kyoungseok Oh	66120	11140	Yes	No	Approval
6/7/2018 11:31		Kyoungseok Oh	66120	11150	Yes	No	Approval
6/7/2018 11:31		Kyoungseok Oh	66120	11160	Yes	No	Approval
6/5/2018 0:57		Steffen Schmitz	64516	6400	Yes	No	Decision

6/5/2018 0:57		Giovanni Romano	10718	12170	Yes	No	Decision
6/1/2018 12:39		Takahiro Arai	65225	7130	Yes	No	
6/5/2018 0:57		Giovanni Romano	10718	8380	Yes	No	Discussion
6/5/2018 0:57		Hiromasa Umeda	40918	10560	Yes	No	Information

6/5/2018 0:57		Florin Baboescu	45772	11220	Yes	No	Approval
6/5/2018 0:57		Ye Liu	57639	9790	Yes	No	Approval
6/5/2018 0:57		Daniel Larsson	39861	11240	Yes	No	Decision
6/5/2018 0:57		Hiromasa Umeda	40918	10590	Yes	No	Approval
6/5/2018 0:57		Hiromasa Umeda	40918	11210	Yes	No	Approval
6/5/2018 0:57		Bin Han	75122	7780	Yes	No	Approval
6/5/2018 0:57		Pavan Nuggehalli	60166	10600	Yes	No	Decision

6/5/2018 0:57		Moray Rumney	6630	10620	Yes	No	Information
6/5/2018 0:57		John Dooley	74855	11300	Yes	No	Approval
6/5/2018 0:57		Thierry Berisot	77639	11890	Yes	No	Discussion
6/5/2018 0:57		Matthew Baker	68789	11800	Yes	No	Approval
6/5/2018 0:57		Gino Masini	23120	11330	Yes	No	Discussion
6/14/2018 17:53		Prashanth Akula	67450	10890	Yes	No	Approval
6/5/2018 0:57		Daniel Larsson	39861	9810	Yes	No	Decision

6/5/2018 0:57		Philippe Reininger	35013	11360	Yes	No	Approval
6/5/2018 0:57		Philippe Reininger	35013	9210	Yes	No	Discussion
		Philippe Reininger	35013	11380	Yes	Yes	Approval
6/5/2018 0:57		Philippe Reininger	35013	11390	Yes	No	Approval
6/5/2018 0:57		I-Kang Fu	54527	128600	Yes	No	Approval
6/5/2018 0:57		I-Kang Fu	54527	9760	Yes	No	Approval
6/5/2018 0:57		Philippe Reininger	35013	12420	Yes	No	Approval
		I-Kang Fu	54527	11430	Yes	Yes	Decision

6/5/2018 0:57		I-Kang Fu	54527	9920	Yes	No	Decision
6/5/2018 0:57		Philippe Reininger	35013	12520	Yes	No	Approval

6/5/2018 0:57		I-Kang Fu	54527	11440	Yes	No	Decision
6/5/2018 0:57		Martin Israelsson	2462	8040	Yes	No	Approval
6/5/2018 0:57		Martin Israelsson	2462	7460	Yes	No	
6/5/2018 0:57		Martin Israelsson	2462	12400	Yes	No	Information

6/5/2018 0:57		Martin Israelsson	2462	11660	Yes	No	Approval
6/5/2018 0:57		I-Kang Fu	54527	11600	Yes	No	Decision
6/5/2018 0:57		I-Kang Fu	54527	9870	Yes	No	Decision
		I-Kang Fu	54527	9230	Yes	Yes	
6/5/2018 0:57		Matteo Fiorani	70506	11490	Yes	No	Approval
6/5/2018 0:57		I-Kang Fu	54527	11530	Yes	No	Decision
		Hans van der Veen	12696	11200	Yes	Yes	Discussion

6/5/2018 0:57		Riikka Susitaival	44957	7890	Yes	No	Decision
6/5/2018 0:57		Riikka Susitaival	44957	8290	Yes	No	Decision
6/5/2018 0:57		Riikka Susitaival	44957	8130	Yes	No	Decision
		Riikka Susitaival	44957	11170	Yes	Yes	Decision
6/8/2018 10:59		Patrick Merias	52292	11610	Yes	No	Approval
6/8/2018 10:59		Patrick Merias	52292	11620	Yes	No	Approval
6/8/2018 10:59		Patrick Merias	52292	11630	Yes	No	Approval
6/8/2018 10:59		Patrick Merias	52292	11640	Yes	No	Approval
6/8/2018 10:59		Patrick Merias	52292	11650	Yes	No	Approval
6/8/2018 10:59		Patrick Merias	52292	8500	Yes	No	Approval
6/8/2018 10:59		Patrick Merias	52292	11670	Yes	No	Approval
6/8/2018 10:59		Patrick Merias	52292	10780	Yes	No	Approval
6/8/2018 10:59		Patrick Merias	52292	11690	Yes	No	Approval
6/8/2018 10:59		Patrick Merias	52292	10230	Yes	No	Approval
6/8/2018 10:59		Patrick Merias	52292	11710	Yes	No	Approval
6/8/2018 10:59		Patrick Merias	52292	7820	Yes	No	Approval
6/8/2018 10:59		Patrick Merias	52292	8530	Yes	No	Approval
6/8/2018 10:59		Patrick Merias	52292	11740	Yes	No	Approval
6/8/2018 10:59		Patrick Merias	52292	10680	Yes	No	Approval
6/8/2018 10:59		Patrick Merias	52292	8570	Yes	No	Approval
6/8/2018 10:59		Patrick Merias	52292	6930	Yes	No	Approval
6/8/2018 10:59		Patrick Merias	52292	11780	Yes	No	Approval

6/8/2018 10:59		Patrick Merias	52292	11790	Yes	No	Approval
6/8/2018 10:59		Patrick Merias	52292	9480	Yes	No	Approval
6/8/2018 10:59		Patrick Merias	52292	11810	Yes	No	Approval
6/8/2018 10:59		Patrick Merias	52292	11000	Yes	No	Approval
6/5/2018 0:57		Tim Frost	28235	6360	Yes	No	Discussion
6/5/2018 0:57		Tim Frost	28235	11840	Yes	No	Discussion
		Tim Frost	28235	11850	Yes	Yes	Approval
6/5/2018 0:57		Johan Bergman	51222	6540	Yes	No	
6/5/2018 0:57		Johan Bergman	51222	7830	Yes	No	
6/5/2018 0:57		Tim Frost	28235	10020	Yes	No	Discussion
6/5/2018 0:57		Johan Bergman	51222	8840	Yes	No	
6/5/2018 0:57		Minsoo Na	57735	11410	Yes	No	Decision
6/7/2018 1:03		Christian Hoymann	43006	11560	Yes	No	Agreement
6/5/2018 0:57		Johan Bergman	51222	10830	Yes	No	
6/5/2018 0:57		Johan Bergman	51222	12130	Yes	No	Approval
6/5/2018 0:57		Leif Mattisson	10602	6950	Yes	No	Approval

6/5/2018 0:57		Leif Mattisson	10602	6960	Yes	No	Approval
6/5/2018 0:57		Leif Mattisson	10602	11960	Yes	No	Approval
6/5/2018 0:57		Leif Mattisson	10602	6990	Yes	No	Approval
6/5/2018 0:57		Leif Mattisson	10602	7050	Yes	No	Approval
6/5/2018 0:57		Leif Mattisson	10602	7090	Yes	No	Approval
6/5/2018 0:57		Leif Mattisson	10602	7100	Yes	No	Approval
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6/5/2018 0:57		Leif Mattisson	10602	7150	Yes	No	Approval
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6/5/2018 0:57		Johan Bergman	51222	12240	Yes	No	Information
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6/7/2018 17:05		Juha Korhonen	21609	8540	Yes	No	Approval
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6/7/2018 17:05		Juha Korhonen	21609	11820	Yes	No	Approval
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6/8/2018 10:59	-			9081	Yes	No	-
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	-			9895	Yes	Yes	discussion
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APPENDIX 21

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IPR2024-00992

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62 items.

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APPENDIX 22

The Wayback Machine - https://web.archive.org/web/20160714061601/http://www.3gpp.org:80/specifications-groups/ran-plenary/ran1-radio-layer-1



The Mobile Broadband Standard
W-CDMA

RAN1 - Radio layer 1

NEW: (2016-04-11) As a result of acquisition of Alcatel-Lucent by Nokia please find here the support letter of Nokia for Matthew Baker to continue as Vice Chairman of 3GPP TSG RAN WG1.

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

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ADVANCED FTP SEARCH

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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 AHG1	Ad-hoc group on ITU (internal) co-ordination

FULL MEETING CALENDAR

GERAN	**71**	**Goteborg**	22-26 Aug 2016
CT	**73**	**New Orleans**	19-20 Sep 2016
RAN	**73**	**New Orleans**	19-22 Sep 2016
SA	**73**	**New Orleans**	21-23 Sep 2016
GERAN	**72**	**US**	14-18 Nov 2016
CT	**74**	**Vienna**	05-06 Dec 2016
RAN	**74**	**Vienna**	05-08 Dec 2016
SA	**74**	**Vienna**	07-09 Dec 2016
GERAN	**73**	**EU**	13-17 Feb 2017
CT	**75**	**Dubrovnik**	06-07 Mar 2017
RAN	**75**	**Dubrovnik**	06-09 Mar 2017
SA	**75**	**Dubrovnik**	08-10 Mar 2017
GERAN	**74**		15-19 May 2017
CT	**76**	**US**	05-06 Jun 2017
RAN	**76**	**US**	05-08 Jun 2017
SA	**76**	**US**	07-09 Jun 2017

ABOUT RELEASES

Release 14
Release 13
Release 12
Release 11
Release 10
Release 9
Release 8
Release 7
Release 6
Release 5
Release 4
Release 1999

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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The Wayback Machine - https://web.archive.org/web/20171015220927/http://www.3gpp.org:80/ftp/tsg_ran/

www.3gpp.org - /ftp/tsg_ran/

[To Parent Directory]

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The Wayback Machine - https://web.archive.org/web/20171016022701/http://www.3gpp.org:80/ftp/TSG_…

www.3gpp.org - /ftp/TSG_RAN/WG1_RL1/

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The Wayback Machine - https://web.archive.org/web/20171021161042/http://www.3gpp.org:80/ftp/tsg_ran…

www.3gpp.org - /ftp/tsg_ran/WG1_RL1/TSGR1_90b/

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www.3gpp.org / ftp / tsg_ran / WG1_RL1 / TSGR1_90b / Docs

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R1-1717042.zip	2017/10/02 12:21	131,7 KB
R1-1717043.zip	2017/10/02 12:21	176 KB
R1-1717044.zip	2017/10/02 12:21	130,9 KB
R1-1717045.zip	2017/10/02 12:21	41,7 KB
R1-1717046.zip	2017/09/27 14:40	159,9 KB
R1-1717047.zip	2017/10/02 17:40	22,4 KB
R1-1717048.zip	2017/10/02 14:07	43,6 KB
R1-1717049.zip	2017/10/02 14:07	51,7 KB
R1-1717050.zip	2017/10/02 14:07	145,9 KB
R1-1717051.zip	2017/10/02 14:07	343,8 KB
R1-1717052.zip	2017/10/02 14:07	77,8 KB
R1-1717053.zip	2017/10/02 13:59	160,1 KB
R1-1717054.zip	2017/10/02 13:59	43,1 KB
R1-1717055.zip	2017/10/02 13:59	58,9 KB
R1-1717056.zip	2017/10/02 17:40	29,3 KB
R1-1717057.zip	2017/10/02 17:40	37,4 KB
R1-1717058.zip	2017/10/02 17:40	266,2 KB
R1-1717059.zip	2017/10/02 17:40	104,4 KB
R1-1717060.zip	2017/10/03 2:58	39 KB
R1-1717061.zip	2017/10/02 19:53	535,9 KB
R1-1717062.zip	2017/10/02 19:53	451,5 KB
R1-1717063.zip	2017/10/03 0:39	158 KB
R1-1717064.zip	2017/10/02 19:53	54,2 KB
R1-1717065.zip	2017/10/02 19:53	203 KB
R1-1717066.zip	2017/10/03 0:18	174,4 KB
R1-1717067.zip	2017/10/02 19:53	146,5 KB
R1-1717068.zip	2017/10/02 19:53	55,5 KB
R1-1717069.zip	2017/10/02 19:53	337,6 KB
R1-1717070.zip	2017/10/02 19:53	970,7 KB
R1-1717071.zip	2017/10/02 19:53	329,7 KB

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sort by name/desc	sort by date/desc	sort by size/desc
R1-1717072.zip	2017/10/02 19:53	203,4 KB
R1-1717073.zip	2017/10/02 19:53	131,1 KB
R1-1717074.zip	2017/10/02 19:53	230,8 KB
R1-1717075.zip	2017/10/02 19:53	209,5 KB
R1-1717076.zip	2017/10/02 19:53	128,3 KB
R1-1717077.zip	2017/10/02 17:40	232,1 KB
R1-1717078.zip	2017/10/02 17:40	204,4 KB
R1-1717079.zip	2017/10/02 17:40	129,2 KB
R1-1717080.zip	2017/10/02 17:40	70 KB
R1-1717081.zip	2017/10/02 14:01	427,8 KB
R1-1717082.zip	2017/10/02 14:08	533,4 KB
R1-1717083.zip	2017/10/02 14:08	270 KB
R1-1717084.zip	2017/10/02 14:07	156 KB
R1-1717085.zip	2017/10/02 14:07	80 KB
R1-1717086.zip	2017/10/02 14:07	299,3 KB
R1-1717087.zip	2017/10/02 14:07	318,4 KB
R1-1717088.zip	2017/10/02 14:07	118,7 KB
R1-1717089.zip	2017/10/02 14:07	166,5 KB
R1-1717090.zip	2017/10/02 14:08	26,7 KB
R1-1717091.zip	2017/10/02 14:08	118,9 KB
R1-1717092.zip	2017/10/02 14:08	94,3 KB
R1-1717093.zip	2017/10/02 14:08	382,6 KB
R1-1717094.zip	2017/10/02 14:08	82,3 KB
R1-1717095.zip	2017/10/02 14:08	205,4 KB
R1-1717096.zip	2017/09/27 14:40	140,7 KB
R1-1717097.zip	2017/10/03 2:58	266,8 KB
R1-1717098.zip	2017/10/02 17:40	219,5 KB
R1-1717099.zip	2017/09/29 20:59	59,7 KB
R1-1717100.zip	2017/09/29 20:59	91,8 KB
R1-1717101.zip	2017/09/29 20:59	40 KB
R1-1717102.zip	2017/09/29 20:59	347,3 KB
R1-1717103.zip	2017/09/29 20:59	158,2 KB
R1-1717104.zip	2017/10/02 15:39	49,6 KB
R1-1717105.zip	2017/09/29 20:59	48,4 KB

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sort by name/desc	sort by date/desc	sort by size/desc
R1-1717106.zip	2017/09/29 20:59	21,6 KB
R1-1717107.zip	2017/09/29 20:59	68,5 KB
R1-1717108.zip	2017/09/29 19:57	57 KB
R1-1717109.zip	2017/09/29 19:57	39,3 KB
R1-1717110.zip	2017/09/29 19:57	61,9 KB
R1-1717111.zip	2017/09/29 19:57	65,4 KB
R1-1717112.zip	2017/09/29 19:57	65,2 KB
R1-1717113.zip	2017/09/29 19:57	96,9 KB
R1-1717114.zip	2017/09/29 19:57	160,5 KB
R1-1717115.zip	2017/09/29 19:57	77,5 KB
R1-1717116.zip	2017/09/29 19:57	148,2 KB
R1-1717117.zip	2017/09/29 19:57	137,4 KB
R1-1717118.zip	2017/09/29 19:57	51,9 KB
R1-1717119.zip	2017/09/29 9:01	44,5 KB
R1-1717120.zip	2017/09/29 9:01	134,5 KB
R1-1717121.zip	2017/09/29 9:01	37,3 KB
R1-1717122.zip	2017/09/29 9:01	122,6 KB
R1-1717123.zip	2017/09/29 9:01	43,7 KB
R1-1717124.zip	2017/09/30 2:37	98,8 KB
R1-1717125.zip	2017/09/30 2:37	44,8 KB
R1-1717126.zip	2017/09/30 2:37	42,2 KB
R1-1717127.zip	2017/09/30 2:37	47,2 KB
R1-1717128.zip	2017/09/30 2:37	144,3 KB
R1-1717129.zip	2017/09/30 2:37	433,8 KB
R1-1717130.zip	2017/09/30 2:37	57,9 KB
R1-1717131.zip	2017/09/30 2:37	249,7 KB
R1-1717132.zip	2017/09/30 2:37	211,6 KB
R1-1717133.zip	2017/09/30 2:37	72,8 KB
R1-1717134.zip	2017/09/30 2:37	27,5 KB
R1-1717135.zip	2017/09/30 2:37	83,6 KB
R1-1717136.zip	2017/09/30 2:37	74,7 KB
R1-1717137.zip	2017/09/30 2:37	40,6 KB
R1-1717138.zip	2017/09/30 2:37	545,8 KB
R1-1717139.zip	2017/09/30 2:37	34,9 KB

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sort by name/desc	sort by date/desc	sort by size/desc
R1-1717140.zip	2017/09/30 2:37	55,8 KB
R1-1717141.zip	2017/09/30 2:37	159,4 KB
R1-1717142.zip	2017/09/30 2:37	116,3 KB
R1-1717143.zip	2017/09/30 2:37	195 KB
R1-1717144.zip	2017/09/30 2:37	74,1 KB
R1-1717145.zip	2017/09/30 2:37	43,7 KB
R1-1717146.zip	2017/09/30 2:37	85,8 KB
R1-1717147.zip	2017/09/30 2:37	49,2 KB
R1-1717148.zip	2017/09/30 2:37	50 KB
R1-1717149.zip	2017/09/30 2:37	262,2 KB
R1-1717150.zip	2017/09/30 2:37	609,3 KB
R1-1717151.zip	2017/10/07 8:36	399 KB
R1-1717152.zip	2017/10/02 15:49	142,2 KB
R1-1717153.zip	2017/10/02 15:49	90,4 KB
R1-1717154.zip	2017/10/02 15:49	62,4 KB
R1-1717155.zip	2017/09/29 15:02	125,5 KB
R1-1717156.zip	2017/09/29 17:09	59,1 KB
R1-1717157.zip	2017/09/29 17:09	27,3 KB
R1-1717158.zip	2017/09/29 17:09	29,5 KB
R1-1717159.zip	2017/09/29 17:09	152,1 KB
R1-1717160.zip	2017/09/29 17:09	133,1 KB
R1-1717161.zip	2017/09/29 17:09	24,6 KB
R1-1717162.zip	2017/09/29 17:09	90 KB
R1-1717163.zip	2017/09/29 17:09	99,3 KB
R1-1717164.zip	2017/09/29 17:09	97,9 KB
R1-1717165.zip	2017/09/29 17:09	172,4 KB
R1-1717166.zip	2017/09/29 17:09	334,4 KB
R1-1717167.zip	2017/09/29 17:09	48,3 KB
R1-1717168.zip	2017/09/29 17:08	321,4 KB
R1-1717169.zip	2017/09/29 17:08	77,6 KB
R1-1717170.zip	2017/09/29 17:09	311,8 KB
R1-1717171.zip	2017/09/29 17:09	38 KB
R1-1717172.zip	2017/09/29 17:09	53,9 KB
R1-1717173.zip	2017/09/29 17:09	99,5 KB

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sort by name/desc	sort by date/desc	sort by size/desc
R1-1717174.zip	2017/09/29 17:09	52,4 KB
R1-1717175.zip	2017/09/29 17:09	53,4 KB
R1-1717176.zip	2017/09/29 17:09	30,7 KB
R1-1717177.zip	2017/09/29 17:09	180,8 KB
R1-1717178.zip	2017/09/29 17:09	293,5 KB
R1-1717179.zip	2017/09/29 17:09	33,7 KB
R1-1717180.zip	2017/09/29 17:09	61,8 KB
R1-1717181.zip	2017/09/29 15:02	22 KB
R1-1717182.zip	2017/09/29 15:02	23,3 KB
R1-1717183.zip	2017/09/29 15:02	115,5 KB
R1-1717184.zip	2017/09/29 15:02	153,2 KB
R1-1717185.zip	2017/09/29 15:02	39,5 KB
R1-1717186.zip	2017/09/29 15:02	66,4 KB
R1-1717187.zip	2017/09/29 15:02	34,2 KB
R1-1717188.zip	2017/09/29 15:02	23,9 KB
R1-1717189.zip	2017/09/29 15:02	35 KB
R1-1717190.zip	2017/09/29 15:02	23,3 KB
R1-1717191.zip	2017/09/27 20:55	19,6 KB
R1-1717192.zip	2017/09/30 4:01	111,6 KB
R1-1717193.zip	2017/09/30 4:01	160,8 KB
R1-1717194.zip	2017/09/30 4:01	123,5 KB
R1-1717195.zip	2017/09/30 4:01	48,9 KB
R1-1717196.zip	2017/09/30 4:01	55,8 KB
R1-1717197.zip	2017/09/30 4:01	105,7 KB
R1-1717198.zip	2017/09/30 4:01	55,6 KB
R1-1717199.zip	2017/09/30 4:01	237,5 KB
R1-1717200.zip	2017/09/30 4:01	54 KB
R1-1717201.zip	2017/09/30 4:01	55,7 KB
R1-1717202.zip	2017/09/30 4:01	332,4 KB
R1-1717203.zip	2017/09/30 4:01	414,7 KB
R1-1717204.zip	2017/09/30 4:01	219,7 KB
R1-1717205.zip	2017/09/30 4:01	75,8 KB
R1-1717206.zip	2017/09/30 4:01	58,3 KB
R1-1717207.zip	2017/09/30 4:01	134,2 KB

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sort by name/desc	sort by date/desc	sort by size/desc
R1-1717208.zip	2017/09/30 4:01	82,8 KB
R1-1717209.zip	2017/09/30 4:01	70,8 KB
R1-1717210.zip	2017/09/30 4:01	113,8 KB
R1-1717211.zip	2017/09/30 4:01	193,8 KB
R1-1717212.zip	2017/09/30 4:01	67,2 KB
R1-1717213.zip	2017/09/30 4:01	88,4 KB
R1-1717214.zip	2017/09/30 4:01	92,9 KB
R1-1717215.zip	2017/09/29 22:14	50 KB
R1-1717216.zip	2017/09/29 22:14	74,3 KB
R1-1717217.zip	2017/09/29 10:54	27,4 KB
R1-1717218.zip	2017/09/29 10:54	27,2 KB
R1-1717219.zip	2017/09/29 10:54	25,7 KB
R1-1717220.zip	2017/09/29 19:24	40,6 KB
R1-1717221.zip	2017/09/29 17:29	41,4 KB
R1-1717222.zip	2017/09/29 19:23	123,3 KB
R1-1717223.zip	2017/09/29 17:29	34 KB
R1-1717224.zip	2017/09/29 17:29	35,5 KB
R1-1717225.zip	2017/09/29 17:29	57,1 KB
R1-1717226.zip	2017/09/29 19:23	122,4 KB
R1-1717227.zip	2017/09/29 19:23	38,9 KB
R1-1717228.zip	2017/09/29 19:23	41,8 KB
R1-1717229.zip	2017/09/29 17:29	46,6 KB
R1-1717230.zip	2017/09/29 19:25	39,1 KB
R1-1717231.zip	2017/09/29 19:25	41,8 KB
R1-1717232.zip	2017/09/29 17:29	187,7 KB
R1-1717233.zip	2017/09/29 17:29	102,9 KB
R1-1717234.zip	2017/09/29 17:29	52,6 KB
R1-1717235.zip	2017/09/29 13:10	31,8 KB
R1-1717236.zip	2017/09/29 13:10	50,9 KB
R1-1717237.zip	2017/09/29 13:10	21,4 KB
R1-1717238.zip	2017/09/29 13:10	22,2 KB
R1-1717239.zip	2017/09/29 13:10	54,5 KB
R1-1717240.zip	2017/09/29 13:10	26,9 KB
R1-1717241.zip	2017/09/29 13:10	24,9 KB

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sort by name/desc	sort by date/desc	sort by size/desc
R1-1717242.zip	2017/09/29 13:10	206,6 KB
R1-1717243.zip	2017/09/29 2:52	80,8 KB
R1-1717244.zip	2017/09/29 22:09	101,1 KB
R1-1717245.zip	2017/09/30 5:50	34,9 KB
R1-1717246.zip	2017/09/30 5:50	60,6 KB
R1-1717247.zip	2017/09/30 5:50	326,3 KB
R1-1717248.zip	2017/09/30 5:50	50,2 KB
R1-1717249.zip	2017/09/30 5:50	152,6 KB
R1-1717250.zip	2017/09/30 5:50	39,6 KB
R1-1717251.zip	2017/09/30 5:50	52,9 KB
R1-1717252.zip	2017/09/30 5:50	64,9 KB
R1-1717253.zip	2017/09/30 5:50	41,9 KB
R1-1717254.zip	2017/09/30 5:50	50,9 KB
R1-1717255.zip	2017/09/30 5:50	41,1 KB
R1-1717256.zip	2017/09/30 5:50	40 KB
R1-1717257.zip	2017/09/30 5:50	1110,8 KB
R1-1717258.zip	2017/09/30 5:51	126,5 KB
R1-1717259.zip	2017/09/29 22:09	90,4 KB
R1-1717260.zip	2017/09/29 22:09	38,9 KB
R1-1717261.zip	2017/09/29 22:09	78,6 KB
R1-1717262.zip	2017/09/29 22:09	58,3 KB
R1-1717263.zip	2017/09/29 22:09	112 KB
R1-1717264.zip	2017/09/30 5:51	34,7 KB
R1-1717265.zip	2017/09/29 22:09	65,5 KB
R1-1717266.zip	2017/09/29 22:09	47,6 KB
R1-1717267.zip	2017/09/29 22:09	61,3 KB
R1-1717268.zip	2017/09/30 5:51	43,2 KB
R1-1717270.zip	2017/09/29 22:09	37,5 KB
R1-1717271.zip	2017/09/29 22:09	39,8 KB
R1-1717272.zip	2017/09/29 22:09	53,5 KB
R1-1717273.zip	2017/09/29 22:09	63,6 KB
R1-1717274.zip	2017/09/29 22:09	104,5 KB
R1-1717275.zip	2017/09/29 22:09	38,4 KB
R1-1717276.zip	2017/09/29 22:09	38,4 KB

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sort by name/desc	sort by date/desc	sort by size/desc
R1-1717277.zip	2017/09/29 22:09	36,8 KB
R1-1717278.zip	2017/09/29 22:09	309,1 KB
R1-1717279.zip	2017/09/29 22:09	77,6 KB
R1-1717280.zip	2017/09/29 22:09	52,5 KB
R1-1717281.zip	2017/09/29 22:09	437,7 KB
R1-1717282.zip	2017/09/29 22:09	45,2 KB
R1-1717283.zip	2017/09/29 22:09	40,9 KB
R1-1717284.zip	2017/09/29 22:09	40 KB
R1-1717285.zip	2017/09/29 22:09	41,8 KB
R1-1717286.zip	2017/09/29 22:09	347,5 KB
R1-1717287.zip	2017/09/29 11:31	149,9 KB
R1-1717288.zip	2017/09/29 11:31	39,5 KB
R1-1717289.zip	2017/09/30 5:51	51,6 KB
R1-1717290.zip	2017/09/30 5:51	66,9 KB
R1-1717291.zip	2017/09/29 22:10	1303,3 KB
R1-1717292.zip	2017/09/29 22:10	766,1 KB
R1-1717293.zip	2017/10/13 5:35	82,6 KB
R1-1717294.zip	2017/09/29 2:52	47,2 KB
R1-1717295.zip	2017/10/02 10:44	374 KB
R1-1717296.zip	2017/10/02 10:44	80,7 KB
R1-1717297.zip	2017/10/02 10:44	265,6 KB
R1-1717298.zip	2017/10/02 10:44	89 KB
R1-1717299.zip	2017/10/02 10:44	155,8 KB
R1-1717300.zip	2017/10/02 10:44	28,6 KB
R1-1717301.zip	2017/10/02 10:44	716,9 KB
R1-1717302.zip	2017/10/02 10:44	468,5 KB
R1-1717303.zip	2017/10/02 10:44	31,7 KB
R1-1717304.zip	2017/10/02 16:53	42,1 KB
R1-1717305.zip	2017/10/02 10:44	61,7 KB
R1-1717306.zip	2017/10/02 10:45	517,4 KB
R1-1717307.zip	2017/10/02 10:45	270,8 KB
R1-1717308.zip	2017/10/02 10:45	300,9 KB
R1-1717309.zip	2017/10/02 10:45	46,8 KB
R1-1717310.zip	2017/10/02 10:45	114,5 KB

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sort by name/desc	sort by date/desc	sort by size/desc
R1-1717311.zip	2017/10/02 18:56	60,8 KB
R1-1717312.zip	2017/10/02 18:56	264,6 KB
R1-1717313.zip	2017/09/28 6:46	431,3 KB
R1-1717314.zip	2017/10/03 5:32	16,2 KB
R1-1717315.zip	2017/10/03 6:00	14,3 KB
R1-1717316.zip	2017/10/03 5:32	27,9 KB
R1-1717317.zip	2017/09/30 6:21	67,5 KB
R1-1717318.zip	2017/09/30 6:47	51,9 KB
R1-1717319.zip	2017/09/30 6:47	52,6 KB
R1-1717320.zip	2017/09/30 6:47	64,3 KB
R1-1717321.zip	2017/09/30 6:47	110 KB
R1-1717322.zip	2017/09/30 6:47	618,2 KB
R1-1717323.zip	2017/09/30 6:47	53,3 KB
R1-1717324.zip	2017/09/30 6:47	55,5 KB
R1-1717325.zip	2017/09/30 6:21	188,8 KB
R1-1717326.zip	2017/09/30 6:21	48,7 KB
R1-1717327.zip	2017/09/30 6:21	95,2 KB
R1-1717328.zip	2017/09/30 6:21	46,7 KB
R1-1717329.zip	2017/09/30 6:21	83,5 KB
R1-1717330.zip	2017/09/30 6:20	735,8 KB
R1-1717331.zip	2017/09/30 6:20	246 KB
R1-1717332.zip	2017/09/30 6:20	1054,1 KB
R1-1717333.zip	2017/09/30 6:20	84,1 KB
R1-1717334.zip	2017/09/30 6:20	548,7 KB
R1-1717335.zip	2017/09/30 6:20	197,9 KB
R1-1717336.zip	2017/09/30 6:20	738,3 KB
R1-1717337.zip	2017/09/30 6:20	82,4 KB
R1-1717338.zip	2017/09/30 6:20	42,7 KB
R1-1717339.zip	2017/09/30 6:20	139,3 KB
R1-1717340.zip	2017/09/30 6:20	255,8 KB
R1-1717341.zip	2017/09/30 6:20	687,8 KB
R1-1717342.zip	2017/09/30 6:20	1022,8 KB
R1-1717343.zip	2017/09/30 6:20	214,8 KB
R1-1717344.zip	2017/09/30 6:21	67,5 KB

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sort by name/desc	sort by date/desc	sort by size/desc
R1-1717345.zip	2017/09/30 6:21	213,6 KB
R1-1717346.zip	2017/09/30 6:21	159 KB
R1-1717347.zip	2017/09/30 6:21	158,4 KB
R1-1717348.zip	2017/09/30 6:21	64,1 KB
R1-1717349.zip	2017/09/30 6:21	60,4 KB
R1-1717350.zip	2017/09/30 6:21	147,1 KB
R1-1717351.zip	2017/09/30 6:21	136 KB
R1-1717352.zip	2017/09/30 6:21	71,5 KB
R1-1717353.zip	2017/10/03 5:34	75,3 KB
R1-1717354.zip	2017/10/03 5:34	147,3 KB
R1-1717355.zip	2017/10/03 5:34	70,9 KB
R1-1717356.zip	2017/10/03 5:34	106,4 KB
R1-1717357.zip	2017/10/03 5:32	77,6 KB
R1-1717358.zip	2017/10/03 5:32	143,8 KB
R1-1717359.zip	2017/10/03 5:34	139,2 KB
R1-1717360.zip	2017/10/03 6:53	70,7 KB
R1-1717361.zip	2017/10/03 5:32	203,2 KB
R1-1717362.zip	2017/10/03 5:32	112,5 KB
R1-1717363.zip	2017/10/03 5:32	124 KB
R1-1717364.zip	2017/10/03 5:32	85,1 KB
R1-1717365.zip	2017/10/03 5:32	44,4 KB
R1-1717366.zip	2017/10/03 5:32	210,6 KB
R1-1717367.zip	2017/10/03 5:32	227,9 KB
R1-1717368.zip	2017/10/03 5:32	172,9 KB
R1-1717369.zip	2017/10/03 5:32	96,9 KB
R1-1717370.zip	2017/10/03 5:32	49 KB
R1-1717371.zip	2017/10/03 5:32	48,8 KB
R1-1717372.zip	2017/10/03 5:32	168,4 KB
R1-1717373.zip	2017/10/03 5:59	709,8 KB
R1-1717374.zip	2017/10/03 5:32	166,2 KB
R1-1717375.zip	2017/10/03 5:58	82,9 KB
R1-1717376.zip	2017/10/03 5:32	76,8 KB
R1-1717377.zip	2017/10/03 5:33	56,9 KB
R1-1717378.zip	2017/10/03 6:10	109,7 KB

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sort by name/desc	sort by date/desc	sort by size/desc
R1-1717379.zip	2017/10/03 5:33	200,2 KB
R1-1717380.zip	2017/10/03 6:10	124,4 KB
R1-1717381.zip	2017/10/03 5:33	296,9 KB
R1-1717382.zip	2017/10/03 5:33	165 KB
R1-1717383.zip	2017/10/03 6:00	65,8 KB
R1-1717384.zip	2017/10/03 5:33	81 KB
R1-1717385.zip	2017/10/03 5:33	1500 KB
R1-1717386.zip	2017/10/03 5:33	1960,4 KB
R1-1717387.zip	2017/10/03 5:33	98,9 KB
R1-1717388.zip	2017/10/03 5:33	133,9 KB
R1-1717389.zip	2017/10/03 5:33	110,1 KB
R1-1717390.zip	2017/10/03 5:33	63,9 KB
R1-1717391.zip	2017/10/03 5:33	82,9 KB
R1-1717392.zip	2017/10/03 5:33	192,9 KB
R1-1717393.zip	2017/10/03 6:10	114,8 KB
R1-1717394.zip	2017/10/03 6:10	58,2 KB
R1-1717395.zip	2017/10/03 6:00	266,7 KB
R1-1717396.zip	2017/10/03 5:33	470,4 KB
R1-1717397.zip	2017/10/03 5:33	84,3 KB
R1-1717398.zip	2017/10/03 5:33	482,6 KB
R1-1717399.zip	2017/10/03 5:33	202,4 KB
R1-1717400.zip	2017/10/03 5:33	55,4 KB
R1-1717401.zip	2017/10/03 6:00	58,8 KB
R1-1717402.zip	2017/10/03 7:14	99,3 KB
R1-1717404.zip	2017/10/03 5:33	280,7 KB
R1-1717405.zip	2017/10/03 5:33	461,2 KB
R1-1717406.zip	2017/10/03 5:33	74,2 KB
R1-1717407.zip	2017/10/03 5:33	185,7 KB
R1-1717408.zip	2017/10/03 5:34	83,2 KB
R1-1717409.zip	2017/10/03 6:00	55,9 KB
R1-1717410.zip	2017/10/03 5:34	137,8 KB
R1-1717411.zip	2017/09/28 6:46	46,9 KB
R1-1717412.zip	2017/10/03 5:34	158,2 KB
R1-1717413.zip	2017/09/29 22:54	25,7 KB

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sort by name/desc	sort by date/desc	sort by size/desc
R1-1717414.zip	2017/09/29 22:54	38,7 KB
R1-1717415.zip	2017/09/28 23:46	136,5 KB
R1-1717416.zip	2017/10/03 3:11	828,6 KB
R1-1717417.zip	2017/10/03 3:11	798,2 KB
R1-1717418.zip	2017/10/03 3:11	67,8 KB
R1-1717419.zip	2017/10/03 3:11	79,6 KB
R1-1717420.zip	2017/10/03 3:11	188,5 KB
R1-1717421.zip	2017/10/03 3:11	90,7 KB
R1-1717422.zip	2017/10/03 3:11	49,2 KB
R1-1717423.zip	2017/10/03 3:11	109,9 KB
R1-1717424.zip	2017/10/03 3:11	237,3 KB
R1-1717425.zip	2017/10/03 3:11	319 KB
R1-1717426.zip	2017/10/03 3:11	66,9 KB
R1-1717427.zip	2017/10/03 3:11	365,9 KB
R1-1717428.zip	2017/10/03 3:11	105,2 KB
R1-1717429.zip	2017/10/03 3:11	291,8 KB
R1-1717430.zip	2017/10/03 3:11	268,2 KB
R1-1717431.zip	2017/10/03 3:11	92,4 KB
R1-1717432.zip	2017/10/03 3:11	61,5 KB
R1-1717433.zip	2017/10/03 3:18	180,4 KB
R1-1717434.zip	2017/10/03 3:18	299,3 KB
R1-1717435.zip	2017/10/03 3:19	264,3 KB
R1-1717436.zip	2017/10/03 3:19	117,5 KB
R1-1717437.zip	2017/10/03 3:19	268 KB
R1-1717438.zip	2017/10/03 3:19	96,3 KB
R1-1717439.zip	2017/09/30 1:47	178,8 KB
R1-1717440.zip	2017/09/30 1:47	112 KB
R1-1717441.zip	2017/09/30 1:47	86,8 KB
R1-1717442.zip	2017/10/02 12:22	238,9 KB
R1-1717443.zip	2017/09/29 15:55	87,7 KB
R1-1717444.zip	2017/09/29 15:55	29,2 KB
R1-1717445.zip	2017/09/29 15:55	142,4 KB
R1-1717446.zip	2017/09/29 15:42	115,6 KB
R1-1717447.zip	2017/09/29 15:42	203,6 KB

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sort by name/desc	sort by date/desc	sort by size/desc
R1-1717448.zip	2017/09/29 15:42	84,9 KB
R1-1717449.zip	2017/09/29 15:42	2006,6 KB
R1-1717450.zip	2017/09/29 15:42	25,6 KB
R1-1717451.zip	2017/09/29 18:01	52,1 KB
R1-1717452.zip	2017/09/29 18:01	70,4 KB
R1-1717453.zip	2017/09/29 18:01	40,9 KB
R1-1717454.zip	2017/09/29 18:01	106,8 KB
R1-1717455.zip	2017/09/29 18:01	35,9 KB
R1-1717456.zip	2017/09/30 5:24	59,2 KB
R1-1717457.zip	2017/09/30 5:24	52,1 KB
R1-1717458.zip	2017/09/30 5:24	55,1 KB
R1-1717459.zip	2017/10/03 3:01	106,3 KB
R1-1717460.zip	2017/10/03 3:01	62,1 KB
R1-1717461.zip	2017/10/03 3:01	487,8 KB
R1-1717462.zip	2017/10/03 3:01	64,5 KB
R1-1717464.zip	2017/10/03 3:01	39 KB
R1-1717465.zip	2017/10/03 3:01	265,6 KB
R1-1717466.zip	2017/10/03 3:01	224,4 KB
R1-1717467.zip	2017/10/03 3:01	87,2 KB
R1-1717468.zip	2017/10/03 3:01	79,3 KB
R1-1717469.zip	2017/10/03 3:01	171,5 KB
R1-1717470.zip	2017/10/03 3:01	69,3 KB
R1-1717471.zip	2017/10/03 3:01	72,1 KB
R1-1717472.zip	2017/10/03 3:01	374,5 KB
R1-1717473.zip	2017/10/03 3:01	45,2 KB
R1-1717474.zip	2017/10/03 3:01	69,3 KB
R1-1717475.zip	2017/10/03 3:01	41,3 KB
R1-1717476.zip	2017/10/03 3:01	190,7 KB
R1-1717477.zip	2017/10/03 3:02	417,7 KB
R1-1717478.zip	2017/10/03 3:02	61,2 KB
R1-1717479.zip	2017/10/03 3:02	50,2 KB
R1-1717480.zip	2017/10/03 3:02	70,7 KB
R1-1717481.zip	2017/10/03 3:02	42,1 KB
R1-1717482.zip	2017/10/03 3:02	39,1 KB

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sort by name/desc	sort by date/desc	sort by size/desc
R1-1717483.zip	2017/10/03 3:02	256,9 KB
R1-1717484.zip	2017/10/03 3:02	122,5 KB
R1-1717485.zip	2017/10/03 3:02	136,5 KB
R1-1717486.zip	2017/10/03 3:02	128,6 KB
R1-1717487.zip	2017/10/03 3:02	65,9 KB
R1-1717488.zip	2017/10/03 3:02	34,5 KB
R1-1717489.zip	2017/10/03 3:02	90,4 KB
R1-1717490.zip	2017/10/03 3:02	58,8 KB
R1-1717491.zip	2017/10/03 3:02	65 KB
R1-1717492.zip	2017/10/03 3:02	324,8 KB
R1-1717493.zip	2017/10/03 3:02	221,1 KB
R1-1717494.zip	2017/10/03 3:02	45,1 KB
R1-1717495.zip	2017/10/03 3:02	214,2 KB
R1-1717496.zip	2017/10/03 3:02	59,6 KB
R1-1717497.zip	2017/10/03 3:02	134,6 KB
R1-1717498.zip	2017/10/03 3:02	70,2 KB
R1-1717499.zip	2017/10/03 3:02	38,8 KB
R1-1717500.zip	2017/10/03 3:02	191,9 KB
R1-1717501.zip	2017/10/03 3:02	65 KB
R1-1717502.zip	2017/10/03 3:02	149,8 KB
R1-1717503.zip	2017/10/03 3:02	34,3 KB
R1-1717504.zip	2017/10/03 3:02	135 KB
R1-1717505.zip	2017/10/03 3:02	41,5 KB
R1-1717507.zip	2017/10/03 3:02	58,8 KB
R1-1717508.zip	2017/10/03 3:02	46,8 KB
R1-1717509.zip	2017/10/03 3:02	268,2 KB
R1-1717510.zip	2017/10/03 3:02	73,6 KB
R1-1717511.zip	2017/10/02 23:13	327,3 KB
R1-1717512.zip	2017/10/02 23:13	32,1 KB
R1-1717513.zip	2017/10/02 23:13	199,1 KB
R1-1717514.zip	2017/10/02 23:13	122,6 KB
R1-1717515.zip	2017/10/02 23:13	123,6 KB
R1-1717516.zip	2017/10/02 23:13	426,4 KB
R1-1717517.zip	2017/10/02 23:13	76,4 KB

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sort by name/desc	sort by date/desc	sort by size/desc
R1-1717518.zip	2017/10/02 23:13	68 KB
R1-1717519.zip	2017/10/02 23:13	146,1 KB
R1-1717520.zip	2017/10/02 23:13	113,9 KB
R1-1717521.zip	2017/10/02 23:13	132,1 KB
R1-1717522.zip	2017/10/02 23:13	49,1 KB
R1-1717523.zip	2017/09/30 3:32	38,4 KB
R1-1717524.zip	2017/09/29 22:07	46,2 KB
R1-1717525.zip	2017/09/30 2:51	48,6 KB
R1-1717526.zip	2017/09/30 2:51	78,7 KB
R1-1717527.zip	2017/09/30 2:51	47,2 KB
R1-1717528.zip	2017/09/30 2:51	130,8 KB
R1-1717529.zip	2017/09/30 2:51	104 KB
R1-1717530.zip	2017/09/30 2:51	59,4 KB
R1-1717531.zip	2017/09/30 2:51	51,7 KB
R1-1717532.zip	2017/09/30 2:50	47,5 KB
R1-1717533.zip	2017/09/30 2:50	47,2 KB
R1-1717534.zip	2017/09/30 2:50	50,3 KB
R1-1717535.zip	2017/09/30 2:50	59,6 KB
R1-1717536.zip	2017/09/30 2:50	47,6 KB
R1-1717537.zip	2017/09/30 2:50	46,7 KB
R1-1717538.zip	2017/09/30 2:50	46,9 KB
R1-1717539.zip	2017/09/30 2:50	57,3 KB
R1-1717540.zip	2017/09/30 2:50	55,8 KB
R1-1717541.zip	2017/09/30 2:50	79,1 KB
R1-1717542.zip	2017/09/30 2:50	52,7 KB
R1-1717543.zip	2017/09/30 2:50	73,8 KB
R1-1717544.zip	2017/09/30 2:50	54,1 KB
R1-1717545.zip	2017/09/30 2:50	53,2 KB
R1-1717546.zip	2017/09/30 2:51	205,8 KB
R1-1717547.zip	2017/09/30 2:51	63,9 KB
R1-1717548.zip	2017/09/30 4:40	53,2 KB
R1-1717549.zip	2017/09/30 4:40	54,6 KB
R1-1717550.zip	2017/09/30 4:40	57,4 KB
R1-1717551.zip	2017/09/30 4:40	53,9 KB

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sort by name/desc	sort by date/desc	sort by size/desc
R1-1717552.zip	2017/09/30 4:40	119,2 KB
R1-1717553.zip	2017/09/30 5:55	191,4 KB
R1-1717554.zip	2017/09/30 3:41	131,4 KB
R1-1717555.zip	2017/09/30 5:55	57,8 KB
R1-1717556.zip	2017/09/30 5:42	105,7 KB
R1-1717557.zip	2017/09/30 3:05	130,4 KB
R1-1717558.zip	2017/09/30 3:05	208,8 KB
R1-1717559.zip	2017/09/30 3:41	54,8 KB
R1-1717560.zip	2017/09/30 3:05	38,6 KB
R1-1717561.zip	2017/09/30 3:41	113,1 KB
R1-1717562.zip	2017/09/30 3:41	162,7 KB
R1-1717563.zip	2017/09/29 15:51	150,4 KB
R1-1717564.zip	2017/09/30 3:32	49 KB
R1-1717565.zip	2017/09/30 3:32	112,4 KB
R1-1717566.zip	2017/09/30 3:32	52,5 KB
R1-1717567.zip	2017/09/30 3:32	108,9 KB
R1-1717568.zip	2017/09/30 3:33	112,3 KB
R1-1717569.zip	2017/09/30 3:33	45,4 KB
R1-1717570.zip	2017/09/30 3:33	147,1 KB
R1-1717571.zip	2017/09/30 3:33	183 KB
R1-1717572.zip	2017/09/30 3:33	48,2 KB
R1-1717573.zip	2017/09/30 3:33	160,8 KB
R1-1717574.zip	2017/09/30 4:26	55,5 KB
R1-1717575.zip	2017/09/30 4:26	80,9 KB
R1-1717576.zip	2017/10/02 21:13	220,7 KB
R1-1717577.zip	2017/10/02 21:13	177,6 KB
R1-1717578.zip	2017/10/02 17:37	215,1 KB
R1-1717579.zip	2017/10/02 7:31	43,4 KB
R1-1717580.zip	2017/10/02 3:57	95,3 KB
R1-1717581.zip	2017/10/02 11:29	577 KB
R1-1717582.zip	2017/10/03 3:59	371,9 KB
R1-1717583.zip	2017/10/02 17:37	254,8 KB
R1-1717584.zip	2017/10/02 17:37	40,5 KB
R1-1717585.zip	2017/10/02 11:29	53,3 KB

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sort by name/desc	sort by date/desc	sort by size/desc
R1-1717586.zip	2017/10/03 4:17	62,4 KB
R1-1717587.zip	2017/10/03 3:59	157,4 KB
R1-1717588.zip	2017/10/03 3:59	125,6 KB
R1-1717589.zip	2017/10/03 3:59	465,4 KB
R1-1717590.zip	2017/10/03 3:59	38 KB
R1-1717591.zip	2017/10/02 11:29	62,9 KB
R1-1717592.zip	2017/10/03 3:30	41,9 KB
R1-1717593.zip	2017/10/03 3:30	34,9 KB
R1-1717594.zip	2017/10/02 21:09	46,6 KB
R1-1717595.zip	2017/10/02 22:10	273,9 KB
R1-1717596.zip	2017/10/02 21:09	47,8 KB
R1-1717597.zip	2017/10/02 15:42	133,4 KB
R1-1717598.zip	2017/10/02 5:40	1143,1 KB
R1-1717599.zip	2017/10/02 15:42	1480,7 KB
R1-1717600.zip	2017/10/02 14:27	70,9 KB
R1-1717601.zip	2017/10/02 15:42	32,6 KB
R1-1717602.zip	2017/10/02 14:27	266,2 KB
R1-1717603.zip	2017/10/02 15:42	120,4 KB
R1-1717604.zip	2017/10/02 15:42	70,7 KB
R1-1717605.zip	2017/10/02 20:58	186,1 KB
R1-1717606.zip	2017/10/02 21:38	59,9 KB
R1-1717607.zip	2017/10/02 21:09	321 KB
R1-1717608.zip	2017/10/02 21:09	52,4 KB
R1-1717609.zip	2017/10/02 21:09	52,6 KB
R1-1717610.zip	2017/10/02 21:38	726,6 KB
R1-1717611.zip	2017/10/02 21:09	156,5 KB
R1-1717612.zip	2017/10/02 21:38	129 KB
R1-1717613.zip	2017/10/02 22:10	59,7 KB
R1-1717614.zip	2017/10/02 22:10	90,1 KB
R1-1717615.zip	2017/10/02 22:10	274,2 KB
R1-1717616.zip	2017/10/02 22:10	40,8 KB
R1-1717617.zip	2017/10/02 22:10	55,2 KB
R1-1717618.zip	2017/10/04 12:14	80 KB
R1-1717619.zip	2017/10/02 15:42	29,1 KB

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sort by name/desc	sort by date/desc	sort by size/desc
R1-1717620.zip	2017/10/02 2:41	70,3 KB
R1-1717621.zip	2017/10/02 2:42	89,7 KB
R1-1717622.zip	2017/10/02 21:58	128,5 KB
R1-1717623.zip	2017/10/02 14:27	50,9 KB
R1-1717624.zip	2017/10/02 21:58	86,9 KB
R1-1717625.zip	2017/10/02 21:58	39,7 KB
R1-1717626.zip	2017/10/02 20:58	42,9 KB
R1-1717627.zip	2017/10/02 20:58	171,7 KB
R1-1717628.zip	2017/10/02 5:40	47,3 KB
R1-1717629.zip	2017/10/02 5:40	173,8 KB
R1-1717630.zip	2017/10/02 15:42	114,9 KB
R1-1717631.zip	2017/10/02 11:29	991,8 KB
R1-1717632.zip	2017/10/02 15:42	171,7 KB
R1-1717633.zip	2017/10/02 5:40	138 KB
R1-1717634.zip	2017/10/02 17:37	83,2 KB
R1-1717635.zip	2017/10/02 2:36	163,7 KB
R1-1717636.zip	2017/10/02 11:29	357,6 KB
R1-1717637.zip	2017/10/02 11:29	164,4 KB
R1-1717638.zip	2017/10/01 23:24	325,8 KB
R1-1717639.zip	2017/10/01 23:24	1092,7 KB
R1-1717640.zip	2017/10/01 23:24	45,1 KB
R1-1717641.zip	2017/10/02 5:33	304,9 KB
R1-1717642.zip	2017/10/02 5:33	146 KB
R1-1717643.zip	2017/10/03 3:10	52,8 KB
R1-1717644.zip	2017/10/02 5:33	60,3 KB
R1-1717645.zip	2017/10/02 5:33	74,7 KB
R1-1717646.zip	2017/10/02 3:44	54,1 KB
R1-1717647.zip	2017/10/02 3:57	659,6 KB
R1-1717648.zip	2017/10/03 0:58	491,2 KB
R1-1717649.zip	2017/10/03 0:58	207,9 KB
R1-1717650.zip	2017/10/03 0:58	62,6 KB
R1-1717651.zip	2017/10/03 1:09	53,4 KB
R1-1717652.zip	2017/10/02 23:46	338,1 KB
R1-1717653.zip	2017/10/02 7:07	31,6 KB

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sort by name/desc	sort by date/desc	sort by size/desc
R1-1717654.zip	2017/10/03 3:06	129,7 KB
R1-1717655.zip	2017/10/03 4:20	61,8 KB
R1-1717656.zip	2017/10/02 3:44	52,9 KB
R1-1717657.zip	2017/10/03 0:58	639,4 KB
R1-1717658.zip	2017/10/03 0:58	1051,9 KB
R1-1717659.zip	2017/10/02 22:23	70,7 KB
R1-1717660.zip	2017/10/03 3:06	51,4 KB
R1-1717661.zip	2017/10/03 3:59	96,4 KB
R1-1717662.zip	2017/10/02 3:57	64,8 KB
R1-1717663.zip	2017/10/03 4:20	248,8 KB
R1-1717664.zip	2017/10/03 4:20	401,8 KB
R1-1717665.zip	2017/10/02 3:44	398,2 KB
R1-1717666.zip	2017/10/03 3:07	52,5 KB
R1-1717667.zip	2017/10/02 3:44	145,8 KB
R1-1717668.zip	2017/09/28 23:27	86,4 KB
R1-1717669.zip	2017/10/02 5:18	224,7 KB
R1-1717670.zip	2017/10/02 3:44	103,1 KB
R1-1717671.zip	2017/10/02 3:44	57,4 KB
R1-1717672.zip	2017/10/02 7:07	100 KB
R1-1717673.zip	2017/10/02 5:18	107,8 KB
R1-1717674.zip	2017/10/02 22:23	177,5 KB
R1-1717675.zip	2017/10/03 3:30	143,8 KB
R1-1717676.zip	2017/10/03 4:20	178,5 KB
R1-1717677.zip	2017/10/02 5:33	162,6 KB
R1-1717678.zip	2017/10/02 3:57	219,7 KB
R1-1717679.zip	2017/10/03 3:08	50 KB
R1-1717680.zip	2017/10/03 5:10	368,7 KB
R1-1717681.zip	2017/10/03 5:11	1001,2 KB
R1-1717682.zip	2017/10/03 5:11	119,8 KB
R1-1717683.zip	2017/10/03 5:11	125,7 KB
R1-1717684.zip	2017/10/03 5:11	568,6 KB
R1-1717685.zip	2017/09/29 5:05	101,8 KB
R1-1717686.zip	2017/09/29 5:05	131 KB
R1-1717687.zip	2017/10/03 5:49	197,5 KB

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sort by name/desc	sort by date/desc	sort by size/desc
R1-1717688.zip	2017/10/03 5:49	2503,6 KB
R1-1717689.zip	2017/10/03 5:50	485 KB
R1-1717690.zip	2017/10/03 5:11	472,4 KB
R1-1717691.zip	2017/10/02 7:08	58,3 KB
R1-1717692.zip	2017/10/03 0:58	50,2 KB
R1-1717693.zip	2017/10/03 3:08	49,6 KB
R1-1717694.zip	2017/10/03 3:59	79 KB
R1-1717695.zip	2017/10/03 4:20	294,5 KB
R1-1717696.zip	2017/09/30 4:00	47,6 KB
R1-1717697.zip	2017/09/30 4:00	99,1 KB
R1-1717698.zip	2017/09/30 4:00	45,7 KB
R1-1717699.zip	2017/09/30 4:00	100,5 KB
R1-1717700.zip	2017/09/30 4:00	56,7 KB
R1-1717701.zip	2017/09/30 4:00	61,4 KB
R1-1717702.zip	2017/09/30 4:00	92,8 KB
R1-1717703.zip	2017/09/30 4:00	62,7 KB
R1-1717704.zip	2017/09/30 4:00	54,6 KB
R1-1717705.zip	2017/09/30 4:00	55,7 KB
R1-1717706.zip	2017/09/30 4:00	286,8 KB
R1-1717707.zip	2017/09/30 4:00	93,7 KB
R1-1717708.zip	2017/09/30 4:00	55,3 KB
R1-1717709.zip	2017/09/30 4:00	105,4 KB
R1-1717710.zip	2017/09/30 4:00	89,2 KB
R1-1717711.zip	2017/09/30 4:00	73 KB
R1-1717712.zip	2017/09/29 13:29	74,7 KB
R1-1717713.zip	2017/10/02 21:23	684,2 KB
R1-1717714.zip	2017/10/02 21:23	87,9 KB
R1-1717715.zip	2017/10/02 21:23	87,7 KB
R1-1717716.zip	2017/10/02 21:23	85,8 KB
R1-1717717.zip	2017/10/02 21:23	185,9 KB
R1-1717718.zip	2017/10/02 21:23	64,6 KB
R1-1717719.zip	2017/10/02 21:23	245,6 KB
R1-1717720.zip	2017/10/02 21:23	317,2 KB
R1-1717721.zip	2017/10/02 21:23	136,3 KB

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sort by name/desc	sort by date/desc	sort by size/desc
R1-1717722.zip	2017/10/02 21:23	121,5 KB
R1-1717723.zip	2017/10/02 21:23	227,1 KB
R1-1717724.zip	2017/09/29 19:29	63,6 KB
R1-1717725.zip	2017/09/29 16:45	39,1 KB
R1-1717726.zip	2017/10/02 5:45	21,3 KB
R1-1717727.zip	2017/10/02 5:45	576,3 KB
R1-1717728.zip	2017/10/02 5:47	599,5 KB
R1-1717729.zip	2017/09/29 16:45	56,6 KB
R1-1717730.zip	2017/09/29 15:35	30,4 KB
R1-1717731.zip	2017/09/29 15:35	27,6 KB
R1-1717732.zip	2017/09/29 15:35	29,6 KB
R1-1717733.zip	2017/09/29 15:35	72,8 KB
R1-1717734.zip	2017/09/30 4:48	205,1 KB
R1-1717735.zip	2017/09/30 4:48	170,6 KB
R1-1717736.zip	2017/09/29 15:35	71,4 KB
R1-1717737.zip	2017/09/29 15:35	72,7 KB
R1-1717738.zip	2017/09/28 14:12	204 KB
R1-1717739.zip	2017/09/28 14:12	24,1 KB
R1-1717740.zip	2017/10/02 11:39	259,4 KB
R1-1717741.zip	2017/10/02 11:39	130,4 KB
R1-1717742.zip	2017/10/02 11:39	176,1 KB
R1-1717743.zip	2017/10/02 11:39	77,2 KB
R1-1717744.zip	2017/10/02 11:39	78,4 KB
R1-1717745.zip	2017/10/02 11:39	126,5 KB
R1-1717746.zip	2017/10/02 11:39	85,9 KB
R1-1717747.zip	2017/10/02 11:39	157,6 KB
R1-1717748.zip	2017/10/02 11:39	63,3 KB
R1-1717749.zip	2017/10/02 11:39	189 KB
R1-1717750.zip	2017/10/02 11:39	69,1 KB
R1-1717751.zip	2017/10/02 11:39	176,7 KB
R1-1717752.zip	2017/10/02 11:39	37,3 KB
R1-1717753.zip	2017/10/02 11:39	98,4 KB
R1-1717754.zip	2017/10/02 11:39	88,5 KB
R1-1717755.zip	2017/09/30 2:37	42,5 KB

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sort by name/desc	sort by date/desc	sort by size/desc
R1-1717756.zip	2017/09/30 2:37	25,4 KB
R1-1717757.zip	2017/09/29 17:08	266,6 KB
R1-1717758.zip	2017/09/29 17:08	113,3 KB
R1-1717759.zip	2017/09/29 17:08	133,5 KB
R1-1717760.zip	2017/10/02 20:54	152,3 KB
R1-1717761.zip	2017/10/03 5:57	550,5 KB
R1-1717762.zip	2017/09/29 23:30	93,9 KB
R1-1717763.zip	2017/09/29 23:43	147,4 KB
R1-1717764.zip	2017/09/30 4:01	52,5 KB
R1-1717765.zip	2017/09/30 4:53	57,8 KB
R1-1717766.zip	2017/09/30 4:53	28,2 KB
R1-1717767.zip	2017/09/30 4:53	83,1 KB
R1-1717768.zip	2017/09/30 4:53	153,8 KB
R1-1717769.zip	2017/09/30 4:53	81,1 KB
R1-1717770.zip	2017/09/30 4:53	69,6 KB
R1-1717771.zip	2017/09/29 19:30	31,7 KB
R1-1717772.zip	2017/09/29 10:56	71,7 KB
R1-1717773.zip	2017/09/29 10:56	79,5 KB
R1-1717774.zip	2017/09/29 10:56	125,1 KB
R1-1717775.zip	2017/09/29 10:56	110,1 KB
R1-1717776.zip	2017/09/29 10:56	220,9 KB
R1-1717777.zip	2017/09/29 10:56	68,5 KB
R1-1717778.zip	2017/09/29 10:56	109,5 KB
R1-1717779.zip	2017/10/03 5:38	164,7 KB
R1-1717780.zip	2017/10/03 4:13	238,8 KB
R1-1717781.zip	2017/10/03 5:09	66 KB
R1-1717782.zip	2017/10/03 5:10	123,5 KB
R1-1717783.zip	2017/09/29 8:49	17,9 KB
R1-1717784.zip	2017/09/29 22:54	115,5 KB
R1-1717785.zip	2017/09/29 1:33	53,7 KB
R1-1717786.zip	2017/10/03 2:00	21,2 KB
R1-1717787.zip	2017/10/03 1:02	15,1 KB
R1-1717788.zip	2017/10/03 1:02	14,6 KB
R1-1717789.zip	2017/09/30 5:04	101,3 KB

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sort by name/desc	sort by date/desc	sort by size/desc
R1-1717790.zip	2017/09/30 5:04	287,9 KB
R1-1717791.zip	2017/09/30 5:04	29,3 KB
R1-1717792.zip	2017/09/30 5:04	649,2 KB
R1-1717793.zip	2017/09/30 5:04	88,1 KB
R1-1717794.zip	2017/09/30 5:04	57,5 KB
R1-1717795.zip	2017/09/30 5:04	183,3 KB
R1-1717796.zip	2017/09/30 5:04	112,7 KB
R1-1717797.zip	2017/10/03 1:02	90,9 KB
R1-1717798.zip	2017/10/03 1:02	74,8 KB
R1-1717799.zip	2017/10/03 1:02	76,2 KB
R1-1717800.zip	2017/10/03 1:02	101,2 KB
R1-1717801.zip	2017/10/03 1:02	67,7 KB
R1-1717802.zip	2017/10/03 1:02	181,8 KB
R1-1717803.zip	2017/10/03 1:02	232,2 KB
R1-1717804.zip	2017/10/03 1:02	43 KB
R1-1717805.zip	2017/10/03 1:02	75,6 KB
R1-1717806.zip	2017/10/03 1:02	61,7 KB
R1-1717807.zip	2017/10/03 1:02	135,2 KB
R1-1717808.zip	2017/10/03 1:02	57,2 KB
R1-1717809.zip	2017/10/03 1:02	46,8 KB
R1-1717810.zip	2017/10/03 1:02	48,1 KB
R1-1717811.zip	2017/10/03 1:02	163,9 KB
R1-1717812.zip	2017/10/03 1:02	436,4 KB
R1-1717813.zip	2017/10/03 1:02	71 KB
R1-1717814.zip	2017/10/03 1:02	263,3 KB
R1-1717815.zip	2017/10/03 1:02	64,2 KB
R1-1717816.zip	2017/10/03 1:02	77,1 KB
R1-1717817.zip	2017/10/03 1:02	106,4 KB
R1-1717818.zip	2017/10/03 1:02	100,6 KB
R1-1717819.zip	2017/10/03 1:02	66,8 KB
R1-1717820.zip	2017/10/03 1:02	60,3 KB
R1-1717821.zip	2017/10/03 1:02	33,4 KB
R1-1717822.zip	2017/10/03 5:32	189,2 KB
R1-1717823.zip	2017/10/03 5:46	129,4 KB

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sort by name/desc	sort by date/desc	sort by size/desc
R1-1717824.zip	2017/10/03 1:02	62,9 KB
R1-1717825.zip	2017/10/03 5:32	36,8 KB
R1-1717826.zip	2017/10/03 1:02	183 KB
R1-1717827.zip	2017/10/03 1:02	60 KB
R1-1717828.zip	2017/10/03 1:02	349,6 KB
R1-1717829.zip	2017/10/03 1:02	548,1 KB
R1-1717830.zip	2017/10/03 1:02	126,1 KB
R1-1717831.zip	2017/10/03 1:02	640,7 KB
R1-1717832.zip	2017/10/03 5:32	54,2 KB
R1-1717833.zip	2017/10/03 1:02	175,1 KB
R1-1717834.zip	2017/10/03 1:02	198,4 KB
R1-1717835.zip	2017/10/03 1:02	48,5 KB
R1-1717836.zip	2017/10/03 5:32	47,2 KB
R1-1717837.zip	2017/10/03 1:02	52,6 KB
R1-1717838.zip	2017/10/03 1:02	132,1 KB
R1-1717839.zip	2017/10/03 5:46	53,3 KB
R1-1717840.zip	2017/10/03 1:02	57 KB
R1-1717841.zip	2017/10/03 5:46	128,2 KB
R1-1717842.zip	2017/10/03 1:02	351,8 KB
R1-1717844.zip	2017/10/03 1:02	395,3 KB
R1-1717845.zip	2017/10/03 1:03	147 KB
R1-1717846.zip	2017/10/03 1:03	141,6 KB
R1-1717847.zip	2017/10/03 1:03	99,8 KB
R1-1717848.zip	2017/10/03 2:01	22,1 KB
R1-1717849.zip	2017/10/03 1:03	75,1 KB
R1-1717850.zip	2017/10/03 5:32	160,1 KB
R1-1717851.zip	2017/09/30 5:04	36,3 KB
R1-1717852.zip	2017/09/30 5:40	199,8 KB
R1-1717853.zip	2017/10/02 1:07	134 KB
R1-1717854.zip	2017/10/02 1:07	71,6 KB
R1-1717855.zip	2017/10/02 1:07	65 KB
R1-1717856.zip	2017/10/02 1:08	91,9 KB
R1-1717857.zip	2017/10/02 1:08	44,5 KB
R1-1717858.zip	2017/10/02 1:08	108,3 KB

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sort by name/desc	sort by date/desc	sort by size/desc
R1-1717859.zip	2017/10/02 1:08	87,1 KB
R1-1717860.zip	2017/10/02 1:08	96,7 KB
R1-1717861.zip	2017/10/02 1:08	183,9 KB
R1-1717862.zip	2017/10/02 1:08	76 KB
R1-1717863.zip	2017/10/02 1:08	109,7 KB
R1-1717864.zip	2017/10/02 1:08	76,2 KB
R1-1717865.zip	2017/10/02 1:08	69 KB
R1-1717866.zip	2017/10/02 1:08	75,5 KB
R1-1717867.zip	2017/10/02 1:08	64,9 KB
R1-1717868.zip	2017/09/30 5:40	206,9 KB
R1-1717869.zip	2017/09/30 6:21	57 KB
R1-1717870.zip	2017/09/30 5:04	30,4 KB
R1-1717871.zip	2017/09/30 6:21	57 KB
R1-1717872.zip	2017/09/30 5:40	285 KB
R1-1717873.zip	2017/09/30 5:40	115,2 KB
R1-1717874.zip	2017/09/30 5:40	134,4 KB
R1-1717875.zip	2017/09/30 6:21	45,5 KB
R1-1717876.zip	2017/09/30 3:02	702,3 KB
R1-1717877.zip	2017/09/30 3:02	32,4 KB
R1-1717878.zip	2017/09/30 3:02	163,9 KB
R1-1717879.zip	2017/09/30 3:02	54,1 KB
R1-1717880.zip	2017/09/30 3:02	136,7 KB
R1-1717881.zip	2017/09/30 3:02	49,2 KB
R1-1717882.zip	2017/09/30 3:02	2438,7 KB
R1-1717883.zip	2017/09/30 3:02	155,4 KB
R1-1717884.zip	2017/09/30 3:02	159 KB
R1-1717885.zip	2017/09/30 3:02	168,1 KB
R1-1717886.zip	2017/09/30 3:03	139,4 KB
R1-1717887.zip	2017/09/30 3:03	139,4 KB
R1-1717888.zip	2017/09/30 3:01	74,9 KB
R1-1717889.zip	2017/09/30 3:02	512,6 KB
R1-1717890.zip	2017/09/30 3:02	100 KB
R1-1717891.zip	2017/09/30 3:02	35,6 KB
R1-1717892.zip	2017/09/30 3:02	193,6 KB

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sort by name/desc	sort by date/desc	sort by size/desc
R1-1717893.zip	2017/09/30 3:02	371,2 KB
R1-1717894.zip	2017/09/30 3:02	159,4 KB
R1-1717895.zip	2017/09/30 3:02	24 KB
R1-1717896.zip	2017/09/30 3:02	60,6 KB
R1-1717897.zip	2017/10/02 11:25	53,5 KB
R1-1717898.zip	2017/09/30 1:56	23,7 KB
R1-1717899.zip	2017/10/02 11:26	22,1 KB
R1-1717900.zip	2017/09/30 5:04	94 KB
R1-1717901.zip	2017/10/02 17:40	131,7 KB
R1-1717902.zip	2017/10/02 19:53	88,5 KB
R1-1717903.zip	2017/10/02 19:53	86,7 KB
R1-1717904.zip	2017/10/02 17:40	95,1 KB
R1-1717905.zip	2017/10/02 17:40	223,2 KB
R1-1717906.zip	2017/10/02 17:40	113,8 KB
R1-1717907.zip	2017/10/02 17:40	200 KB
R1-1717908.zip	2017/10/02 17:40	447,9 KB
R1-1717909.zip	2017/10/02 17:40	87,6 KB
R1-1717910.zip	2017/10/02 17:40	123,2 KB
R1-1717911.zip	2017/10/02 19:53	110,9 KB
R1-1717912.zip	2017/10/02 19:53	406 KB
R1-1717913.zip	2017/10/02 19:53	844,2 KB
R1-1717914.zip	2017/10/02 19:53	113,8 KB
R1-1717915.zip	2017/10/02 19:53	30,5 KB
R1-1717916.zip	2017/10/02 17:40	651,1 KB
R1-1717917.zip	2017/10/02 7:25	22,3 KB
R1-1717918.zip	2017/10/05 17:43	54 KB
R1-1717919.zip	2017/10/03 3:07	97,9 KB
R1-1717920.zip	2017/10/02 13:08	54,8 KB
R1-1717921.zip	2017/10/02 13:06	186,3 KB
R1-1717922.zip	2017/09/29 5:46	193,2 KB
R1-1717923.zip	2017/10/02 2:56	33,8 KB
R1-1717924.zip	2017/10/02 2:50	33,1 KB
R1-1717925.zip	2017/10/03 5:30	52,8 KB
R1-1717926.zip	2017/10/03 5:30	205,4 KB

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sort by name/desc	sort by date/desc	sort by size/desc
R1-1717927.zip	2017/10/03 5:30	132,6 KB
R1-1717928.zip	2017/10/03 5:30	40,8 KB
R1-1717929.zip	2017/10/03 5:30	102,3 KB
R1-1717930.zip	2017/10/03 5:30	101,1 KB
R1-1717931.zip	2017/10/03 5:30	54,9 KB
R1-1717932.zip	2017/10/03 5:30	60,8 KB
R1-1717933.zip	2017/10/03 5:30	43,9 KB
R1-1717934.zip	2017/10/03 5:30	204,5 KB
R1-1717935.zip	2017/10/03 5:30	58,3 KB
R1-1717936.zip	2017/10/03 5:30	73,4 KB
R1-1717937.zip	2017/10/03 5:30	35,1 KB
R1-1717938.zip	2017/10/03 5:30	58,1 KB
R1-1717939.zip	2017/10/03 5:30	49,1 KB
R1-1717940.zip	2017/10/03 5:30	284,1 KB
R1-1717941.zip	2017/10/03 5:30	46 KB
R1-1717942.zip	2017/10/03 5:30	141,7 KB
R1-1717943.zip	2017/10/03 5:30	71,1 KB
R1-1717944.zip	2017/10/03 5:30	104,1 KB
R1-1717945.zip	2017/10/03 5:30	294,5 KB
R1-1717946.zip	2017/10/03 5:31	402 KB
R1-1717947.zip	2017/10/03 5:31	341,1 KB
R1-1717948.zip	2017/10/03 5:31	87,9 KB
R1-1717949.zip	2017/10/03 5:31	149 KB
R1-1717950.zip	2017/10/03 5:31	47,6 KB
R1-1717951.zip	2017/10/03 5:31	116,7 KB
R1-1717952.zip	2017/10/03 5:31	152,9 KB
R1-1717953.zip	2017/10/03 5:31	42,5 KB
R1-1717954.zip	2017/10/03 5:31	51 KB
R1-1717955.zip	2017/10/03 5:31	52,3 KB
R1-1717956.zip	2017/10/03 5:31	75 KB
R1-1717957.zip	2017/10/03 5:31	52,3 KB
R1-1717958.zip	2017/10/03 5:31	31,9 KB
R1-1717959.zip	2017/10/03 5:31	109 KB
R1-1717960.zip	2017/10/03 5:31	418,3 KB

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sort by name/desc	sort by date/desc	sort by size/desc
R1-1717961.zip	2017/10/03 5:31	77 KB
R1-1717962.zip	2017/10/03 5:31	156,8 KB
R1-1717963.zip	2017/10/03 5:31	89,8 KB
R1-1717964.zip	2017/10/03 5:31	73,7 KB
R1-1717965.zip	2017/10/03 5:31	154,4 KB
R1-1717966.zip	2017/10/03 5:31	270,9 KB
R1-1717967.zip	2017/10/03 5:31	111,9 KB
R1-1717968.zip	2017/10/03 5:31	154 KB
R1-1717969.zip	2017/10/03 5:31	44,9 KB
R1-1717970.zip	2017/10/03 5:31	436,9 KB
R1-1717971.zip	2017/10/03 5:31	49,8 KB
R1-1717972.zip	2017/10/03 5:31	138 KB
R1-1717973.zip	2017/10/03 5:31	258,7 KB
R1-1717974.zip	2017/10/03 5:31	115,7 KB
R1-1717975.zip	2017/10/03 5:31	373,5 KB
R1-1717976.zip	2017/10/03 5:31	188 KB
R1-1717977.zip	2017/10/03 5:31	165,3 KB
R1-1717978.zip	2017/10/03 5:31	71,9 KB
R1-1717979.zip	2017/10/03 5:31	152,9 KB
R1-1717980.zip	2017/10/03 5:31	60,9 KB
R1-1717981.zip	2017/10/03 5:31	51,1 KB
R1-1717982.zip	2017/10/03 5:31	177,7 KB
R1-1717983.zip	2017/10/03 5:31	86 KB
R1-1717984.zip	2017/10/03 5:31	51,8 KB
R1-1717985.zip	2017/09/29 13:00	709 KB
R1-1717986.zip	2017/10/02 2:54	34,7 KB
R1-1717987.zip	2017/09/29 13:00	73,5 KB
R1-1717988.zip	2017/09/30 3:27	12,6 KB
R1-1717989.zip	2017/10/03 11:59	127,6 KB
R1-1717990.zip	2017/10/03 11:59	449,5 KB
R1-1717991.zip	2017/10/03 11:59	304,8 KB
R1-1717992.zip	2017/10/03 11:59	282,8 KB
R1-1717993.zip	2017/10/03 11:59	235,5 KB
R1-1717994.zip	2017/10/03 11:59	65,4 KB

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sort by name/desc	sort by date/desc	sort by size/desc
R1-1717995.zip	2017/10/03 11:58	3710,3 KB
R1-1717996.zip	2017/10/03 11:57	1203,2 KB
R1-1717997.zip	2017/10/03 11:57	47,5 KB
R1-1717998.zip	2017/10/03 11:57	613,5 KB
R1-1717999.zip	2017/10/03 2:18	182 KB
R1-1718001.zip	2017/10/03 2:18	327,9 KB
R1-1718002.zip	2017/10/03 2:18	313,1 KB
R1-1718003.zip	2017/10/03 2:18	86,1 KB
R1-1718004.zip	2017/10/03 2:18	137,2 KB
R1-1718005.zip	2017/10/03 2:18	27,5 KB
R1-1718006.zip	2017/10/03 2:18	25,7 KB
R1-1718007.zip	2017/10/03 2:18	223,2 KB
R1-1718008.zip	2017/10/03 2:18	287,4 KB
R1-1718009.zip	2017/09/29 9:11	59,4 KB
R1-1718010.zip	2017/09/29 9:11	83 KB
R1-1718011.zip	2017/09/29 9:11	178,2 KB
R1-1718012.zip	2017/09/29 9:11	332,9 KB
R1-1718013.zip	2017/09/29 9:11	56 KB
R1-1718014.zip	2017/09/29 9:11	40 KB
R1-1718015.zip	2017/09/30 4:25	27,1 KB
R1-1718016.zip	2017/09/30 4:54	60,1 KB
R1-1718017.zip	2017/09/30 4:54	31,5 KB
R1-1718018.zip	2017/09/30 4:25	46,4 KB
R1-1718019.zip	2017/09/30 0:20	44,6 KB
R1-1718020.zip	2017/09/30 0:20	38,8 KB
R1-1718021.zip	2017/09/30 0:20	44,4 KB
R1-1718022.zip	2017/09/30 4:01	55,3 KB
R1-1718023.zip	2017/09/30 2:51	31 KB
R1-1718024.zip	2017/09/30 12:35	43,4 KB
R1-1718025.zip	2017/09/30 12:35	24,8 KB
R1-1718026.zip	2017/09/30 12:35	23,5 KB
R1-1718027.zip	2017/09/30 12:35	18,7 KB
R1-1718028.zip	2017/09/30 12:35	62,9 KB
R1-1718029.zip	2017/09/30 12:35	107,2 KB

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sort by name/desc	sort by date/desc	sort by size/desc
R1-1718030.zip	2017/09/30 12:35	23 KB
R1-1718031.zip	2017/09/30 12:35	23,8 KB
R1-1718032.zip	2017/09/30 12:35	80,8 KB
R1-1718033.zip	2017/09/30 12:35	145,4 KB
R1-1718034.zip	2017/09/30 12:35	179,6 KB
R1-1718035.zip	2017/09/30 12:35	81,8 KB
R1-1718036.zip	2017/09/30 1:49	156,5 KB
R1-1718037.zip	2017/09/30 1:49	51,4 KB
R1-1718038.zip	2017/09/30 1:49	34,5 KB
R1-1718039.zip	2017/09/30 1:49	18,9 KB
R1-1718040.zip	2017/09/30 1:49	22,1 KB
R1-1718041.zip	2017/09/30 1:49	119,8 KB
R1-1718042.zip	2017/09/30 12:35	407 KB
R1-1718043.zip	2017/09/30 12:35	521,8 KB
R1-1718044.zip	2017/09/30 12:36	356,5 KB
R1-1718045.zip	2017/09/30 12:36	18,3 KB
R1-1718046.zip	2017/09/30 12:36	171,4 KB
R1-1718047.zip	2017/09/30 12:36	177,5 KB
R1-1718048.zip	2017/09/30 12:36	296,7 KB
R1-1718049.zip	2017/09/30 12:36	128,2 KB
R1-1718050.zip	2017/09/30 12:36	161 KB
R1-1718051.zip	2017/09/30 12:36	130,2 KB
R1-1718052.zip	2017/09/30 12:36	52,4 KB
R1-1718053.zip	2017/09/30 12:36	40 KB
R1-1718054.zip	2017/09/30 12:36	54,3 KB
R1-1718055.zip	2017/09/30 12:36	49,2 KB
R1-1718056.zip	2017/09/30 12:36	41,2 KB
R1-1718057.zip	2017/09/30 12:36	49,7 KB
R1-1718058.zip	2017/09/30 12:36	138,2 KB
R1-1718059.zip	2017/09/30 12:36	19,6 KB
R1-1718060.zip	2017/09/30 12:36	448,8 KB
R1-1718061.zip	2017/09/30 12:36	20,6 KB
R1-1718062.zip	2017/09/30 1:49	20,8 KB
R1-1718063.zip	2017/09/30 1:49	68,9 KB

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sort by name/desc	sort by date/desc	sort by size/desc
R1-1718064.zip	2017/09/30 1:49	19,8 KB
R1-1718065.zip	2017/09/30 1:49	21,1 KB
R1-1718066.zip	2017/10/02 0:23	93,1 KB
R1-1718067.zip	2017/10/02 0:23	18 KB
R1-1718068.zip	2017/10/02 0:23	16,7 KB
R1-1718069.zip	2017/10/02 0:23	18,2 KB
R1-1718070.zip	2017/10/02 0:23	43,9 KB
R1-1718071.zip	2017/09/30 2:37	153,1 KB
R1-1718072.zip	2017/10/02 2:53	34,9 KB
R1-1718073.zip	2017/09/30 3:33	116,9 KB
R1-1718074.zip	2017/09/30 3:33	131,5 KB
R1-1718075.zip	2017/10/02 9:09	296,1 KB
R1-1718076.zip	2017/10/02 9:09	151 KB
R1-1718077.zip	2017/10/02 9:09	61,5 KB
R1-1718078.zip	2017/10/02 9:09	58,6 KB
R1-1718079.zip	2017/10/02 9:09	24,4 KB
R1-1718080.zip	2017/10/02 9:09	22,2 KB
R1-1718081.zip	2017/09/29 9:33	245,6 KB
R1-1718082.zip	2017/09/29 9:33	41,4 KB
R1-1718083.zip	2017/09/29 9:33	22,3 KB
R1-1718084.zip	2017/09/29 9:33	116,3 KB
R1-1718085.zip	2017/09/29 9:33	24,2 KB
R1-1718086.zip	2017/09/30 3:22	83,5 KB
R1-1718087.zip	2017/09/30 3:22	29,6 KB
R1-1718088.zip	2017/09/30 3:22	80,1 KB
R1-1718089.zip	2017/09/30 3:22	33,7 KB
R1-1718090.zip	2017/09/30 3:22	35,3 KB
R1-1718091.zip	2017/09/30 3:22	33,1 KB
R1-1718092.zip	2017/09/30 3:22	31,2 KB
R1-1718093.zip	2017/09/30 3:22	83,7 KB
R1-1718094.zip	2017/09/30 3:22	35,3 KB
R1-1718095.zip	2017/09/30 3:22	79,4 KB
R1-1718096.zip	2017/09/30 3:22	213,4 KB
R1-1718097.zip	2017/09/30 3:22	267,1 KB

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sort by name/desc	sort by date/desc	sort by size/desc
R1-1718098.zip	2017/09/30 3:52	50,9 KB
R1-1718099.zip	2017/09/30 3:52	58,3 KB
R1-1718100.zip	2017/09/30 3:52	50,2 KB
R1-1718101.zip	2017/09/30 3:52	53,1 KB
R1-1718102.zip	2017/09/30 3:52	38,3 KB
R1-1718103.zip	2017/09/30 3:52	38,9 KB
R1-1718104.zip	2017/09/30 3:52	35,3 KB
R1-1718105.zip	2017/09/30 3:52	33,5 KB
R1-1718106.zip	2017/09/30 3:52	255,5 KB
R1-1718107.zip	2017/09/30 3:52	31 KB
R1-1718108.zip	2017/09/30 3:52	58,7 KB
R1-1718109.zip	2017/09/30 3:52	56,9 KB
R1-1718110.zip	2017/09/30 3:52	58,8 KB
R1-1718111.zip	2017/09/30 3:52	89,9 KB
R1-1718112.zip	2017/09/30 3:52	65,9 KB
R1-1718113.zip	2017/09/30 3:52	53,6 KB
R1-1718114.zip	2017/09/30 3:52	54,4 KB
R1-1718115.zip	2017/09/30 3:52	115 KB
R1-1718116.zip	2017/09/30 3:52	87,9 KB
R1-1718117.zip	2017/09/30 3:52	499 KB
R1-1718118.zip	2017/09/30 3:52	119,1 KB
R1-1718119.zip	2017/09/30 3:52	74,2 KB
R1-1718120.zip	2017/09/30 3:32	36,5 KB
R1-1718121.zip	2017/09/30 3:32	34,4 KB
R1-1718122.zip	2017/09/30 3:32	37,8 KB
R1-1718123.zip	2017/09/30 3:32	35,6 KB
R1-1718124.zip	2017/09/30 3:32	36 KB
R1-1718125.zip	2017/09/30 3:32	33 KB
R1-1718126.zip	2017/09/30 3:25	162,9 KB
R1-1718127.zip	2017/09/30 3:25	41,3 KB
R1-1718128.zip	2017/09/30 3:25	284,2 KB
R1-1718129.zip	2017/09/30 3:25	51,4 KB
R1-1718130.zip	2017/09/30 3:25	48,7 KB
R1-1718131.zip	2017/09/30 3:26	38,7 KB

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sort by name/desc	sort by date/desc	sort by size/desc
R1-1718132.zip	2017/09/30 3:26	22,2 KB
R1-1718133.zip	2017/09/30 3:30	113,1 KB
R1-1718134.zip	2017/09/30 3:30	38,1 KB
R1-1718135.zip	2017/09/30 3:30	377 KB
R1-1718136.zip	2017/09/30 3:30	50,2 KB
R1-1718137.zip	2017/10/07 8:36	60,9 KB
R1-1718138.zip	2017/09/30 3:30	129,7 KB
R1-1718139.zip	2017/09/30 3:30	110,4 KB
R1-1718140.zip	2017/09/30 3:38	235,6 KB
R1-1718141.zip	2017/09/30 3:38	195,8 KB
R1-1718142.zip	2017/09/30 3:38	417,6 KB
R1-1718143.zip	2017/09/30 5:50	128,5 KB
R1-1718144.zip	2017/09/30 3:38	65 KB
R1-1718145.zip	2017/09/30 3:38	67,1 KB
R1-1718146.zip	2017/09/30 3:38	89,9 KB
R1-1718147.zip	2017/09/30 3:38	119,2 KB
R1-1718148.zip	2017/09/30 3:38	68,9 KB
R1-1718149.zip	2017/09/30 3:38	132,4 KB
R1-1718150.zip	2017/09/30 3:38	496,5 KB
R1-1718151.zip	2017/09/30 3:38	160,4 KB
R1-1718152.zip	2017/09/30 3:38	587,8 KB
R1-1718153.zip	2017/09/30 3:38	237,7 KB
R1-1718154.zip	2017/09/30 3:38	215,3 KB
R1-1718155.zip	2017/09/30 3:38	1373,6 KB
R1-1718156.zip	2017/09/30 3:45	103,2 KB
R1-1718157.zip	2017/09/30 3:45	96,5 KB
R1-1718158.zip	2017/09/30 3:45	52 KB
R1-1718159.zip	2017/09/30 3:45	361 KB
R1-1718160.zip	2017/09/30 3:45	304,5 KB
R1-1718161.zip	2017/09/30 3:45	101,2 KB
R1-1718162.zip	2017/09/30 3:45	117,9 KB
R1-1718163.zip	2017/10/02 2:52	32,9 KB
R1-1718164.zip	2017/09/29 9:57	141,9 KB
R1-1718165.zip	2017/09/29 12:54	55 KB

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sort by name/desc	sort by date/desc	sort by size/desc
R1-1718166.zip	2017/09/29 12:54	70,2 KB
R1-1718167.zip	2017/09/29 12:54	51,5 KB
R1-1718168.zip	2017/09/29 12:54	96,3 KB
R1-1718169.zip	2017/09/29 12:54	35,5 KB
R1-1718170.zip	2017/09/29 12:54	40,2 KB
R1-1718171.zip	2017/10/02 0:03	68,6 KB
R1-1718172.zip	2017/10/02 9:21	63 KB
R1-1718173.zip	2017/10/02 9:21	52,4 KB
R1-1718174.zip	2017/09/29 12:54	95,3 KB
R1-1718175.zip	2017/09/29 12:54	250,3 KB
R1-1718176.zip	2017/10/03 4:18	117,2 KB
R1-1718177.zip	2017/10/03 3:23	3022,7 KB
R1-1718178.zip	2017/10/03 3:22	43,4 KB
R1-1718179.zip	2017/10/03 5:39	33,5 KB
R1-1718180.zip	2017/10/03 5:39	154,1 KB
R1-1718181.zip	2017/10/03 5:39	152,8 KB
R1-1718182.zip	2017/10/03 5:39	29,8 KB
R1-1718183.zip	2017/10/03 5:39	217,6 KB
R1-1718184.zip	2017/10/03 5:39	71,4 KB
R1-1718185.zip	2017/10/03 5:39	47,4 KB
R1-1718186.zip	2017/10/03 5:39	33,6 KB
R1-1718187.zip	2017/10/03 4:32	293,8 KB
R1-1718188.zip	2017/10/03 5:39	115,9 KB
R1-1718189.zip	2017/10/03 5:39	130,8 KB
R1-1718190.zip	2017/10/03 4:18	626,4 KB
R1-1718191.zip	2017/10/03 4:18	57,2 KB
R1-1718192.zip	2017/10/03 4:18	731,7 KB
R1-1718193.zip	2017/10/03 4:18	362,2 KB
R1-1718194.zip	2017/10/03 4:18	53,7 KB
R1-1718195.zip	2017/10/03 4:18	152,9 KB
R1-1718196.zip	2017/10/03 4:18	177,5 KB
R1-1718197.zip	2017/10/03 4:18	113,3 KB
R1-1718198.zip	2017/10/03 4:18	152,6 KB
R1-1718199.zip	2017/10/03 4:18	619,1 KB

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sort by name/desc	sort by date/desc	sort by size/desc
R1-1718200.zip	2017/10/03 4:19	1643,4 KB
R1-1718201.zip	2017/10/03 4:19	44,7 KB
R1-1718202.zip	2017/10/03 4:19	781,6 KB
R1-1718203.zip	2017/10/03 4:56	154,1 KB
R1-1718204.zip	2017/10/03 4:56	222,4 KB
R1-1718205.zip	2017/10/03 4:56	234,8 KB
R1-1718206.zip	2017/10/03 4:56	79,8 KB
R1-1718207.zip	2017/10/03 6:08	249 KB
R1-1718208.zip	2017/10/03 6:07	91,8 KB
R1-1718209.zip	2017/10/03 6:07	103,6 KB
R1-1718210.zip	2017/10/03 6:07	245,5 KB
R1-1718211.zip	2017/10/03 6:07	362,6 KB
R1-1718212.zip	2017/10/03 6:07	83,5 KB
R1-1718213.zip	2017/10/03 4:56	544 KB
R1-1718214.zip	2017/10/03 6:08	119,9 KB
R1-1718215.zip	2017/10/03 4:56	73,4 KB
R1-1718216.zip	2017/10/03 4:56	133,2 KB
R1-1718217.zip	2017/10/03 4:56	315,7 KB
R1-1718218.zip	2017/10/03 4:56	214,2 KB
R1-1718219.zip	2017/10/03 4:56	206,9 KB
R1-1718220.zip	2017/10/03 4:56	111,6 KB
R1-1718221.zip	2017/10/03 4:56	110,6 KB
R1-1718222.zip	2017/10/03 4:56	118,8 KB
R1-1718223.zip	2017/10/03 3:22	110,9 KB
R1-1718224.zip	2017/10/03 3:22	86,9 KB
R1-1718225.zip	2017/10/03 4:56	161,6 KB
R1-1718226.zip	2017/10/03 4:56	812,3 KB
R1-1718227.zip	2017/10/03 4:56	53,7 KB
R1-1718228.zip	2017/10/03 5:39	157,9 KB
R1-1718229.zip	2017/10/03 5:39	127,3 KB
R1-1718230.zip	2017/10/02 15:49	99,5 KB
R1-1718231.zip	2017/09/29 11:39	68,4 KB
R1-1718232.zip	2017/09/29 11:39	69 KB
R1-1718233.zip	2017/09/29 11:39	166,7 KB

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sort by name/desc	sort by date/desc	sort by size/desc
R1-1718234.zip	2017/09/29 11:39	67,9 KB
R1-1718235.zip	2017/09/29 11:39	67,4 KB
R1-1718236.zip	2017/09/29 11:39	68,4 KB
R1-1718237.zip	2017/10/02 10:45	131 KB
R1-1718238.zip	2017/10/02 10:45	263,7 KB
R1-1718239.zip	2017/10/02 16:53	185,6 KB
R1-1718240.zip	2017/10/02 16:53	29,6 KB
R1-1718241.zip	2017/10/02 16:53	28,3 KB
R1-1718242.zip	2017/10/02 10:45	23,6 KB
R1-1718243.zip	2017/10/02 10:45	114,4 KB
R1-1718244.zip	2017/10/02 10:45	43,1 KB
R1-1718245.zip	2017/10/02 10:47	1816,1 KB
R1-1718246.zip	2017/10/02 10:47	142,9 KB
R1-1718247.zip	2017/10/02 10:47	1869,5 KB
R1-1718248.zip	2017/10/02 10:47	204,3 KB
R1-1718249.zip	2017/10/02 10:47	44,7 KB
R1-1718250.zip	2017/10/02 10:47	99,1 KB
R1-1718251.zip	2017/10/02 10:47	33,8 KB
R1-1718252.zip	2017/10/02 18:56	44,6 KB
R1-1718253.zip	2017/10/02 8:39	509,5 KB
R1-1718254.zip	2017/10/02 8:39	72,2 KB
R1-1718255.zip	2017/09/29 19:29	17,8 KB
R1-1718256.zip	2017/09/29 19:29	219,1 KB
R1-1718257.zip	2017/10/02 8:39	68,3 KB
R1-1718258.zip	2017/10/02 8:39	107,3 KB
R1-1718259.zip	2017/10/02 8:39	79,5 KB
R1-1718260.zip	2017/10/02 8:39	70,2 KB
R1-1718261.zip	2017/10/02 16:59	26,8 KB
R1-1718262.zip	2017/09/29 19:57	42,6 KB
R1-1718263.zip	2017/09/30 2:38	274,7 KB
R1-1718264.zip	2017/09/30 2:38	73,7 KB
R1-1718265.zip	2017/09/30 2:38	189,7 KB
R1-1718266.zip	2017/09/30 2:38	50 KB
R1-1718267.zip	2017/09/30 2:38	645,7 KB

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sort by name/desc	sort by date/desc	sort by size/desc
R1-1718268.zip	2017/09/30 2:38	40,4 KB
R1-1718269.zip	2017/09/29 19:58	70 KB
R1-1718270.zip	2017/09/29 10:50	291,4 KB
R1-1718271.zip	2017/09/29 10:50	504,4 KB
R1-1718272.zip	2017/09/29 10:50	218,6 KB
R1-1718273.zip	2017/09/29 11:29	73 KB
R1-1718274.zip	2017/09/30 5:08	61,2 KB
R1-1718275.zip	2017/09/30 5:08	62,7 KB
R1-1718276.zip	2017/10/03 6:08	171,1 KB
R1-1718277.zip	2017/10/03 6:08	65,2 KB
R1-1718278.zip	2017/10/03 6:08	92,6 KB
R1-1718279.zip	2017/10/03 6:08	195,1 KB
R1-1718280.zip	2017/10/03 6:08	84,6 KB
R1-1718281.zip	2017/10/03 6:08	182,8 KB
R1-1718282.zip	2017/10/03 6:08	129,4 KB
R1-1718283.zip	2017/10/02 11:17	91,6 KB
R1-1718284.zip	2017/10/02 11:17	66,3 KB
R1-1718285.zip	2017/10/02 11:17	55,5 KB
R1-1718286.zip	2017/10/02 11:17	62 KB
R1-1718287.zip	2017/10/02 11:17	92,7 KB
R1-1718288.zip	2017/10/02 11:17	57,1 KB
R1-1718289.zip	2017/10/02 11:17	55,9 KB
R1-1718290.zip	2017/10/02 11:17	56,8 KB
R1-1718291.zip	2017/09/30 5:31	19,7 KB
R1-1718292.zip	2017/09/30 5:31	17 KB
R1-1718293.zip	2017/09/30 5:31	17,9 KB
R1-1718294.zip	2017/09/30 5:31	23,3 KB
R1-1718295.zip	2017/09/29 13:11	187,4 KB
R1-1718296.zip	2017/09/29 13:11	342,2 KB
R1-1718297.zip	2017/09/29 13:11	225,8 KB
R1-1718298.zip	2017/09/29 13:11	19,6 KB
R1-1718299.zip	2017/09/29 18:19	29,5 KB
R1-1718300.zip	2017/09/29 16:45	89 KB
R1-1718301.zip	2017/09/29 16:45	90,7 KB

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sort by name/desc	sort by date/desc	sort by size/desc
R1-1718302.zip	2017/10/02 22:52	81,5 KB
R1-1718303.zip	2017/10/02 22:52	299,2 KB
R1-1718304.zip	2017/10/02 22:53	66,2 KB
R1-1718305.zip	2017/10/02 22:53	48,4 KB
R1-1718306.zip	2017/10/02 22:53	50,2 KB
R1-1718307.zip	2017/10/02 22:53	104,9 KB
R1-1718308.zip	2017/10/02 22:53	881,8 KB
R1-1718309.zip	2017/10/02 22:53	44,7 KB
R1-1718310.zip	2017/10/02 22:53	110,7 KB
R1-1718311.zip	2017/10/02 22:53	96,5 KB
R1-1718312.zip	2017/10/02 22:53	67,6 KB
R1-1718313.zip	2017/10/02 12:54	81,4 KB
R1-1718314.zip	2017/09/29 14:25	103,3 KB
R1-1718315.zip	2017/10/02 12:54	65,8 KB
R1-1718316.zip	2017/09/29 17:58	5622,4 KB
R1-1718317.zip	2017/09/30 13:19	36,9 KB
R1-1718318.zip	2017/10/07 21:38	635 KB
R1-1718319.zip	2017/09/30 13:19	144,6 KB
R1-1718320.zip	2017/10/03 5:17	132,2 KB
R1-1718321.zip	2017/10/03 5:17	72,3 KB
R1-1718322.zip	2017/10/03 5:17	121,5 KB
R1-1718323.zip	2017/10/03 5:17	227,9 KB
R1-1718324.zip	2017/10/03 5:17	22,7 KB
R1-1718325.zip	2017/10/03 5:17	35,3 KB
R1-1718326.zip	2017/10/03 5:17	40,4 KB
R1-1718327.zip	2017/10/03 5:17	302,6 KB
R1-1718328.zip	2017/10/03 5:17	121,4 KB
R1-1718329.zip	2017/10/03 5:17	86,8 KB
R1-1718330.zip	2017/10/03 5:17	34,9 KB
R1-1718331.zip	2017/10/03 5:17	89,7 KB
R1-1718332.zip	2017/10/03 5:17	181,1 KB
R1-1718333.zip	2017/10/03 5:17	102,2 KB
R1-1718334.zip	2017/10/03 5:17	126,2 KB
R1-1718335.zip	2017/10/03 5:18	145,3 KB

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sort by name/desc	sort by date/desc	sort by size/desc
R1-1718336.zip	2017/10/03 5:18	327 KB
R1-1718337.zip	2017/10/03 5:18	475,3 KB
R1-1718338.zip	2017/10/03 5:18	34,6 KB
R1-1718339.zip	2017/10/03 5:18	36,4 KB
R1-1718340.zip	2017/10/03 5:18	455,3 KB
R1-1718341.zip	2017/10/03 5:18	67,9 KB
R1-1718342.zip	2017/10/03 5:19	1189,6 KB
R1-1718343.zip	2017/10/03 6:00	316,5 KB
R1-1718344.zip	2017/10/03 6:00	858,6 KB
R1-1718345.zip	2017/10/03 6:00	602,1 KB
R1-1718346.zip	2017/10/03 5:19	233,4 KB
R1-1718347.zip	2017/10/03 5:19	219,7 KB
R1-1718348.zip	2017/10/03 5:19	360,4 KB
R1-1718349.zip	2017/10/03 5:19	77,5 KB
R1-1718350.zip	2017/10/03 5:19	39,6 KB
R1-1718351.zip	2017/10/03 5:20	1307,4 KB
R1-1718352.zip	2017/10/03 5:21	2282,7 KB
R1-1718353.zip	2017/10/03 5:21	219,4 KB
R1-1718354.zip	2017/10/03 5:21	267,7 KB
R1-1718355.zip	2017/10/03 5:21	343,3 KB
R1-1718356.zip	2017/10/03 5:21	96,7 KB
R1-1718357.zip	2017/10/03 5:21	310,5 KB
R1-1718358.zip	2017/10/02 23:18	398,7 KB
R1-1718359.zip	2017/10/02 23:18	462,4 KB
R1-1718360.zip	2017/10/02 23:18	985,6 KB
R1-1718361.zip	2017/10/02 23:18	39,4 KB
R1-1718362.zip	2017/10/02 23:18	45,7 KB
R1-1718363.zip	2017/10/02 23:18	32,3 KB
R1-1718364.zip	2017/10/02 23:18	30,7 KB
R1-1718365.zip	2017/10/02 23:18	612,1 KB
R1-1718366.zip	2017/10/02 23:18	109,1 KB
R1-1718367.zip	2017/10/03 5:30	206,3 KB
R1-1718368.zip	2017/10/03 2:36	113,5 KB
R1-1718369.zip	2017/09/29 20:13	26,9 KB

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sort by name/desc	sort by date/desc	sort by size/desc
R1-1718370.zip	2017/10/03 5:41	452,9 KB
R1-1718371.zip	2017/10/03 5:41	151,8 KB
R1-1718372.zip	2017/10/03 5:41	694,3 KB
R1-1718373.zip	2017/10/03 5:41	396 KB
R1-1718374.zip	2017/10/03 5:41	1101,9 KB
R1-1718375.zip	2017/10/03 5:41	400,6 KB
R1-1718376.zip	2017/10/03 5:41	196,6 KB
R1-1718377.zip	2017/10/03 5:41	190,3 KB
R1-1718378.zip	2017/10/03 2:30	67,7 KB
R1-1718379.zip	2017/10/03 2:30	1285,2 KB
R1-1718380.zip	2017/10/03 2:30	1285,2 KB
R1-1718381.zip	2017/10/03 2:30	84,2 KB
R1-1718382.zip	2017/10/03 2:30	17,1 KB
R1-1718383.zip	2017/10/03 2:30	232,2 KB
R1-1718384.zip	2017/10/03 2:30	114,9 KB
R1-1718385.zip	2017/10/03 2:30	54,4 KB
R1-1718386.zip	2017/10/03 2:30	25,6 KB
R1-1718387.zip	2017/10/03 2:30	24,7 KB
R1-1718388.zip	2017/10/03 2:30	41,6 KB
R1-1718389.zip	2017/10/03 2:30	239,3 KB
R1-1718390.zip	2017/10/03 2:30	51,8 KB
R1-1718391.zip	2017/10/03 2:30	26,8 KB
R1-1718392.zip	2017/10/03 2:30	28,4 KB
R1-1718393.zip	2017/10/03 2:30	85,8 KB
R1-1718394.zip	2017/10/03 2:30	35,4 KB
R1-1718395.zip	2017/10/03 2:30	15,4 KB
R1-1718396.zip	2017/10/03 2:30	48,1 KB
R1-1718397.zip	2017/10/03 2:30	24,4 KB
R1-1718398.zip	2017/10/03 2:30	57,4 KB
R1-1718399.zip	2017/10/03 2:30	45,7 KB
R1-1718400.zip	2017/10/03 2:30	29,8 KB
R1-1718401.zip	2017/10/03 2:32	390,8 KB
R1-1718402.zip	2017/10/03 2:30	34,4 KB
R1-1718403.zip	2017/10/03 2:28	843 KB

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sort by name/desc	sort by date/desc	sort by size/desc
R1-1718404.zip	2017/10/03 2:30	15,5 KB
R1-1718405.zip	2017/10/03 2:30	17 KB
R1-1718406.zip	2017/10/03 2:28	413,2 KB
R1-1718407.zip	2017/10/03 2:30	35,2 KB
R1-1718408.zip	2017/10/02 22:00	197,3 KB
R1-1718409.zip	2017/10/02 22:00	130,5 KB
R1-1718410.zip	2017/10/02 22:00	187,9 KB
R1-1718411.zip	2017/10/02 22:00	395,6 KB
R1-1718412.zip	2017/10/02 22:00	1264 KB
R1-1718413.zip	2017/10/02 22:00	339 KB
R1-1718414.zip	2017/10/02 23:40	67 KB
R1-1718415.zip	2017/10/02 23:40	85,2 KB
R1-1718416.zip	2017/10/02 23:40	51,6 KB
R1-1718417.zip	2017/10/02 23:40	49,7 KB
R1-1718418.zip	2017/10/02 23:40	51,2 KB
R1-1718419.zip	2017/10/02 23:40	89,2 KB
R1-1718420.zip	2017/10/02 23:40	61,8 KB
R1-1718421.zip	2017/09/30 1:14	39,1 KB
R1-1718422.zip	2017/09/30 1:14	32,6 KB
R1-1718423.zip	2017/10/02 16:53	68,9 KB
R1-1718424.zip	2017/10/03 5:51	43,4 KB
R1-1718425.zip	2017/10/03 5:51	137,5 KB
R1-1718426.zip	2017/10/03 5:51	134,1 KB
R1-1718427.zip	2017/10/03 5:51	36,3 KB
R1-1718428.zip	2017/10/03 5:51	41,7 KB
R1-1718429.zip	2017/10/03 5:51	67,1 KB
R1-1718430.zip	2017/10/03 5:51	61,2 KB
R1-1718431.zip	2017/10/03 5:51	198 KB
R1-1718432.zip	2017/10/03 5:51	164 KB
R1-1718433.zip	2017/10/03 5:51	267,5 KB
R1-1718434.zip	2017/10/03 5:51	94,7 KB
R1-1718435.zip	2017/10/03 5:51	47,6 KB
R1-1718436.zip	2017/10/03 5:51	80,9 KB
R1-1718437.zip	2017/10/03 5:51	476,9 KB

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sort by name/desc	sort by date/desc	sort by size/desc
R1-1718438.zip	2017/10/03 5:51	70,6 KB
R1-1718439.zip	2017/10/03 5:51	106,9 KB
R1-1718440.zip	2017/10/03 5:51	64,3 KB
R1-1718441.zip	2017/10/03 5:51	85,7 KB
R1-1718442.zip	2017/10/03 5:51	52,2 KB
R1-1718443.zip	2017/10/03 5:51	43 KB
R1-1718444.zip	2017/10/03 5:51	115,1 KB
R1-1718445.zip	2017/10/03 5:51	197 KB
R1-1718446.zip	2017/10/03 5:51	40,1 KB
R1-1718447.zip	2017/10/03 5:51	75,9 KB
R1-1718448.zip	2017/10/03 5:51	93 KB
R1-1718449.zip	2017/10/03 5:51	237,5 KB
R1-1718450.zip	2017/10/03 5:51	362,1 KB
R1-1718451.zip	2017/10/03 5:51	681,7 KB
R1-1718452.zip	2017/10/03 5:51	463,7 KB
R1-1718453.zip	2017/10/03 5:51	67,9 KB
R1-1718454.zip	2017/10/03 5:51	170,7 KB
R1-1718455.zip	2017/10/03 5:51	99,8 KB
R1-1718456.zip	2017/10/02 5:35	183,2 KB
R1-1718457.zip	2017/10/02 5:35	216,4 KB
R1-1718458.zip	2017/10/02 6:57	113,9 KB
R1-1718459.zip	2017/09/30 7:24	109,6 KB
R1-1718460.zip	2017/09/30 6:17	223,3 KB
R1-1718461.zip	2017/09/30 8:11	102,2 KB
R1-1718462.zip	2017/09/30 7:39	22,2 KB
R1-1718463.zip	2017/10/02 8:18	55,8 KB
R1-1718464.zip	2017/10/02 8:18	209,4 KB
R1-1718465.zip	2017/10/02 8:18	116,3 KB
R1-1718466.zip	2017/10/03 5:25	157 KB
R1-1718467.zip	2017/10/03 5:25	355,8 KB
R1-1718468.zip	2017/10/01 23:41	67,1 KB
R1-1718469.zip	2017/10/02 7:22	27,2 KB
R1-1718470.zip	2017/10/03 2:18	34,2 KB
R1-1718471.zip	2017/10/03 2:18	36,7 KB

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sort by name/desc	sort by date/desc	sort by size/desc
R1-1718472.zip	2017/10/03 2:39	128,2 KB
R1-1718473.zip	2017/10/03 2:39	177,1 KB
R1-1718474.zip	2017/10/03 2:39	54,4 KB
R1-1718475.zip	2017/10/03 2:39	54,4 KB
R1-1718476.zip	2017/10/03 2:39	198,3 KB
R1-1718477.zip	2017/10/03 0:18	375,6 KB
R1-1718478.zip	2017/10/03 0:18	50,7 KB
R1-1718479.zip	2017/10/03 0:18	98,2 KB
R1-1718480.zip	2017/10/03 0:18	51,5 KB
R1-1718481.zip	2017/10/03 0:18	65,2 KB
R1-1718482.zip	2017/10/03 0:18	545,7 KB
R1-1718483.zip	2017/10/03 0:18	84,1 KB
R1-1718484.zip	2017/10/03 0:18	144,8 KB
R1-1718485.zip	2017/10/03 0:18	55,2 KB
R1-1718486.zip	2017/10/03 0:18	54,6 KB
R1-1718487.zip	2017/10/03 0:19	274,9 KB
R1-1718488.zip	2017/10/03 0:19	171 KB
R1-1718489.zip	2017/10/03 0:19	54,3 KB
R1-1718490.zip	2017/10/03 0:19	1208 KB
R1-1718491.zip	2017/10/03 0:19	77,6 KB
R1-1718492.zip	2017/10/03 0:19	135 KB
R1-1718493.zip	2017/10/03 0:19	62 KB
R1-1718494.zip	2017/10/03 0:19	262,1 KB
R1-1718495.zip	2017/10/03 0:19	52 KB
R1-1718496.zip	2017/10/03 0:19	121,4 KB
R1-1718497.zip	2017/10/02 9:16	29,2 KB
R1-1718498.zip	2017/10/03 1:49	375,4 KB
R1-1718499.zip	2017/10/03 1:49	73,5 KB
R1-1718500.zip	2017/10/03 1:49	44,2 KB
R1-1718501.zip	2017/10/03 1:49	523,7 KB
R1-1718502.zip	2017/10/03 0:19	48,5 KB
R1-1718503.zip	2017/10/03 1:26	77,5 KB
R1-1718504.zip	2017/10/03 4:32	398,5 KB
R1-1718505.zip	2017/10/03 4:32	236,3 KB

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sort by name/desc	sort by date/desc	sort by size/desc
R1-1718506.zip	2017/10/03 5:41	660,1 KB
R1-1718507.zip	2017/10/02 18:10	389,5 KB
R1-1718508.zip	2017/10/02 18:10	126,5 KB
R1-1718509.zip	2017/10/02 18:10	36 KB
R1-1718510.zip	2017/10/03 4:25	115,6 KB
R1-1718511.zip	2017/10/02 18:10	194,8 KB
R1-1718512.zip	2017/10/02 18:10	265,9 KB
R1-1718513.zip	2017/10/02 18:10	178,2 KB
R1-1718514.zip	2017/10/02 18:10	338,4 KB
R1-1718515.zip	2017/10/03 4:29	559,6 KB
R1-1718516.zip	2017/10/02 18:10	660,2 KB
R1-1718517.zip	2017/10/02 18:10	432,9 KB
R1-1718518.zip	2017/10/02 18:10	128,9 KB
R1-1718519.zip	2017/10/02 18:10	553,2 KB
R1-1718520.zip	2017/10/02 18:10	106,5 KB
R1-1718521.zip	2017/10/02 21:13	62,1 KB
R1-1718522.zip	2017/10/02 21:13	64,7 KB
R1-1718523.zip	2017/10/02 21:13	56,8 KB
R1-1718524.zip	2017/10/02 5:50	597,9 KB
R1-1718525.zip	2017/10/02 6:23	204,7 KB
R1-1718526.zip	2017/10/03 5:37	429,9 KB
R1-1718527.zip	2017/10/03 5:37	91 KB
R1-1718528.zip	2017/10/03 5:37	768,2 KB
R1-1718529.zip	2017/10/03 5:37	52,2 KB
R1-1718530.zip	2017/10/03 5:37	229,4 KB
R1-1718531.zip	2017/10/03 5:37	245,1 KB
R1-1718532.zip	2017/10/03 5:37	127,8 KB
R1-1718533.zip	2017/10/03 5:37	32,9 KB
R1-1718534.zip	2017/10/03 5:37	795,8 KB
R1-1718535.zip	2017/10/03 5:37	155,4 KB
R1-1718536.zip	2017/10/03 5:37	391,2 KB
R1-1718537.zip	2017/10/03 5:37	140,8 KB
R1-1718538.zip	2017/10/03 5:38	112,8 KB
R1-1718539.zip	2017/10/03 5:38	164,1 KB

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sort by name/desc	sort by date/desc	sort by size/desc
R1-1718540.zip	2017/10/03 5:38	90,3 KB
R1-1718541.zip	2017/10/03 5:38	179,7 KB
R1-1718542.zip	2017/10/03 6:38	55 KB
R1-1718543.zip	2017/10/03 5:38	154,8 KB
R1-1718544.zip	2017/10/03 5:38	153,7 KB
R1-1718545.zip	2017/10/03 5:38	81,9 KB
R1-1718546.zip	2017/10/03 5:38	79,9 KB
R1-1718547.zip	2017/10/03 5:38	444,8 KB
R1-1718548.zip	2017/10/03 5:38	110 KB
R1-1718549.zip	2017/10/03 5:39	200,8 KB
R1-1718550.zip	2017/10/03 5:46	382 KB
R1-1718551.zip	2017/10/03 5:38	201,1 KB
R1-1718552.zip	2017/10/03 5:39	515,4 KB
R1-1718553.zip	2017/10/03 5:39	1844,4 KB
R1-1718554.zip	2017/10/03 5:51	458,4 KB
R1-1718555.zip	2017/10/03 5:51	273,8 KB
R1-1718556.zip	2017/10/03 5:51	291,8 KB
R1-1718557.zip	2017/10/03 5:51	161,5 KB
R1-1718558.zip	2017/10/03 5:51	340,2 KB
R1-1718559.zip	2017/10/03 5:39	347,3 KB
R1-1718560.zip	2017/10/03 5:39	69,9 KB
R1-1718561.zip	2017/10/03 5:40	201,5 KB
R1-1718562.zip	2017/10/03 5:40	283,2 KB
R1-1718563.zip	2017/10/03 5:40	394,5 KB
R1-1718564.zip	2017/10/03 5:40	137,6 KB
R1-1718565.zip	2017/10/03 5:40	630 KB
R1-1718566.zip	2017/10/03 5:40	285,2 KB
R1-1718567.zip	2017/10/03 5:40	194,8 KB
R1-1718568.zip	2017/10/03 5:40	397,6 KB
R1-1718569.zip	2017/10/03 5:41	221,3 KB
R1-1718570.zip	2017/10/03 5:41	272,7 KB
R1-1718571.zip	2017/10/03 5:41	308,4 KB
R1-1718572.zip	2017/10/03 5:41	335,2 KB
R1-1718573.zip	2017/10/03 5:41	243,8 KB

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sort by name/desc	sort by date/desc	sort by size/desc
R1-1718574.zip	2017/10/03 5:43	64,2 KB
R1-1718575.zip	2017/10/03 5:41	100,6 KB
R1-1718576.zip	2017/10/03 5:41	249 KB
R1-1718577.zip	2017/10/03 6:27	99,7 KB
R1-1718579.zip	2017/10/03 5:41	37,8 KB
R1-1718580.zip	2017/10/03 5:44	371,3 KB
R1-1718581.zip	2017/10/03 5:45	950,8 KB
R1-1718582.zip	2017/10/03 5:41	133,4 KB
R1-1718583.zip	2017/10/12 5:28	176,6 KB
R1-1718584.zip	2017/10/03 6:09	120,2 KB
R1-1718585.zip	2017/10/12 5:28	314,7 KB
R1-1718586.zip	2017/10/03 6:04	254,6 KB
R1-1718587.zip	2017/10/11 5:32	155,8 KB
R1-1718588.zip	2017/10/03 6:04	98,7 KB
R1-1718589.zip	2017/10/03 6:04	165,4 KB
R1-1718590.zip	2017/10/03 6:09	476,8 KB
R1-1718592.zip	2017/10/03 5:41	149 KB
R1-1718593.zip	2017/10/03 5:41	1527,6 KB
R1-1718594.zip	2017/10/03 5:41	235,8 KB
R1-1718595.zip	2017/10/06 6:54	15,2 KB
R1-1718596.zip	2017/10/06 6:54	39,2 KB
R1-1718599.zip	2017/10/02 6:29	26,9 KB
R1-1718600.zip	2017/10/02 10:47	82 KB
R1-1718601.zip	2017/10/02 19:12	106,4 KB
R1-1718602.zip	2017/10/02 19:12	50,1 KB
R1-1718603.zip	2017/10/02 19:12	61,7 KB
R1-1718604.zip	2017/10/02 19:12	50,1 KB
R1-1718605.zip	2017/10/02 19:12	117,2 KB
R1-1718606.zip	2017/10/02 19:12	59,6 KB
R1-1718607.zip	2017/10/02 19:12	69 KB
R1-1718608.zip	2017/10/02 19:12	107,3 KB
R1-1718609.zip	2017/10/02 19:12	129,1 KB
R1-1718610.zip	2017/10/02 10:48	107,7 KB
R1-1718611.zip	2017/10/02 14:51	139,6 KB

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sort by name/desc	sort by date/desc	sort by size/desc
R1-1718612.zip	2017/10/02 14:51	316,7 KB
R1-1718613.zip	2017/10/02 14:51	298,1 KB
R1-1718614.zip	2017/10/02 14:51	53,3 KB
R1-1718615.zip	2017/10/02 14:51	111 KB
R1-1718616.zip	2017/10/02 14:51	412,5 KB
R1-1718617.zip	2017/10/03 4:37	37,4 KB
R1-1718618.zip	2017/10/02 14:51	465,7 KB
R1-1718619.zip	2017/10/02 20:59	81,4 KB
R1-1718620.zip	2017/10/02 20:59	96,7 KB
R1-1718621.zip	2017/10/02 20:59	125,3 KB
R1-1718622.zip	2017/10/05 20:25	193,3 KB
R1-1718623.zip	2017/10/02 20:59	41,4 KB
R1-1718624.zip	2017/10/02 20:59	46,8 KB
R1-1718625.zip	2017/10/02 8:18	196,2 KB
R1-1718626.zip	2017/10/03 3:18	24,6 KB
R1-1718627.zip	2017/10/03 6:00	393,3 KB
R1-1718628.zip	2017/10/03 6:00	65,3 KB
R1-1718629.zip	2017/10/03 6:00	63 KB
R1-1718630.zip	2017/10/07 21:38	12,2 KB
R1-1718631.zip	2017/10/03 6:00	283,7 KB
R1-1718632.zip	2017/10/03 6:00	507,9 KB
R1-1718633.zip	2017/10/03 6:00	56 KB
R1-1718634.zip	2017/10/03 6:00	42,9 KB
R1-1718635.zip	2017/10/03 6:00	179,4 KB
R1-1718636.zip	2017/10/03 6:00	1328,1 KB
R1-1718637.zip	2017/10/03 6:00	33,2 KB
R1-1718638.zip	2017/10/03 6:00	98,1 KB
R1-1718639.zip	2017/10/03 6:00	122,4 KB
R1-1718640.zip	2017/10/03 6:00	39,7 KB
R1-1718641.zip	2017/10/03 6:00	37 KB
R1-1718642.zip	2017/10/03 6:00	86,8 KB
R1-1718643.zip	2017/10/03 6:00	435,1 KB
R1-1718644.zip	2017/10/03 6:00	48,2 KB
R1-1718645.zip	2017/10/03 6:00	263 KB

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sort by name/desc	sort by date/desc	sort by size/desc
R1-1718646.zip	2017/10/03 6:00	46 KB
R1-1718647.zip	2017/10/03 6:00	105,1 KB
R1-1718648.zip	2017/10/03 6:00	120,9 KB
R1-1718649.zip	2017/10/03 6:00	105 KB
R1-1718650.zip	2017/10/03 6:00	41,5 KB
R1-1718651.zip	2017/10/03 6:00	35 KB
R1-1718652.zip	2017/10/03 6:00	22,2 KB
R1-1718653.zip	2017/10/03 6:00	46,9 KB
R1-1718654.zip	2017/10/03 6:00	40,2 KB
R1-1718655.zip	2017/10/03 6:00	42,8 KB
R1-1718656.zip	2017/10/03 6:00	32,3 KB
R1-1718657.zip	2017/10/02 23:48	92,6 KB
R1-1718658.zip	2017/10/02 23:48	51 KB
R1-1718659.zip	2017/10/02 23:48	78,9 KB
R1-1718660.zip	2017/10/02 23:48	47,3 KB
R1-1718661.zip	2017/10/02 23:48	35,3 KB
R1-1718662.zip	2017/10/02 23:48	222 KB
R1-1718663.zip	2017/10/02 23:48	84,2 KB
R1-1718664.zip	2017/10/02 23:48	74,6 KB
R1-1718665.zip	2017/10/02 23:48	31,7 KB
R1-1718666.zip	2017/10/02 23:48	138,4 KB
R1-1718667.zip	2017/10/02 23:48	674,1 KB
R1-1718668.zip	2017/10/02 23:48	19,6 KB
R1-1718669.zip	2017/10/02 23:48	90,1 KB
R1-1718670.zip	2017/10/02 23:48	212,1 KB
R1-1718671.zip	2017/10/02 23:48	84,6 KB
R1-1718672.zip	2017/10/02 9:02	53 KB
R1-1718673.zip	2017/10/02 21:36	87,4 KB
R1-1718674.zip	2017/10/02 21:36	116,2 KB
R1-1718675.zip	2017/10/02 21:36	114,7 KB
R1-1718676.zip	2017/10/02 21:36	233,1 KB
R1-1718677.zip	2017/10/02 21:36	2380,7 KB
R1-1718678.zip	2017/10/02 21:36	147,8 KB
R1-1718679.zip	2017/10/02 21:36	93,7 KB

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sort by name/desc	sort by date/desc	sort by size/desc
R1-1718680.zip	2017/10/03 6:02	55,3 KB
R1-1718681.zip	2017/10/03 6:02	42,2 KB
R1-1718682.zip	2017/10/03 6:02	42,9 KB
R1-1718683.zip	2017/10/03 6:02	52,6 KB
R1-1718684.zip	2017/10/03 6:05	31,8 KB
R1-1718685.zip	2017/10/03 6:02	38 KB
R1-1718686.zip	2017/10/03 6:02	36,4 KB
R1-1718687.zip	2017/10/03 6:02	31,7 KB
R1-1718688.zip	2017/10/02 17:21	28,7 KB
R1-1718689.zip	2017/10/02 17:21	37 KB
R1-1718690.zip	2017/10/02 17:21	40,9 KB
R1-1718691.zip	2017/10/02 17:21	35 KB
R1-1718692.zip	2017/10/02 22:02	63 KB
R1-1718693.zip	2017/10/02 22:02	224,9 KB
R1-1718694.zip	2017/10/02 10:38	35,5 KB
R1-1718695.zip	2017/10/03 5:58	156,8 KB
R1-1718696.zip	2017/10/03 5:58	78,1 KB
R1-1718697.zip	2017/10/03 5:58	114,6 KB
R1-1718698.zip	2017/10/03 5:58	357 KB
R1-1718699.zip	2017/10/03 5:58	19,6 KB
R1-1718700.zip	2017/10/03 5:58	22 KB
R1-1718701.zip	2017/10/03 5:58	91,6 KB
R1-1718702.zip	2017/10/03 6:04	176,3 KB
R1-1718703.zip	2017/10/03 5:58	18,1 KB
R1-1718704.zip	2017/10/03 9:34	33 KB
R1-1718705.zip	2017/10/02 22:53	187,9 KB
R1-1718706.zip	2017/10/02 18:10	45,3 KB
R1-1718707.zip	2017/10/02 22:53	154,4 KB
R1-1718708.zip	2017/10/02 12:43	117,5 KB
R1-1718709.zip	2017/10/03 5:55	56,3 KB
R1-1718710.zip	2017/10/03 5:57	65,9 KB
R1-1718711.zip	2017/10/03 5:57	58,8 KB
R1-1718712.zip	2017/10/03 5:57	97 KB
R1-1718713.zip	2017/10/03 5:57	53,6 KB

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sort by name/desc	sort by date/desc	sort by size/desc
R1-1718714.zip	2017/10/03 5:57	69,6 KB
R1-1718715.zip	2017/10/03 5:57	1710,3 KB
R1-1718716.zip	2017/10/03 5:57	803,9 KB
R1-1718717.zip	2017/10/03 5:57	136,5 KB
R1-1718718.zip	2017/10/03 5:57	107,2 KB
R1-1718719.zip	2017/10/03 5:57	73,7 KB
R1-1718720.zip	2017/10/03 5:57	424,7 KB
R1-1718721.zip	2017/10/03 5:57	42,4 KB
R1-1718722.zip	2017/10/02 12:43	268,1 KB
R1-1718723.zip	2017/10/02 12:43	169,2 KB
R1-1718724.zip	2017/10/02 12:43	121,6 KB
R1-1718725.zip	2017/10/02 13:07	377 KB
R1-1718726.zip	2017/10/03 10:44	60,6 KB
R1-1718727.zip	2017/10/03 5:55	45,4 KB
R1-1718728.zip	2017/10/03 5:55	58 KB
R1-1718729.zip	2017/10/03 5:55	88,7 KB
R1-1718730.zip	2017/10/02 15:46	47,1 KB
R1-1718731.zip	2017/10/02 15:46	22,1 KB
R1-1718733.zip	2017/10/02 14:10	432,3 KB
R1-1718734.zip	2017/10/03 5:52	42,4 KB
R1-1718735.zip	2017/10/03 5:52	62,5 KB
R1-1718736.zip	2017/10/03 5:52	1396,9 KB
R1-1718737.zip	2017/10/03 5:52	84,2 KB
R1-1718738.zip	2017/10/03 5:52	130,6 KB
R1-1718740.zip	2017/10/03 5:52	190,4 KB
R1-1718741.zip	2017/10/03 5:52	43,6 KB
R1-1718742.zip	2017/10/03 5:52	106,2 KB
R1-1718743.zip	2017/10/03 5:52	235,3 KB
R1-1718744.zip	2017/10/03 5:52	155,2 KB
R1-1718745.zip	2017/10/03 5:52	31,2 KB
R1-1718746.zip	2017/10/03 5:52	59,6 KB
R1-1718747.zip	2017/10/03 5:52	199,5 KB
R1-1718748.zip	2017/10/03 5:58	251,1 KB
R1-1718749.zip	2017/10/03 5:52	383,8 KB

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sort by name/desc	sort by date/desc	sort by size/desc
R1-1718750.zip	2017/10/03 5:53	2689 KB
R1-1718751.zip	2017/10/03 5:53	580,3 KB
R1-1718752.zip	2017/10/03 5:53	61 KB
R1-1718753.zip	2017/10/03 5:53	36,6 KB
R1-1718754.zip	2017/10/03 5:53	472,4 KB
R1-1718755.zip	2017/10/03 5:53	153,6 KB
R1-1718756.zip	2017/10/03 5:53	240,1 KB
R1-1718757.zip	2017/10/03 5:53	53,7 KB
R1-1718758.zip	2017/10/03 3:19	104,1 KB
R1-1718759.zip	2017/10/03 3:40	416,9 KB
R1-1718760.zip	2017/10/02 15:04	433,1 KB
R1-1718761.zip	2017/10/02 15:20	433,1 KB
R1-1718762.zip	2017/10/05 7:33	2500,9 KB
R1-1718763.zip	2017/10/05 7:32	1710,4 KB
R1-1718764.zip	2017/10/03 8:55	105 KB
R1-1718765.zip	2017/10/05 9:50	29,3 KB
R1-1718766.zip	2017/10/03 9:06	94,5 KB
R1-1718767.zip	2017/10/07 8:36	266,8 KB
R1-1718768.zip	2017/10/03 20:22	137,7 KB
R1-1718769.zip	2017/10/09 18:41	116,2 KB
R1-1718770.zip	2017/10/11 5:32	233,7 KB
R1-1718771.zip	2017/10/11 5:32	59,2 KB
R1-1718772.zip	2017/10/11 5:32	120,6 KB
R1-1718773.zip	2017/10/05 11:29	314,5 KB
R1-1718774.zip	2017/10/09 18:41	55,8 KB
R1-1718775.zip	2017/10/04 13:25	93,4 KB
R1-1718776.zip	2017/10/04 13:25	18,1 KB
R1-1718777.zip	2017/10/04 13:25	16,8 KB
R1-1718778.zip	2017/10/04 13:25	18,3 KB
R1-1718779.zip	2017/10/04 13:25	44,3 KB
R1-1718780.zip	2017/10/09 18:41	397,3 KB
R1-1718781.zip	2017/10/09 18:41	148,4 KB
R1-1718782.zip	2017/10/07 21:38	113,6 KB
R1-1718783.zip	2017/10/09 18:41	67,5 KB

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sort by name/desc	sort by date/desc	sort by size/desc
R1-1718784.zip	2017/10/11 5:32	49,1 KB
R1-1718785.zip	2017/10/07 21:38	22,1 KB
R1-1718786.zip	2017/10/07 21:38	21,9 KB
R1-1718787.zip	2017/10/09 18:41	94,8 KB
R1-1718788.zip	2017/10/09 18:41	37,8 KB
R1-1718789.zip	2017/10/09 18:41	45,1 KB
R1-1718790.zip	2017/10/06 6:54	2129,7 KB
R1-1718791.zip	2017/10/06 6:53	740,1 KB
R1-1718792.zip	2017/10/11 5:32	64,2 KB
R1-1718793.zip	2017/10/06 6:53	325,6 KB
R1-1718794.zip	2017/10/11 5:32	76,7 KB
R1-1718795.zip	2017/10/09 18:41	224,2 KB
R1-1718796.zip	2017/10/12 5:28	369,5 KB
R1-1718797.zip	2017/10/09 18:41	2890,9 KB
R1-1718798.zip	2017/10/11 5:32	25,1 KB
R1-1718799.zip	2017/10/07 8:36	483,5 KB
R1-1718800.zip	2017/10/09 6:02	1120,8 KB
R1-1718801.zip	2017/10/11 5:32	39,2 KB
R1-1718802.zip	2017/10/11 5:32	39,3 KB
R1-1718803.zip	2017/10/09 18:41	40,6 KB
R1-1718804.zip	2017/10/12 5:28	200,5 KB
R1-1718805.zip	2017/10/07 21:38	444,2 KB
R1-1718806.zip	2017/10/07 21:38	174,6 KB
R1-1718807.zip	2017/10/09 18:41	71,7 KB
R1-1718808.zip	2017/10/09 18:42	754,7 KB
R1-1718809.zip	2017/10/09 6:02	105,6 KB
R1-1718810.zip	2017/10/09 18:41	139,2 KB
R1-1718811.zip	2017/10/09 6:02	121,9 KB
R1-1718812.zip	2017/10/09 18:41	63,8 KB
R1-1718813.zip	2017/10/09 6:02	18,3 KB
R1-1718814.zip	2017/10/09 18:41	137,1 KB
R1-1718815.zip	2017/10/09 18:41	92,6 KB
R1-1718816.zip	2017/10/09 6:02	90 KB
R1-1718817.zip	2017/10/11 5:32	182,3 KB

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sort by name/desc	sort by date/desc	sort by size/desc
R1-1718818.zip	2017/10/11 5:32	162 KB
R1-1718819.zip	2017/10/12 5:28	716,1 KB
R1-1718820.zip	2017/10/09 18:41	87,4 KB
R1-1718821.zip	2017/10/09 18:41	69,1 KB
R1-1718822.zip	2017/10/11 5:32	31,4 KB
R1-1718823.zip	2017/10/09 18:41	401,5 KB
R1-1718824.zip	2017/10/09 18:41	55,6 KB
R1-1718825.zip	2017/10/09 18:41	275,5 KB
R1-1718826.zip	2017/10/09 18:41	94,3 KB
R1-1718827.zip	2017/10/11 5:32	64,7 KB
R1-1718828.zip	2017/10/09 18:41	82,6 KB
R1-1718829.zip	2017/10/09 18:41	27,9 KB
R1-1718830.zip	2017/10/12 5:28	37,3 KB
R1-1718831.zip	2017/10/09 18:41	38,7 KB
R1-1718832.zip	2017/10/09 18:41	23,6 KB
R1-1718833.zip	2017/10/09 18:41	92,2 KB
R1-1718834.zip	2017/10/09 18:41	110,9 KB
R1-1718835.zip	2017/10/11 5:32	33,6 KB
R1-1718836.zip	2017/10/11 5:32	34,6 KB
R1-1718837.zip	2017/10/09 18:41	41,1 KB
R1-1718838.zip	2017/10/09 18:41	80,3 KB
R1-1718839.zip	2017/10/09 18:41	52 KB
R1-1718840.zip	2017/10/09 18:41	232,6 KB
R1-1718841.zip	2017/10/09 18:41	62 KB
R1-1718842.zip	2017/10/11 5:32	35,2 KB
R1-1718843.zip	2017/10/11 5:32	31,3 KB
R1-1718844.zip	2017/10/12 5:28	212,2 KB
R1-1718845.zip	2017/10/09 18:41	110,1 KB
R1-1718846.zip	2017/10/11 5:32	31,6 KB
R1-1718847.zip	2017/10/11 5:32	31,9 KB
R1-1718848.zip	2017/10/09 18:41	1843,6 KB
R1-1718849.zip	2017/10/09 18:41	34,1 KB
R1-1718850.zip	2017/10/11 5:32	72,8 KB
R1-1718851.zip	2017/10/09 18:41	39,6 KB

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sort by name/desc	sort by date/desc	sort by size/desc
R1-1718852.zip	2017/10/09 18:41	229,1 KB
R1-1718853.zip	2017/10/13 5:35	104,2 KB
R1-1718854.zip	2017/10/09 18:41	163,2 KB
R1-1718856.zip	2017/10/11 5:32	39 KB
R1-1718857.zip	2017/10/09 18:41	229,6 KB
R1-1718858.zip	2017/10/09 18:41	52,2 KB
R1-1718859.zip	2017/10/09 18:41	72,2 KB
R1-1718860.zip	2017/10/09 18:41	242,4 KB
R1-1718861.zip	2017/10/09 18:41	282 KB
R1-1718862.zip	2017/10/09 18:41	64,2 KB
R1-1718863.zip	2017/10/09 18:41	113,1 KB
R1-1718864.zip	2017/10/11 5:32	38,8 KB
R1-1718865.zip	2017/10/11 5:32	163,7 KB
R1-1718866.zip	2017/10/11 5:32	40,8 KB
R1-1718867.zip	2017/10/11 5:32	18,9 KB
R1-1718868.zip	2017/10/11 5:32	18,4 KB
R1-1718869.zip	2017/10/11 5:32	164,2 KB
R1-1718870.zip	2017/10/12 5:28	41,3 KB
R1-1718871.zip	2017/10/11 5:32	41,6 KB
R1-1718872.zip	2017/10/11 5:32	146,4 KB
R1-1718874.zip	2017/10/13 5:35	45,1 KB
R1-1718875.zip	2017/10/11 5:32	38,1 KB
R1-1718876.zip	2017/10/12 5:28	60,6 KB
R1-1718877.zip	2017/10/11 5:32	129,7 KB
R1-1718878.zip	2017/10/12 5:28	98 KB
R1-1718879.zip	2017/10/11 5:32	31,1 KB
R1-1718880.zip	2017/10/12 5:28	35,6 KB
R1-1718881.zip	2017/10/11 5:32	36 KB
R1-1718882.zip	2017/10/12 5:28	224 KB
R1-1718883.zip	2017/10/11 5:32	179 KB
R1-1718884.zip	2017/10/11 5:32	317,4 KB
R1-1718885.zip	2017/10/11 5:32	39,6 KB
R1-1718886.zip	2017/10/12 5:28	117,4 KB
R1-1718887.zip	2017/10/11 5:32	5214 KB

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sort by name/desc	sort by date/desc	sort by size/desc
R1-1718888.zip	2017/10/11 5:32	181,9 KB
R1-1718889.zip	2017/10/11 5:32	531,4 KB
R1-1718890.zip	2017/10/11 5:32	46,9 KB
R1-1718891.zip	2017/10/11 5:32	160,8 KB
R1-1718893.zip	2017/10/11 5:32	985,3 KB
R1-1718894.zip	2017/10/11 5:32	679,2 KB
R1-1718895.zip	2017/10/11 5:32	37,6 KB
R1-1718896.zip	2017/10/11 5:32	27 KB
R1-1718897.zip	2017/10/11 5:32	83,4 KB
R1-1718898.zip	2017/10/11 5:32	19,9 KB
R1-1718899.zip	2017/10/11 5:32	54,4 KB
R1-1718900.zip	2017/10/11 5:32	49 KB
R1-1718901.zip	2017/10/11 5:32	55,6 KB
R1-1718902.zip	2017/10/12 5:28	31,3 KB
R1-1718903.zip	2017/10/12 5:28	33,7 KB
R1-1718904.zip	2017/10/11 5:32	221,5 KB
R1-1718905.zip	2017/10/11 5:32	1737,8 KB
R1-1718906.zip	2017/10/11 5:32	20,6 KB
R1-1718907.zip	2017/10/11 5:32	31,7 KB
R1-1718910.zip	2017/10/11 5:32	27,4 KB
R1-1718911.zip	2017/10/11 5:32	941,5 KB
R1-1718912.zip	2017/10/11 5:32	4687,5 KB
R1-1718913.zip	2017/10/13 5:35	52,1 KB
R1-1718914.zip	2017/10/11 5:32	1727,3 KB
R1-1718915.zip	2017/10/12 5:28	14,4 KB
R1-1718916.zip	2017/10/11 5:32	45,2 KB
R1-1718917.zip	2017/10/11 5:32	24,3 KB
R1-1718918.zip	2017/10/12 5:28	164,7 KB
R1-1718919.zip	2017/10/11 5:32	56,6 KB
R1-1718920.zip	2017/10/12 5:28	21,2 KB
R1-1718921.zip	2017/10/11 5:32	29,5 KB
R1-1718922.zip	2017/10/11 5:32	97,3 KB
R1-1718923.zip	2017/10/11 5:32	66,9 KB
R1-1718926.zip	2017/10/13 5:35	29,8 KB

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sort by name/desc	sort by date/desc	sort by size/desc
R1-1718927.zip	2017/10/11 5:32	43,7 KB
R1-1718928.zip	2017/10/11 5:32	51,1 KB
R1-1718929.zip	2017/10/11 5:32	50,3 KB
R1-1718930.zip	2017/10/11 5:32	55,6 KB
R1-1718931.zip	2017/10/11 5:32	73,5 KB
R1-1718932.zip	2017/10/12 5:28	276,9 KB
R1-1718933.zip	2017/10/12 5:28	42 KB
R1-1718934.zip	2017/10/12 5:28	46,9 KB
R1-1718935.zip	2017/10/11 5:32	131,9 KB
R1-1718936.zip	2017/10/11 5:32	75,4 KB
R1-1718937.zip	2017/10/11 5:32	96,6 KB
R1-1718939.zip	2017/10/12 5:28	37,9 KB
R1-1718940.zip	2017/10/11 5:32	12,3 KB
R1-1718941.zip	2017/10/11 5:32	89,6 KB
R1-1718942.zip	2017/10/11 5:32	34 KB
R1-1718943.zip	2017/10/11 5:32	34,5 KB
R1-1718944.zip	2017/10/11 5:32	34,9 KB
R1-1718945.zip	2017/10/12 5:28	75,4 KB
R1-1718946.zip	2017/10/12 5:28	74,8 KB
R1-1718947.zip	2017/10/13 5:35	27,2 KB
R1-1718948.zip	2017/10/12 5:28	50,8 KB
R1-1718949.zip	2017/10/12 5:28	675,6 KB
R1-1718950.zip	2017/10/11 5:32	34,7 KB
R1-1718951.zip	2017/10/12 5:28	0 KB
R1-1718952.zip	2017/10/11 5:32	35,8 KB
R1-1718953.zip	2017/10/17 8:10	34,2 KB
R1-1718954.zip	2017/10/12 5:28	49,8 KB
R1-1718955.zip	2017/10/12 5:28	54,3 KB
R1-1718956.zip	2017/10/11 5:32	51,3 KB
R1-1718957.zip	2017/10/11 5:32	34 KB
R1-1718958.zip	2017/10/11 5:32	31,5 KB
R1-1718959.zip	2017/10/13 5:35	227,6 KB
R1-1718960.zip	2017/10/11 5:32	57,7 KB
R1-1718961.zip	2017/10/11 5:32	40,7 KB

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sort by name/desc	sort by date/desc	sort by size/desc
R1-1718962.zip	2017/10/17 8:10	39,4 KB
R1-1718963.zip	2017/10/17 8:10	87,1 KB
R1-1718964.zip	2017/10/12 5:28	18,6 KB
R1-1718965.zip	2017/10/13 5:35	77,8 KB
R1-1718967.zip	2017/10/11 5:32	270,2 KB
R1-1718968.zip	2017/10/13 5:35	254,3 KB
R1-1718969.zip	2017/10/13 5:35	95,8 KB
R1-1718970.zip	2017/10/12 5:28	171,5 KB
R1-1718971.zip	2017/10/12 5:28	40,8 KB
R1-1718972.zip	2017/10/12 5:28	30,6 KB
R1-1718973.zip	2017/10/12 5:28	35 KB
R1-1718974.zip	2017/10/12 5:28	36,1 KB
R1-1718975.zip	2017/10/12 5:28	52,3 KB
R1-1718976.zip	2017/10/12 5:28	36,8 KB
R1-1718977.zip	2017/10/12 5:28	76,9 KB
R1-1718978.zip	2017/10/12 5:28	27,9 KB
R1-1718979.zip	2017/10/12 5:28	1235,9 KB
R1-1718980.zip	2017/10/12 5:28	61,9 KB
R1-1718981.zip	2017/10/12 5:28	283,6 KB
R1-1718982.zip	2017/10/12 5:28	40 KB
R1-1718983.zip	2017/10/12 5:28	23,3 KB
R1-1718984.zip	2017/10/13 5:35	41,3 KB
R1-1718985.zip	2017/10/12 5:28	51,2 KB
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R1-1719037.zip	2017/10/13 5:35	60,7 KB

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R1-1719153.zip	2017/10/13 5:35	290,8 KB
R1-1719154.zip	2017/10/17 8:09	29,3 KB
R1-1719156.zip	2017/10/13 5:35	41,7 KB
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R1-1719165.zip	2017/10/13 5:35	35,3 KB
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R1-1719182.zip	2017/10/17 8:09	66,4 KB
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sort by name/desc	sort by date/desc	sort by size/desc
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R1-1719250.zip	2017/11/24 22:45	101,3 KB
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R1-1719253.zip	2017/10/17 8:08	38,7 KB

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sort by name/desc	sort by date/desc	sort by size/desc
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TDoc_List_Meeting_RAN1#90-Bis.zip	2018/01/10 16:45	484,4 KB

2277 items.

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APPENDIX 27

3GPP TSG RAN WG1 Meeting #91 **R1-1719301**
Reno, USA, 27th November – 1st December 2017

2

Source: **MCC Support**

Title: **Final Report of 3GPP TSG RAN WG1 #90bis v1.0.0 (Prague, Czech Rep, 9th – 13th October 2017)**

Document for: **Approval**



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3GPP TSG RAN WG1 Meeting #91 **R1-1719301**
Reno, USA, 27th November – 1st December 2017

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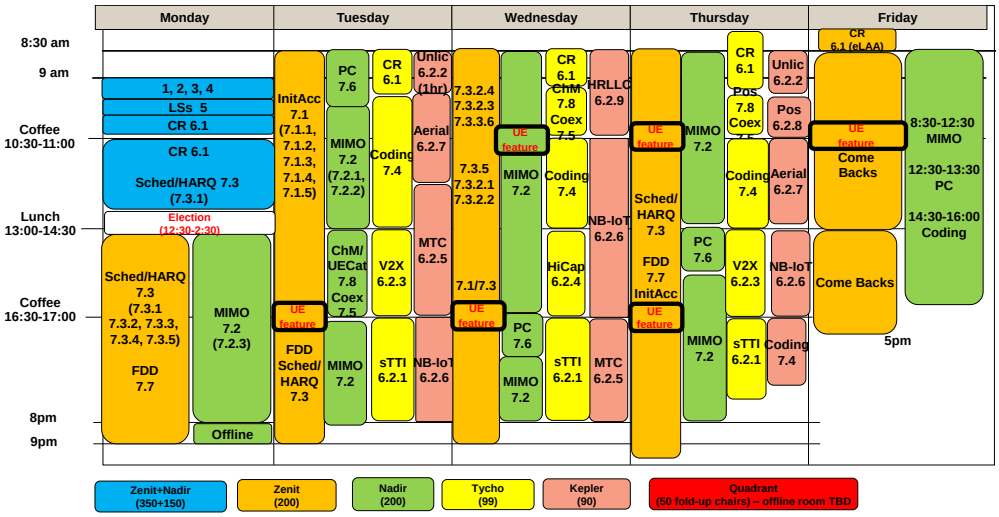
3GPP TSG RAN WG1 Meeting #91 R1-1719301
Reno, USA, 27th November – 1st December 2017

Main facts summary

The 3GPP TSG WG RAN1#90bis 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 9th October and finished at 17:15 on Friday 13th October 2017.
The number of attending delegates, having confirmed their participation through the electronic check-in application, was **451.**
Note that the number of registered was 584.

On day one, Monday 9th of October, the election of one WG RAN1 Vice Chairman took place and the result was as follows:
New Vice Chairman: **Dr. Havish Koorapaty (Ericsson LM, ETSI)**.

The schedule of the week was as follows:



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 **2274**.

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 Wanshi Chen (RAN1 Chairman) welcomed the participants of the RAN WG1 #90 bis meeting and opened the meeting at 09:00.

Mr Nicolas Chuberre from Thales on behalf of the European Friends of 3GPP, Apple, BlackBerry, BT, Ericsson, Huawei, Intel, InterDigital, KPN, Motorola, Nokia, Orange, Qualcomm, SIM Alliance, Sony, TIM, Telefonica, Telenor, TeliaSonera, Thales, Deutsche Telekom, 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)

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.

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1.5 Aspects related to RAN1 Meeting Management

Delegates are encouraged to check R1-1718766 for some thoughts on RAN1 meeting management.

2 Approval of Agenda

R1-1716940 Draft Agenda of RAN1#90bis meeting RAN1 Chair
Wanshi Chen (RAN1 Chair) proposed the agenda for the meeting, as well the schedule of the week.
Discussion: Chairman highlighted that there was only 10 working days left until Dec… and warned the group to stay focused on basic and essential features.
Details of the elections were provided to the group. Refer to AI 8.
Decision: The agenda is approved.

3 Highlights from RAN plenary

R1-1716943 Highlights from RAN#77RAN1 Chair
The document was presented by Wanshi Chen (RAN1 Chair) and provides the highlights relevant to RAN1 from the last plenary.
Discussion: NR part was already presented in September ad-hoc.
Additional ad-hoc meeting in January 2018 will be hosted by NAF3, in Vancouver - Canada.
Decision: The document is noted.

4 Approval of Minutes from previous meetings

R1-1716941 Report of RAN1#90 meeting ETSI
The document was presented by Patrick Merias from MCC (ETSI Mobile Competence Center) and provides the report from last RAN1#90 meeting in Prague.
Discussion: MCC recalled that the report (with a focus on NR) was presented in September ad-hoc meeting. R1-1716941 is the final report including the LTE part.
Typo regarding the number of checked in delegates – should be read as 444.
Decision: The document is approved.

R1-1716942 Report of RAN1#AH3_NR meeting ETSI
The document was presented by Patrick Merias from MCC (ETSI Mobile Competence Center) and provides the report from last RAN1 ad-hoc meeting in Nagoya.
Discussion: MCC asked for confirmation that no updates post AH3_NR are needed to both 38.201/202. Confirmed by rapporteur for 38.202.
Decision: The document is approved.

5 Incoming Liaison Statements

The document was presented by … from …
Discussion:
Decision: The document is noted.

R1-1716945 Reply LS on Relay UE discovery RAN2, Nokia
RAN2 clarifies that currently discovery operation on AS layer is model-transparent and that discovery enhancements were not studied in RAN2 during the feD2D SI. However, the choice of discovery model is performed by the upper layers/Core Network and is known by the upper layers in the UE. Therefore, it can be feasible for the upper layers in the UE to indicate currently used discovery model when requesting AS layer to perform sidelink discovery transmission or sidelink discovery monitoring. If the information is provided by upper layers, then it can also be made possible for RRC Connected UE to indicate the utilized discovery model to the eNB, if needed.
Decision: The document is noted.
R1-1716959 LS on FS_REAR study outcome SA2, Huawei
Decision: The document is noted.

R1-1716946 Response LS to RAN1 on P2X RAN2, LG Electronics
RAN2 asks RAN1 to check the corresponding CRs and to give feedback if there is any concern.
Discussion: Huawei commented that some offline is required before any feedback to RAN2.
Decision: The document is noted. Discuss further offline – Hanbyul (LGE).
Friday: LGE confirmed that there was no need for a reply LS.

R1-1716960 LS on RAR reception for NB-IoT RAN2, Nokia

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RAN2 has discussed the RAR reception issue due to large repetition numbers (e.g. 2048) for NPDCCH and NPDSCH transmission and agreed to the attached MAC CR. RAN1 to update RAN1 specifications accordingly.
Decision: The document is noted.

R1-1716955 **LS on effect of SRS switching in TDD + FDD CA RAN4, Qualcomm**
Decision: The document is noted. Already discussed in last meeting.

R1-1716948 **Reply LS on sPDCCH monitoring in sTTIRAN2, Ericsson**
RAN2 made the following agreement regarding retransmission timers for DRX:
drx-RetransmissionTimer, and *drx-ULRetransmissionTimer* for sTTI can be configured independently.
Decision: The document is noted.
R1-1716951 **LS on SPS and SR for sTTI RAN2, Huawei**
Inform RAN1 that RAN2 desires to support SPS and check the feasibility of SPS activation/deactivation for sTTI.
Decision: The document is noted.
R1-1717147 SPS for short TTIHuawei, HiSilicon
R1-1717756 **Draft LS reply on SPS for short TTI Huawei**
Decision: The document is noted. Detailed to be handled in 6.2.1

R1-1716950 **LS on RAN2 agreements on Enhancements to LTE operation in unlicensed spectrum RAN2, Nokia**
Decision: The document is noted. Details to be handled in 6.2.2

R1-1716952 **LS on latency requirement for Aerial Vehicles RAN2, NTT DOCOMO**
- RAN2 informs RAN1 that the value 50 ms for latency requirements was confirmed and agreed.
- RAN2 agreed to adopt the following definition of "user plane latency" from the TS 38.913 and TR 38.802. The "latency" in TR 36.777 means "*The time it takes to successfully deliver an application layer packet/message from the radio protocol layer 2/3 SDU ingress point to the radio protocol layer 2/3 SDU egress point via the radio interface in both uplink and downlink directions, where neither device nor Base Station reception is restricted by DRX*", and where "the radio protocol layer 2/3 SDU ingress point" means the input to PDCP in the transmitter and "the radio protocol layer 2/3 SDU egress" means the output from PDCP in the receiver.

Decision: The document is noted. Details to be handled in 6.2.7

R1-1716962 **LS on RSSI Definition in Signal Quality Measurements for Mobility in NR RAN4, Ericsson**
RAN4 informs that the inter-frequency measurement requirements shall be defined using measurement gaps. However intra-frequency measurement requirements shall be defined using without measurement gaps and also with measurement gaps.
Asks RAN WG1 to take into account the above mentioned information and recommendation when defining RSSI part of the SSB based RSRQ and RSSI part of the CSI-RS based RSRQ.
Discussion: Samsung commented that the intra-frequency measurement may require more discussion in RAN1.
Decision: The document is noted. Details to be handled in 7.1.5

R1-1718023 **[Draft] Reply LS on Transport Block Sizes Samsung**
Decision: The document (reply to R1-1715355 (R2-1709802)) is noted. Details to be handled in 7.3.3.1

The following LSs are noted, without online presentation (unless specifically requested)
R1-1716944 **LS on CSG support in NB-IoT RAN2, Nokia**
R1-1716947 **Reply LS on QoS support over PC5 RAN2, Nokia**
R1-1716949 **LS on UE GNSS RTK measurement for high accuracy positioning RAN2, Nokia**
R1-1716953 **Reply LS on LTE Rel-14 UE feature list for MUST RAN4, MediaTek inc.**
R1-1716954 **LS reply on TM10 / FD-MIMO UE capability signalling RAN4, Intel Corporation**
R1-1716956 **LS on new UE power class for Rel-15 efeMTC RAN4, Ericsson**
R1-1716957 **LS on Rel-14 RAN4 UE feature list RAN4, Intel Corporation**
R1-1716958 **Reply LS on support of CACC and platooning applications by 3GPP systems SA1, LG Electronics**
R1-1716961 **LS on scenarios of multiple SSB RAN4, Huawei**
R1-1716963 **Reply LS to RAN2 for NR UE categories and UE capabilities RAN4, Ericsson**

TA Adjustment Stepsize in NR
R1-1717047 **Draft LS reply on UE timing advance adjustment step size Huawei, HiSilicon**
Decision: The document is noted. Details to be handled in 7.1.4.2.
R1-1717787 **[DRAFT] LS on response to UE timing advance adjustment step size CATT**
Decision: The document is noted. Details to be handled in 7.1.4.2.

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R1-1717788 **[DRAFT] LS on response to RACH agreements CATT**
Decision: The document is noted. Details to be handled in 7.1.4.2

R1-1717316 **[draft] Reply LS on mixed numerologies FDM operation Intel Corporation**
Decision: The document is endorsed and final LS is approved in R1-1718829.

R1-1718176 **[Draft] Reply LS on NR L1 processing chain NTT DOCOMO, INC.**
Decision: The document is noted. Continue discussion offline – Yuichi (NTT DOCOMO)
Friday: R1-1719199 **[Draft] Reply LS on NR L1 processing chain NTT DOCOMO, INC.**
Decision: The document is endorsed and final version is approved in R1-1719203.

R1-1717315 **[Draft]Response LS on simultaneous transmission and/or reception over EPC/E-UTRAN and 5GC/NR Intel Corporation**
Decision: The document is noted.
R1-1718595 Draft response LS on simultaneous transmission and/or reception over EPC/E-UTRAN and 5GC/NR Qualcomm Incorporated
Late submission
Continue discussion offline – Hong (Intel)/Peter (Qualcomm).
R1-1719068 **[Draft] Response LS on simultaneous transmission and/or reception over EPC/E-UTRAN and 5GC/NR Intel**
Discussion: Huawei never had a chance seeing this draft reply before its presentation – requested more time to look at it. After reviewing it, Huawei suggested adding "capability" for further clarification.
Decision: The document is endorsed with the update "UE category/capability", and final LS is approved in R1-1719211.

LS received during the course of the week
R1-1718940 **Reply LS on power sharing for LTE-NR Dual connectivity RAN4, LG Electronics**
Decision: The document is noted. Details to be handled in 7.6.1
R1-1719192 **LS to RAN1 on SCell activation and deactivation RAN2, OPPO**
Decision: The document is noted.
R1-1719193 **LS to RAN1 on SPS and Grant-free RAN2, Samsung**
Decision: The document is noted.

6 E-UTRA

6.1 Maintenance of E-UTRA Releases 8 – 14

R1-1719120 **Chairman's notes of AI 6.1 Maintenance of E-UTRA Releases 8 – 14 Ad-Hoc chair (Nokia)**
The document was presented by Matthew Baker of Nokia.
Decision: The document is endorsed, and content incorporated below.

6.1.1 Maintenance of E-UTRA Release 8 – 13

eMTC
R1-1716994 **TBS for TDD special subframe for BL/CE UE without repetition Ericsson**
Decision: The document is endorsed and CR0980 to 36.213 (Rel-13, F) is agreed in R1-1718830.
To send an LS to RAN4 based on the above agreed CR.
Tuesday: Shadow CR0987 to 36.213 (Rel-14, A) is agreed in R1-1719075
LS to RAN4 – Johan - R1-1719076
Thursday: R1-1719076 **[Draft] LS on TBS for TDD special subframe for BL/CE UE without repetition Ericsson**
Decision: The document is endorsed and final LS is approved in R1-1719090 with CRs attached.

R1-1717523 **Correction on MPDCCH frequency hopping Samsung**
Decision: The draft CR is endorsed in principle – to further add a change "SPS RNTI" to "SPS C-RNTI".
Prepare final CRs
Tuesday: Agreed in R1-1718831 (36.211, Rel-13, CR0393) and shadow CR in R1-1718837 (36.211, Rel-14, CR0396) (w/o the change of SPS C-RNTI).

R1-1717898 **Draft CR on correct RRC parameter name for number of PUCCH repetitions Xiaomi Technology**
Decision: The document is endorsed and CR0982 to 36.213 (Rel-13, F) is agreed in R1-1718832.

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R1-1718088 **Issue with handovers in eMTC** **Qualcomm Incorporated**
Decision: The document is noted. To discuss further offline in drafting an LS covering both Rel-13 and Rel-14 (including handling the case of when MBSFN/SIB2 is not included in HO command) – Alberto (Qualcomm)
Thursday:
R1-1718879 **[Draft] LS on handover issues for eMTC** **Qualcomm**
Decision: The document is endorsed and final LS is approved in R1-1719091.

Agreement:

- For Rel-13, for the case where the MBSFN subframe configuration of the target cell is not otherwise known, the UE can assume that the MBSFN subframe configuration is the same as the valid/invalid mask in the handover message (*fdd-DownlinkOrTddSubframeBitmapBR-r13*).

R1-1718299 **Draft CR for Non-repeated PUCCH SR transmissions on invalid UL subframes** **Nokia, Nokia Shanghai Bell**
Decision: The document is noted. Continue discussion offline
Tuesday: CRs are agreed in R1-1719077 36213CR0988 (Rel-13/F) and R1-1719078 36213CR0989 (Rel-14/A) with the following change:

The SR transmission instances are $N^{(m)}_{PUCCH,rep}$ consecutive BL/CE uplink subframes when $N^{(m)}_{PUCCH,rep}>1$, or one (BL/CE or non-BL/CE) uplink subframe when $N^{(m)}_{PUCCH,rep}=1$, where $N^{(m)}_{PUCCH,rep}$ is provided by higher layer parameter *NumRepetitionCE-format1*. The starting ~~from a~~ subframe satisfies~~ying~~ $(10\times n_f+\lfloor n_s/2\rfloor-N_{OFFSET,SR})\bmod SR_{PERIODICITY}=0$, ~~where $N^{(m)}_{PUCCH,rep}$ is provided by higher layer parameter *NumRepetitionCE-format1*~~.

Field Code Changed
Field Code Changed

NB-IoT
R1-1718824 **Discussion on the postponement of NPUSCH transmission** **ZTE, SaneChips** (rev of R1-1718022)
Decision: The document is noted. Continue discussion offline
Clarification (Tuesday):
Note that, as already specified, the 256ms before the first NPUSCH gap begins at the start of the NPUSCH grant, even if NPUSCH transmision is postponed due to a collision with NPRACH.
No CR needed.

CA
R1-1718086 **Clarification on CSI report for one serving cell** **Qualcomm Incorporated**

- Proposal: Clarify that it is RAN1 understanding that "For more than one serving cell" = "The transmitted aperiodic CSI report contains CSI for more than one serving cell".
  - i.e., it is not a valid combination to have 2 cells configured, one activated only, and use up to 20PRBs for the case above.
  - RAN1 to discuss if a CR is needed.

Disucssion: Intel supports the proposal
Fujitsu: which part of the spec is impacted should be clarified.
Decision: The document is noted.

Conclusion:

- In the following 36.213 text:
  For a non-BL/CE UE and for $29 \le I_{MCS} \le 31$ *the modulation order* (Q_m) *is determined as follows:*
  - *if DCI format 0 is used and* $I_{MCS}=29$ *or, if DCI format 4 is used and only 1 TB is enabled and* $I_{MCS}=29$ *for the enabled TB and the signalled number of transmission layers is 1, and if*
  - *the "CSI request" bit field is 1 bit and the bit is set to trigger an aperiodic report and,* $N_{PRB} \le 4$ *or,*
  - *the "CSI request" bit field is 2 bits and is triggering an aperiodic CSI report for one serving cell according to Table 7.2.1-1A, and,* $N_{PRB} \le 4$ *or,*

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- *the "CSI request" bit field is 2 bits and is triggering an aperiodic CSI report for more than one serving cell according to Table 7.2.1-1A and, $N_{PRB} \leq 20$ or,*

....

The wording "for more than one serving cell" refers to "The transmitted aperiodic CSI report contains CSI for more than one serving cell"

- No CR is necessary

R1-1718087 Clarification for DAI Qualcomm Incorporated
Decision: The document is noted. Continue discussion offline.
Tuesday: Discuss whether PUCCH format 4/5 must be configured if a UE is configured with more than 5 CCs.
Thursday: Email discussion until 28th October – Alberto (Qualcomm)

MIMO
R1-1718089 Draft CR on clarification on DMRS ports associated with PDSCH Qualcomm Incorporated
Decision: The draft 36.211 CR is endorsed. Final CR is agreed in R1-1718835 (36.211, Rel-13, CR0394), and shadow CR in R1-1718836 (36.211, Rel-14, CR0395).

6.1.2 Maintenance of Release 14 Enhanced Licensed-Assisted Access to Unlicensed Spectrum

R1-1717317 Discussion on CSI report reference subframe for an LAA SCell Intel Corporation
Suggestion: When a UE is configured in transmission mode 1-9 or transmission mode 10 with a single configured CSI process for the serving cell, for aperiodic CSI reporting for an LAA SCell on a licensed cell, the Release 14 UE behavior needs to be aligned with the Release 13 UE behavior.
Decision: The document is endorsed. Prepare CR0981 to 36.213 (Rel-13) in R1-1718838.
Friday: CR0981 to 36.213 (Rel-13) in R1-1718838 is agreed.

R1-1717414 Correction on UL multicarrier operation for eLAA in 36.213 Huawei, HiSilicon
Allow the UE to select a carrier into multicarrier set C regardless whether the carrier is indicated with 25us LBT or Cat.4 LBT. , i.e, The UE could include c_j indicated with Type 2 channel access procedure into set C and switch c_j to Type 1 channel access procedure if c_j is uniformly randomly selected from C.
Decision: The document is noted. Continue discussion offline
Friday: Still no consensus – not seen as an essential correction.

6.1.3 Maintenance of Release 14 V2V/V2X services based on LTE sidelink

R1-1716989 Correction on TBS selection for PSSCH transmission in TS 36.213 Huawei, HiSilicon
Exclude the V2X PSSCH MCS/TBS configurations that lead to decoding error floors.
Decision: The document is noted.

R1-1717046 Discussion on LTE Rel-14 V2X PSSCH Channel Interleaver (Error floors with Cmux = 10, and fix with Cmux = 8 or 9) NXP Semiconductors
Decision: The document is noted.

R1-1717096 Discussion on LTE Rel-14 V2X PSSCH network MCS optimization (non-monotonic MCS vs SNR curve, new MCS-TBS and MCS-exception tables) NXP Semiconductors
Decision: The document is noted. Continue discussion offline
Thursday:
R1-1718967 Way forward on LTE Rel-14 V2X rate-matching NXP, Huawei, HiSilicon, Ericsson, CATT

Agreement:

- Bullet 1 is agreed for PSSCH
- Bullet 2 is agreed with the following additional simulation cases:
  - 1st symbol is available
  - Retransmission is used
- Bullet 3 is not agreed – decide at RAN1#91 how to handle the list.

6.1.4 Maintenance of Release 14 Full-Dimension MIMO for LTE

R1-1718090 Correction on power boosting for UL DMRS Qualcomm Incorporated
Decision: The draft CR is endorsed. Final CR0398 to 36.211 (Rel-14, F) is agreed in R1-1718842.

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R1-1718091 **Clarification on supporting lower frequency domain density for Class A NZP CSI-RS Qualcomm Incorporated**
Decision: The draft CR (36.213, Rel-14, F) is noted. Continue discussion offline.
Tuesday: Agreed in R1-1719079 36213CR0990 with deletion of "resource" in "CSI-RS resource configuration" x 2.

R1-1718092 **Renaming of duplicated table 7.2.1-1A Qualcomm Incorporated**
Decision: The draft CR (36.213, Rel-14, D) is endorsed in principle - to fix the typo in cover page (7.1.1 to 7.2.1) & to add the necessary reference change in also 7.2.2 – prepare final CR.
Tuesday: Agreed in R1-1718843 (CR0983)

CBSR
R1-1718809 **Discussions on CBSR for advanced CSI LG Electronics** (Revision of R1-1717244)
Proposal. If CBSR for advanced CSI is supported, beam restriction is sufficient.
Decision: The document is noted.
R1-1717524 **Codebook subset restriciton for advanced CSI codebook Samsung**
Proposal: For advanced CSI codebook,

- *Beam restriction based on beam groups is supported*
  - *Partition $N_1N_2O_1O_2$ DFT beams into beam groups $G(r_1, r_2)$ comprising (N_1, N_2) adjacent beams*
    - *(r_1, r_2) is the leading DFT beam, $r_1 \in \{0, N_1, \dots, (O_1 - 1)N_1\}$, $r_2 \in \{0, N_2, \dots, (O_2 - 1)N_2\}$*
    - *$G(r_1, r_2) = \{(r_1 + x_1, r_2 + x_2): x_1 = 0,1, \dots, N_1 - 1, x_2 = 0,1, \dots, N_2 - 1\}$*
  - *Bitmap $B = B_1B_2$*
    - *B_1 has a fixed length O_1O_2 and restricts (r_1, r_2) values*
    - *$B_2 = B^{(1)}B^{(2)} \dots B^{(P)}$*
      - *P = # (r_1, r_2) values restricted via B_1*
      - *$B^{(i)}$ has length N_1N_2 and restricts DFT beams in $G(r_1, r_2)$ corresponding to i-th restricted (r_1, r_2) value via B_1*
  - *Total length of the bitmap = $O_1O_2 + PN_1N_2$*
  - *P is fixed, e.g. P=2*
- *If WB beam power restriction can be supported for the beams in the P restricted beam groups*
  - *If supported, 1 bit is used to restrict WB beam power values for each beam.*

Decision: The document is noted.
R1-1717784 **Codebook Subset Restriction in advanced CSI Huawei, HiSilicon**

- Proposal1: Introduce beam + power restriction for CSR for advanced CSI codebook.
- Proposal2: CSR for type II codebook in NR is reused for advanced CSI codebook.

Decision: The document is noted.
R1-1717875 **Evaluation of CBSR for hybrid CSI Intel Corporation**

- For hybrid CSI reporting, the codebook subset restriction should be introduced for both eMIMO types to avoid PMI reporting recommending beamforming of CSI-RS resource (of the 2nd eMIMO type with Class B FD-MIMO and K = 1) to the undesired directions.

Decision: The document is noted.
R1-1718269 **Advanced CSI Codebook Subset Restriction Ericsson**
Proposals:

- Beam level CBSR is also supported for advanced CSI feedback.
- Option 1 based UE behavior is used for CBSR, i.e., when any of the two beams $\{b_1, b_2\}$ in a codeword is a restricted beam, the codeword is not used in CSI feedback.
- W2 based CBSR is not applied when advanced CSI is configured, at least for rank 1 and rank 2.
- Rank based CBSR should also be supported for advanced CSI feedback.

Decision: The document is noted.

Conclusion:

- Accept codebook subset restriction for Advanced CSI and Hybrid CSI for both eMIMO types under TEI-15
  - Further discussion offline on the corresponding details – to handle later this week

Thursday
R1-1718918 **WF on CBSR for advanced CSI codebook Huawei, HiSilicon, Samsung**

Observations:

- Alt 1: Beam restriction, restricting both strong and weak beams together
- Alt 2: Joint beam/power restriction as in R1-1718918

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- Different views on performance gain from including the per-beam power restriction
- Some companies have concerns on:
  - complexity of joint beam/power search
  - restriction of flexibility of beam restriction for a given signalling overhead
- Alt 3: Two beam restriction bit maps, independently restricting the strong and weak beams.
  - Concerns on the signalling overhead

Next steps:

- Further evaluate the potential gains of Alt 2 and Alt 3 joint beam/power restriction under the assumption of the same signalling overhead as beam-only restriction.
- Aim to provide simulation results by 3rd November so that further email discussion can take place before RAN1#91.

6.1.5 Maintenance of Release 14 Further Enhanced MTC for LTE

R1-1718093 Retuning between SRS symbols Qualcomm Incorporated

Proposal: For the case of SRS->SRS retuning in UpPTS, and when one or more of the SRS symbols collide with the retuning gap (one or two symbols), it is up to UE implementation to drop any one or two SRS symbols.

Decision: The document is noted.

Continue discussion offline particularly regarding up to UE implementation, or UE not expected to handle, or define explicit UE behaviour, etc.

Tuesday:

R1-1718881 SRS to SRS retuning in UpPTS Qualcomm Incorporated

Decision: CR in R1-1718881 specifying that the UE is not expected to handle this case – agreed in R1-1719080 36.211CR0397.

R1-1718094 Corrections on HARQ-ACK bundling Qualcomm Incorporated

Decision: The document is noted. Continue discussion offline.

R1-1718880 Corrections on HARQ-ACK bundling Qualcomm Incorporated

Thursday decision: DraftCR to 36.213 (Rel-14, F) is agreed in R1-1719092 as CR0991 with change of M (x2) in penultimate bullet to a variable that is not used elsewhere.

R1-1718095 Discussion on comb 4 for eMTC Qualcomm Incorporated

Proposal: Adopt one of the following two options for SRS with comb 4:
- Option 1: Support only comb 2 for eMTC (i.e., remove support of comb 4 for eMTC similarly to the CR in R1-1712755).
- Option 2: Support comb 2 and comb 4 for eMTC, with separate capability to indicate support of comb 4 (and send LS to RAN2 to introduce this capability from Rel-14)

Also supported by Ericsson

Decision: The document is noted. Continue discussion offline.

Proposal (to be checked until Wed): Send an LS to RAN2 asking to add a new UE capability for comb-4 for eMTC - (Alberto).

Thursday: R1-1719081 [Draft] LS on Comb 2 SRS enhancements Qualcomm

Decision: The document is noted. Final LS is approved in R1-1719093 with the addition of "for Rel-14 BL/CE UEs" in the title.

6.1.6 Maintenance of Release 14 Enhancements of NB-IoT for LTE

36.212

R1-1716988 Correction to multi-carrier NPRACH IE name in PDCCH order DCI format N1 Huawei, HiSilicon

R1-1717029 Correction on NB-IoT DCI format N1 in 36.212 Ericsson

Continue discussion offline based on the above two CRs.

Tuesday: Both CRs are merged and agreed as CR0266R1 to 36.212 (Rel-14, F) in R1-1718867.

36.213

R1-1717026 Corrections of parameter names for NB-IoT Ericsson

Decision: The draft CR is endorsed in principle. Discussion further offline on the detailed wording for SIB1 & correction of typo in the cover page (regarding wording parameter) – prepare final CR.

Tuesday: Final CR in R1-1718846 (36.213, Rel-13, CR0984) & shadow CR in R1-1718847 (36.213, Rel-14, CR0985)

Agreed in R1-1719082 (Rel-13, CR0984R1) & R1-1719083 (Rel-14, CR0985R1) with typos corrected on cover sheet.

R1-1718255 Clarification on timing relationships of 2 HARQ processes Huawei, HiSilicon

Decision: The document is noted. Continue discussion offline.

Tuesday: Revised in **R1-1718868 (36.213 CR0986, Rel-14, F)** – discuss wording offline to clarify further.

Thursday: Agreed in R1-1718964 as CR0986R1.

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36,214

R1-1717024 **Revision of UE measurement report definitions considering NB-IoT Ues** **Ericsson**

Decision: The document (CR0047 to 36.214, Rel-14, F) is agreed.

Improved FH Randomization

R1-1717027 **Improved FH randomization for NB-IoT Rel-14** **Ericsson**

Proposal 1: For random access on non-anchor carriers reinitialize and run the pseudo random frequency generator, based on a non-linear combination of the cell id, the frame and hyper frame numbers, before the start of each NPRACH resource.

Proposal 2: For random access on non-anchor carriers specify c_{init} in accordance with Equations 3 and 4:

$$(n_f - \lfloor N_{\text{start}}^{\text{NPRACH}}/10 \rfloor) \bmod (N_{\text{period}}^{\text{NPRACH}}/10) = 0 \quad \text{(Eq. 3)}$$

$$c_{\text{init}} = (N_{\text{ID}}^{\text{Ncell}} + 1)((1024 \cdot n_{hf} + n_f) \bmod 79 + 1)^2 \cdot 2^9 + N_{\text{ID}}^{\text{Ncell}} \quad \text{(Eq. 4)}$$

Decision: The document is noted.

R1-1717193 **Improved frequency hopping randomization for NPRACH ZTE, SaneChips**

Proposal 1: In Rel-14, it is proposed to limit the hopping pattern in non-anchor carriers.

Decision: The document is noted.

Continue discussion offline based on the above two contributions

Thursday: Check at RAN1#91.

RACH power control

R1-1716984 **On Rel-14 NB-IoT RACH power control Huawei, HiSilicon**

- Proposal 1: For a Rel-14 UE which has level ramped from NPRACH level 0 in a RACH procedure, use the NPRACH level 0 power control and power ramping procedure in the new NPRACH level, i.e. based on path-loss with power ramping.
- Proposal 2: Network can configure a cell-specific Δ additional to the NRSRP threshold of CE level 0 to indicate that the UE shall not perform level ramping when it measures NRSRP higher than "NRSRP threshold of CE level 0 + Δ", Δ from the set {0, 10, 20, 30} dB.
- Proposal 2a: The UE in CE level 0 which does not perform level ramping shall consider the Random Access procedure unsuccessfully completed when it fails at the maximum number of attempts (i.e. *maxNumPreambleAttemptCE*) configured in CE level 0.
- Proposal 3: Network can configure whether NPUSCH power control for Msg3 shall be according to the existing open loop power control functionality in TS 36.213 but without the restriction on the number of repetitions.
- Proposal 4: Prepare a CR to section 16.3.1/16.2.1 of TS 36.213 and send LS to inform RAN2 accordingly.

Decision: The document is noted.

R1-1717028 **On improved Random Access Procedure for NB-IoT Rel-14** **Ericsson**

Proposal: RAN1 to prepare CRs for implementing the herein described set of solutions in the scope of NB-IoT Release 14. A LS to inform RAN2 about this decision should be sent.

Decision: The document is noted.

R1-1717192 **NPRACH power control for Rel-14 NB-IoT** **ZTE, SaneChips**

Proposal 1: For UEs satisfy Measured RSRP Value >=RSRP_0+ Delta, if maximum ramping attempts is reached for CE level 0

1) Restart the preamble transmission on CE level 0
2) Reset ramp attempt count
3) Random powerRampingStep: UE selects randomized powerRampingStep value, since increasing Tx power difference will fasten the access time for these UEs

Proposal 2: For UEs Measured RSRP Value <RSRP_0+ Delta, Rel-13 NPRACH power control is used.

Proposal 3: It is more effective to first fix the NPRACH hopping pattern problem in order to solve NPRACH capacity issue. With increased NPRACH capacity, the problem will be moot in most cases.

Decision: The document is noted.

Continue discussion offline based on the above three contributions

Wednesday:

R1-1718954 **WF on NPRACH power control Huawei, HiSilicon, Ericsson, Softbank, Deutsche Telekom, China Telecom, China Unicom, Vodafone**

- Agree to introduce the following solutions for Rel-14 to reduce the possible uplink interference caused by the NB-IoT UE which has level ramped from NPRACH level 0 in a RACH procedure.
  - For a Rel-14 UE which has level ramped from NPRACH level 0 in a RACH procedure, use the NPRACH level 0 power control and power ramping procedure in the new NPRACH level, i.e. based on path-loss with power ramping.

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- Network can configure a cell-specific Δ additional to the NRSRP threshold of CE level 0 to indicate that the UE shall not perform level ramping when it measures NRSRP higher than "NRSRP threshold of CE level 0 + Δ", Δ from the set {0, 10, 20, 30} dB.
  - The UE above which does not perform level ramping shall consider the Random Access procedure unsuccessfully completed when it fails at the maximum number of attempts (i.e. maxNumPreambleAttemptCE) configured in CE level 0.
- For a Rel-14 UE which has level ramped from NPRACH level 0 in a RACH procedure, network can configure whether NPUSCH power control for Msg3 shall be according to the existing open loop power control functionality in TS 36.213 but without the restriction on the number of repetitions.

Decision: The document is noted.

Proposal:
- Adopt the solution in R1-1718954 as an optional UE capability
  - ZTE and Sanechips object.

Proposal:
- Adopt just the additional Δ bullet from R1-1718954 as an optional UE capability

Thursday conclusion: no consensus – check whether situation has changed on Friday.

Friday

R1-1719188 WF on NPRACH power control Huawei, HiSilicon, Ericsson, Softbank, Deutsche Telekom, China Telecom, China Unicom, Vodafone, Qualcomm

Agreements:
- Working assumption: introduce the following solutions for Rel-14 to reduce the possible uplink interference caused by the NB-IoT UE which has level ramped from NPRACH level 0 in a RACH procedure.
  - For a Rel-14 UE which has level ramped from NPRACH level 0 in a RACH procedure, use the NPRACH level 0 power control and power ramping procedure in the new NPRACH level, i.e. based on path-loss with power ramping.
  - Network can configure a cell-specific Δ additional to the NRSRP threshold of CE level 0 to indicate that the UE shall not perform level ramping when it measures NRSRP higher than "NRSRP threshold of CE level 0 + Δ", Δ from the set {0, 10, 20, 30} dB.
    - The UE above which does not perform level ramping shall consider the Random Access procedure unsuccessfully completed when it fails at the maximum number of attempts (i.e. maxNumPreambleAttemptCE) configured in CE level 0.
  - Adopt the solutions above as an optional UE capability.
  - FFS how to fix the Msg3 power control for Rel-14 UE measured in CE level 0.

Interference Randomization for NPUSCH

R1-1717025 On interference randomization of NPUSHEricsson

Proposal: It is not necessary additional interference randomization for NPUSCH needs to be introduced.

Decision: The document is noted.

R1-1717194 NPUSCH Interference randomization enhancement ZTE, SaneChips

Proposal 1: For Rel-14 unicast NPUSCH configured with interference randomization enhancement or Msg3 in non-anchor carrier, introduce the following symbol-level scrambling to SC-FDMA symbols in $M_{identical}^{NPUSCH} \cdot N_{slots}$ *slots for* $N_{sc}^{RU} > 1$*:*

$$y'(l) = y(l) \cdot \theta_f(l),$$

$$\theta_f(l) = \begin{cases} 1, \text{if } c_f(2l) = 0 \text{ and } c_f(2l+1) = 0 \\ -1, \text{if } c_f(2l) = 0 \text{ and } c_f(2l+1) = 1 \\ j, \text{if } c_f(2l) = 1 \text{ and } c_f(2l+1) = 0 \\ -j, \text{if } c_f(2l) = 1 \text{ and } c_f(2l+1) = 1 \end{cases},$$

$$l = 0,\ldots, M_{identical}^{NPUSCH} \cdot N_{slots} \cdot (N_{symb}^{UL} - 1) - 1,$$

where the scrambling sequence $c_f(j)$ *is given by clause 7.2 of 36.211 and shall be initialized at the start of every* $M_{identical}^{NPUSCH} \cdot N_{slots}$ *slots,* $j = 0,\ldots,2 \cdot M_{identical}^{NPUSCH} \cdot N_{slots} \cdot (N_{symb}^{UL} - 1) - 1$,

$c_{init} = (n_{RNTI} + 1)[(10n_f + \lfloor n_s / 2 \rfloor) \bmod 61 + 1] \cdot 2^9 + N_{ID}^{Ncell}$.

- *Adopt the CR in R1-1717195.*

Decision: The document is noted.

R1-1717195 Interference randomization for NPUSCH ZTE, SaneChips

Continue discussion offline based on the above three contributions

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Thursday
R1-1718975 **WF on NPUSCH scrambling for Rel-14 NB-IoT ZTE, LGE, Sanechips, Lenovo**

Conclusions:
- Not adopted for Rel-14.
- No consensus for Rel-15.

6.1.7 Other

R1-1717243 **Clarification on PUSCH and SRS transmission in UpPTS MediaTek Beijing Inc.**
Proposal: A UE shall not transmit SRS on symbols scheduled for PUSCH data transmission in UpPTS if a UE is configured for PUSCH transmission in UpPTS and a SRS transmission overlaps with a PUSCH transmission on the same symbol in UpPTS within a TDD serving cell.
Decision: The document is noted.
R1-1717294 **PUSCH and SRS Transmission in UpPTS MediaTek, CMCC**
Discussion: Qualcomm CR may not be needed – simple clarification could be made
Decision: The document is noted. Continue discussion offline especially whether to take the CR0979 (36.213, Rel-14, F) in R1-1717294 or alternatively specifying the UE is not expected to handle the case.
Thursday: Agreed in R1-1719088 as 36.213CR979R1 with work item code for UL enhancement WI.

R1-1717893 **Discussion on additional signalling for special subframe configuration 10 CMCC**
Decision: The document is noted. Continue discussion offline
Thursday
R1-1719038 **WF on higher layer signalling for special subframe configuration 10 CMCC**

Agreement:
- For special subframe configuration 10 (SSP10), specify a Rel-14 cell-specific RRC signalling configuration to inform UEs of whether the CRS on the 5th symbol of DwPTS is transmitted or not.
  - If the UE is informed that no CRS is transmitted on the 5th symbol of DwPTS under SSP10, UE is not expected to perform CRS-based measurement and channel estimation on the 5th symbol of DwPTS, and UE is not expected to decode PDSCH in DwPTS.
- To keep backward compatibility with the legacy Rel-14 UEs who cannot read the newly specified signalling, a new Rel-14 IE '*TDD-Config-v14xy*' in TS36.331 is recommended to be specified, which includes both configuration of the SSP10 and the newly specified signalling.
  - The new Rel-14 IE 'TDD-Config-v14xy' cannot be simultaneously configured with 'TDD-Config-v1430' in TS36.331.
- A new optional UE capability is introduced to signal whether the UE supports SSP10 with no CRS on the 5th symbol.
- Send an LS to RAN2 to specify the signalling - R1-1719089 (CMCC) – revisit on Friday.

Friday
R1-1719089 **[Draft] LS on higher layer signalling for special subframe configuration 10 CMCC**
Decision: The document is endorsed and final version is approved in R1-1719204.

R1-1718096 **Introduction of 2Gbps category Qualcomm Incorporated**
- Following guidance from RAN saying that CRs were to be checked in RAN WG for technical endorsement.

Decision: The document is noted.

Conclusion:
- RAN1 technically endorses the changes above from RAN1 perspective, corresponding to the CR in R2-1710247 (attached in 8096).
- Send LS to RAN2/RAN with the confirmation of technical endorsement from RAN1 perspective – Alberto (Qualcomm)

Tuesday:
R1-1718850 **[Draft] LS on 2Gbps category Qualcomm**
Decision: The document is endorsed and final LS is approved in R1-1719084.

R1-1718767 **Discussion on modulation enhancements Qualcomm Incorporated, Samsung, KDDI** (Revision of R1-1718097)
Decision: The document is noted. Continue discussion offline
Thursday conclusion: not adopted in Rel-14 unless consensus to do so appears by RAN1#91.

6.2 LTE Release 15

R1-1717725 Introduction of reduced control plane latency Ericsson

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R1-1717729 Control Plane latency reduction Ericsson

Friday
Rapporteur to prepare summary of the agreements for feCoMP by 10/20.
Editors to provide initial draft CRs for feCoMP by 11/17, to be commented on and to update by 11/23.

6.2.1 Shortened TTI and processing time for LTE - *WID in RP-171468*

R1-1719121 Chairman's notes of AI 6.2.1 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 incorporated below.

R1-1718316 Introduction of shortened processing time and shortened TTI Ericsson
R1-1718911 Introduction of shortened processing time and shortened TTI - 36.211 s03-05 Ericsson Rel-15 36.211 CR0385R2, B
Decision: Endorsed
R1-1718912 Introduction of shortened processing time and shortened TTI - 36.211 s06-08 Ericsson Rel-15 36.211 CR0399, B
Decision: Endorsed

R1-1717151 Introduction of shortened processing time and shortened TTI into 36.212 Huawei
Decision: Endorsed via email approval post RAN1#90.
R1-1718790 Introduction of shortened processing time and shortened TTI into 36.213, s06-s09 Motorola Mobility
Decision: Endorsed via email approval post RAN1#90.
R1-1718791 Introduction of shortened processing time and shortened TTI into 36.213, s10-s13 Motorola Mobility
Decision: Endorsed via email approval post RAN1#90.

Email approval on reached offline consensus at RAN1#90bis (Ericsson - Mårten, from 16th Oct to 20th Oct)
Email approval on list of physical layer related RRC parameters including sending an LS to RAN2 (Ericsson - Mårten, from 20th Oct to 27th Oct)
Friday
Rapporteur to update the summary of agreements by 10/14
Editors to provide updated CRs by 10/19, to be commented on and to update by 10/24.

6.2.1.1 Shortened processing time for 1ms TTI

6.2.1.1.1 Configuration of shortened processing time for 1ms TTI

Including DL/UL configuration of shortened processing time in single carrier and CA scenario

R1-1717145 Configuration of shortened processing time for 1ms TTI Huawei, HiSilicon
R1-1717156 Configuration and UE capabilities for 1ms n+3 Ericsson
R1-1717181 On configuration of shortened processing time for 1ms TTI Nokia, Nokia Shanghai Bell
R1-1717245 Discussion on configuration of shortened processing time for 1ms TTI LG Electronics
R1-1717318 Capability indication for shortened processing time for 1ms TTI Intel Corporation
R1-1717525 Configuration of shortened processing time for 1ms TTI Samsung
R1-1718098 Configuration of shortened processing time for 1ms TTI Qualcomm Incorporated

Agreement: The previous agreement regarding UE capability is changed as per below

FROM: The UE capability of reduced processing time for 1 ms TTI is separately reported for FS1, FS2 and FS3.
TO: The UE capability is reported per band combination. For each band combination the maximum number of supported CCs for short processing time are reported. The reported number of carriers apply to all the FS-type(s) supported. The supported FS-type(s) are also reported per band combination.

Agreement: Shortened processing time for 1 ms TTI is configured per CC. The cell carrying the PUCCH should be configured with n+3 timing.
NOTE: In case some issues might be encountered further restrictions can be considered.

Agreement: Cross-carrier scheduling for short processing time is supported within the same PUCCH group. Both scheduling and scheduled cell shall be configured with short processing time.

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6.2.1.1.2 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)

R1-1717246 Discussion on PUCCH resource collision handling for FS2 LG Electronics
R1-1717124 Handling collisions between n+4 and n+3 for FS2 Huawei, HiSilicon
R1-1717696 Remaining issues of handling collisions between n+4 and n+3 ZTE, Sanechips
R1-1717235 Remaining issues of collision handling between n+3 and n+4 Nokia, Nokia Shanghai Bell
R1-1717157 Remaining aspects of collisions handling with reduced processing time for 1ms TTI Ericsson
R1-1717526 Handling collisions between n+4 and n+3 Samsung
R1-1718099 Handling collisions between n+4 and n+3 Qualcomm Incorporated

R1-1718935 WF on 1-ms FS2Nokia, LG Electronics, Nokia Shanghai Bell

Proposed offline consensus:
For a carrier configured with shortened processing time, DL HARQ-ACK timing from PDSCH to HARQ-ACK, bit ordering, and PUCCH resource are determined by using the table below:

TDD UL/DL Configuration	Subframe n									
	0	1	2	3	4	5	6	7	8	9
0	-	-	(6)	3	(4), 3	-	-	(6)	3	(4), 3
1	-	-	(7), 6, 3	(4), 3	-	-	-	(7), 6, 3	(4), 3	-
2	-	-	(8), 7, 4, 6, 3	-	-	-	-	(8), 7, 4, 6, 3	-	-
3	-	-	7, 6, (11), 5	(6), 5, 4	(5), 4, 3	-	-	-	-	-
4	-	-	(12), 8, 7, 11, 6	6, 5, 4, (7), 3	-	-	-	-	-	-
5	-	-	(13), 12, 9, 8, 7, 5, 4, 11, 6, 3	-	-	-	-	-	-	-
6	-	-	(7), 6	(7), 4	(5), 4	-	-	(7), 6	(7), 3	-

Notes:
- DL subframes only for UEs not configured with shortened processing time are in parentheses
- DL subframes only for UEs configured with shortened processing time are highlighted in red.
- DL subframes highlighted in green are common for both above UE types
- A UE configured with shortened processing time should take into account:
  - DL subframes for UEs with applying either processing time (numbers highlighted in green), and DL subframes only for UEs configured with shortened processing time (numbers highlighted in red) in order to determine HARQ-ACK codebook for a certain UL subframe
  - Additionally, the UE should also consider DL subframes only for UEs not configured with shortened processing time (the ones in parentheses) in order to reserve PUCCH resource. I.e. implicit resource allocation is applied, without an additional RRC configured starting position

Conclusion: There is consensus on the overall description above. More time is requested to check the table details. Table details will be included in e-mail discussion after RAN1#90b

6.2.1.1.3 UL DCI for asynchronous UL HARQ

Including aspects related asynchronous HARQ in UL for the reduced processing time operation.

R1-1717182 On UL DCI details for asynchronous UL HARQ of 1ms TTI shortened processing time Nokia, Nokia Shanghai Bell

Offline consensus:
Amend the following fields to DCI format 0 and format 4 of an UL grant scheduling PUSCH with reduced processing time:
- HARQ ID
  - ceil(log2(UL HARQ processes for sTTI)) if configured with sTTI, 3 bit otherwise
- 2 bit RV indicating {0,1,2,3}
  - In case DCI format 4, the indicated RV applies to both PUSCH CWs.

R1-1717125 Asynchronous UL HARQ Huawei, HiSilicon
R1-1717158 UL DCI for asynchronous HARQ for PUSCH Ericsson
R1-1717319 Asynchronous HARQ for PUSCH transmissions Intel Corporation
R1-1717527 UL DCI for asynchronous UL HARQ Samsung
R1-1718100 UL DCI for asynchronous UL HARQ Qualcomm Incorporated

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6.2.1.1.4 Other

R1-1717126 CSI feedback for 1ms TTI Huawei, HiSilicon
R1-1717159 Removing UL channel interleaver for 1ms TTI Ericsson
R1-1717528 Clarification of fallback mode to n+4 timing Samsung
R1-1717529 FS3 aspects for 1ms TTI Samsung
R1-1717530 UL power control timing for 1ms TTI Samsung

6.2.1.2 Shortened TTI with shortened processing time

6.2.1.2.1 Aspects related to interaction between different TTI lengths

Including dynamic switching between TTI and sTTI within a cell & across CCs; different sTTIs across PUCCH groups
Including HARQ processes handling, including the #HARQ processes, and TTI/sTTI collisions.

R1-1717129 Aspects related to interaction between different TTI lengths Huawei, HiSilicon
R1-1717160 Aspects related to the dynamic switching between 1ms TTI and sTTI Ericsson
R1-1717183 On interaction between different TTI lengthsNokia, Nokia Shanghai Bell

R1-1718793 Summary of Email discussion [90-12] on UL collision handling and power control (revision of R1-1717247) LG Electronics

Agreement:
- When HARQ-ACK for PDSCH is transmitted on sPUSCH due to collision between PUSCH and sPUSCH or between PUCCH and sPUSCH in the same subframe on a given carrier, joint coding of HARQ-ACK for PDSCH and sHARQ-ACK for sPDSCH is supported.
  - The feedback on sPUSCH consists of the concatenation of sHARQ-ACK (from one with the lowest cell index) prior to HARQ-ACK (from one with the lowest cell index).

Agreement:
- When HARQ-ACK for PDSCH is transmitted on sPUSCH due to collision between PUSCH and sPUSCH in the same subframe on a given carrier, spatial bundling for HARQ-ACK of PUSCH before mapping onto sPUSCH is supported.
  - For 7os sPUSCH spatial bundling is applied when configured, for 2/3os sPUSCH spatial bundling is always applied
  - FFS other bundling

Agreement:
- When HARQ-ACK for PDSCH is transmitted on sPUSCH due to collision between PUCCH and sPUSCH in the same subframe on a given carrier, spatial bundling for HARQ-ACK of PUCCH before mapping onto sPUSCH is supported.
  - For 7os sPUSCH spatial bundling is applied when configured, for 2/3os sPUSCH spatial bundling is always applied
  - FFS other bundling

Agreement:
- When HARQ-ACK for PDSCH is transmitted on sPUCCH due to collision between PUCCH and sPUCCH in the same subframe on a given carrier, joint coding of HARQ-ACK for PDSCH and sHARQ-ACK for sPDSCH is supported.
  - The feedback on sPUCCH consists of the concatenation of sHARQ-ACK (from one with the lowest cell index) prior to HARQ-ACK (from one with the lowest cell index).

Agreement:
- When HARQ-ACK for PDSCH is transmitted on sPUCCH due to collision between PUCCH and 2/3-OS sPUCCH in the same subframe on a given carrier, spatial bundling for HARQ-ACK of PUCCH before mapping onto 2/3-OS sPUCCH is always applied.
  - FFS other bundling

Proposed offline consensus:
When HARQ-ACK for PDSCH is transmitted on sPUCCH due to collision between PUCCH and sPUCCH in the same subframe on a given carrier, HARQ and sHARQ bits are determined independently (using fixed codebook or dynamic codebook, depending on configuration).

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- How to determine the HARQ bits for 1 ms is FFS
  - Alt 1: No HARQ bits are included if no PDCCH is detected. If PDCCH is detected, use Alt 2
  - Alt 2:
    - All HARQ bits from the configured carriers are always included (fixed codebook size configured)
    - The HARQ bits are determined based on 1 ms DAI (dynamic codebook size configured)
  - Alt 3:
    - All HARQ bits from the configured carriers are always included (fixed codebook size configured)
    - The HARQ bits for 1 ms are determined based on 1 ms DAI in sDCI (dynamic codebook size configured)

Proposed offline consensus:
- In case of collision between PUSCH and sPUCCH in the same subframe on a given carrier, the UE should attempt to drop/stop as soon as possible (up to UE implementation) the whole/remaining transmission of PUSCH and shall transmit sPUCCH, and the UE shall not resume the dropped/stopped transmission.

Proposed offline consensus:
- In case of collision between PUSCH and 1-slot sPUCCH in the same subframe on a given carrier, HARQ-ACK of PUSCH is transmitted on 1-slot sPUCCH.
  - Spatial bundling for HARQ-ACK of PUSCH before mapping onto 1-slot sPUCCH is supported when configured.

Proposed offline consensus:
- In case of collision between PUSCH and 2/3-OS sPUCCH in the same subframe on a given carrier, HARQ-ACK of PUSCH is transmitted on 2/3-OS sPUCCH.
  - Spatial bundling for HARQ-ACK of PUSCH before mapping onto 2/3-OS sPUCCH is applied.
  - FFS on the support of bundling in frequency domain

Proposed offline consensus:
- In case of collision between PUSCH and sPUCCH in the same subframe on a given carrier, CSI of PUSCH is dropped.

Proposed offline consensus:
- In case of collision between PUCCH and sPUCCH in the same subframe on a given carrier for a UE, SR of PUCCH (if present) is transmitted on sPUCCH.

R1-1717248 Discussion on interaction between different TTI lengths LG Electronics
R1-1717531 Remaining issues for dynamic switching between 1ms TTI and sTTI Samsung
R1-1717697 Collision handling of 1ms TTI and sTTI in uplink ZTE, Sanechips
R1-1718101 Aspects related to interaction between different TTI lengths Qualcomm Incorporated

6.2.1.2.2 DL control channel design

6.2.1.2.2.1 sTTI scheduling

Considering fields for sDCI1.

Email approval on details of sDCI formats (LGE(Kyuhwan), from 20th of Oct to 3rd of Nov)

R1-1717130 sTTI scheduling Huawei, HiSilicon
R1-1717161 DCI for sTTI scheduling Ericsson
R1-1717184 On scheduling of sPDSCH and sPUSCH Nokia, Nokia Shanghai Bell

R1-1717249 Summary of Email discussion [90-05] on DCI formats for sTTI LG Electronics

DL DCI format related:

Agreement: DL TM-dependent sDCI format is defined in each TM for sTTI operation with bit fields for which those of the legacy DL TM-dependent DCI format in the corresponding TM are the baseline.

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Proposed offline consensus:
The sDCI size is aligned between one of sDCI formats for DL assignment of configured DL TM and one of sDCI formats for UL grant of configured UL TM.

Agreement:
Following fields are removed from the baseline fields of DL sDCI format.
- Carrier indicator, MUST interference MUST interference presence and power ratio
- Second TB-related, TB to CW swap if the working assumption to support a single codeword for sPDSCH is confirmed.
- FFS: flag for format 0/1A, scrambling identity, TPC command, aperiodic zero-power CSI-RS resource indicator for PDSCH RE mapping, SRS request

Agreement:
Following fields are inserted into the baseline fields of DL sDCI format.
- DMRS indication for 2/3 os sTTI
- ARI
- sPDCCH resource reuse if dynamic mechanism for the reuse of unused sPDCCH resource by explicit indication is agreed to be supported.
- FFS: UL/DL differentiation flag, Transmission scheme flag, sDCI/DCI flag, RA header, Number of scheduled sTTIs for multi-sTTI scheduling

Proposed offline consensus:
The bit size of DMRS indication field of DL sDCI format (if agreed to be inserted into the baseline DL sDCI format) is 1 bit.

Agreement: The bit size of UL/DL flag of UL/DL sDCI format (if agreed to be inserted into the baseline UL/DL sDCI format) is 1 bit.

Agreement:
- The bit size of following sDCI field is changed from the baseline fields of DL sDCI format.
  - RB assignment
  - FFS on DAI, MIMO-related (TPMI), HARQ process ID (at least for subslot and for TDD)

Proposed offline consensus:
The bit size of HARQ process ID is changed to 4 bits from that of the baseline DL sDCI format..

Proposal 1:
For down-selection at RAN1#90bis: DL fallback transmission scheme for sTTI
- Alt 1: *is* supported
- Alt 2: *is not* supported

Proposal 2:
DL fallback sDCI format (if supported) is defined for sTTI operation with bit fields for which those of the legacy DL fallback DCI format (i.e., DCI format 1a) are the baseline.

Proposal 26:
FFS whether to align the sDCI size between fallback and TM-dependent sDCI format.

Proposal 20:
The bit size of sPDCCH resource reuse (if agreed to be inserted into the baseline DL sDCI format) will be down-selected among [1, 2, 3, 4] bit(s).

UL sDCI format related

Agreement:
- For UL TM1, a single sDCI format is defined. The bit fields of the legacy DCI format 0 are used as baseline
  - FFS which bit fields are removed, and which bit fields that need to be added

Agreement:
- UL TM-dependent sDCI format is defined in TM2. The bit fields of the legacy DCI format 4 are used as baseline

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- FFS which bit fields are removed, and which bit fields that need to be added

Agreement: Following fields are removed from the baseline fields of UL sDCI format.
- Carrier indicator, Frequency hopping flag
- Second TB-related if only single codeword is agreed to be supported for sPUSCH.
- FFS: A-CSI request, Resource allocation type, multi-cluster flag, DAI, SRS request

Agreement: At least the following fields are inserted into the baseline fields of UL sDCI format.
- HARQ process ID, RV

Agreement: At least for one codeword and single sTTI scheduling, the bit size of RV field of UL sDCI format is 2 bits.

Agreement: Following fields are inserted into the baseline fields of UL sDCI format.
- DMRS position (2/3os)
- FFS: UL/DL differentiation flag, Transmission scheme flag, Fields related to IFDMA-based DMRS, Number of schduled sTTIs for multi-sTTI scheduling

Agreement: The bit size of DMRS position field of UL sDCI format for 2/3-OS sTTI is 2 bits.

Proposed offline discussion:
The bit size of HARQ process ID field of UL sDCI format (if agreed to be inserted into the baseline UL sDCI format) is 4 bits.

Proposed offline discussion:
The bit size of following sDCI field is changed from the baseline fields of UL sDCI format.
- RB assignment
- FFS on Cyclic shift for DMRS and OCC index and IFDMA configuration (format 0), A-CSI request, DAI, HARQ process number, NDI, RV

Proposal 5:
For down-selection at RAN1#90bis: Fallback transmission scheme in UL for TM2 sTTI
- Alt 1: *is* supported
- Alt 2: *is not* supported

Proposal 6: UL fallback sDCI format (if supported) is defined in TM2 with bit fields for which those of the legacy UL DCI format 0 are the baseline.

Others

Proposal 9: FFS whether to support
- Subframe type-dependent DL TM,
- Dynamic indication of configured TM,
- Activating/Deactivating the sTTI operation

Proposal 14: FFS whether to support followings.
- Multi-sTTI DCI, DMRS sharing across sTTI in a slot

R1-1717320	Discussions on DCI formats for sTTI scheduling	Intel Corporation
R1-1717532	sTTI scheduling and sDCI formats	Samsung
R1-1717698	Discussion on sTTI scheduling	ZTE, Sanechips
R1-1718102	sTTI scheduling	Qualcomm Incorporated

6.2.1.2.2.2 sPDCCH design

Considering sCCE definition, mapping alternatives, RB sets, etc.

Email approval on remaining details of sPDCCH design and search space (Huawei(Chengyan), from 20th of Oct to 3rd of Nov)

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R1-1717131	sPDCCH design	Huawei, HiSilicon
R1-1717162	Design aspects of sPDCCH	Ericsson
R1-1717185	On details of short PDCCH design	Nokia, Nokia Shanghai Bell
R1-1717250	Consideration on sPDCCH design	LG Electronics
R1-1717321	Remaining details of sPDCCH design for shortened TTI	Intel Corporation
R1-1717533	Remaining issues on sPDCCH design	Samsung
R1-1717699	Remaining issues of sPDCCH design	ZTE, Sanechips
R1-1718103	sPDCCH design	Qualcomm Incorporated

R1-1718118 **Summary of the email discussion [90-06] on sPDCCH design** **Qualcomm Incorporated**

Agreement:
- No maximum size needs to be specified for an sPDCCH RB set.
- The overall search space (over all ALs and RB sets) configured to a UE is limited up to 16 sCCEs for 2/3os.
  - FFS for 7os

Agreement:
- The starting sCCE index of an sPDCCH search space at aggregation level L is configured by higher layer signalling.
  - FFS if the actual starting index is signalled, or if a parameter impacting the starting index

Agreement: An RB set can be configured to apply to MBSFN, non-MBSFN subframes, or all subframes

Proposed offline consensus:
A UE can be configured with up to two RB sets for sPDCCH monitoring that apply to MBSFN subframes, and up to two RB sets that apply to non-MBSFN subframes

Agreement: DMRS bundling in frequency domain is mandatory for DMRS-based sPDCCH using a sPRG size of 2

Agreement: An sPDCCH candidate for CRS based sPDCCH is built up of consecutive logical sCCE(s).

Agreement: In case there is one RB remaining for 2/3os sPDSCH within an sPRG, the DMRS-based sPDSCH is not mapped to that single RB.

Agreement: For an RB set with CRS-based sPDCCH, the distributed sCCE-to-sREG mapping is implemented at the sREG level

Agreement: For an RB set with DMRS-based sPDCCH, the distributed sCCE-to-sREG mapping is implemented at the sCCE level.

Agreement: For a CRS-based sPDCCH, sREGs within an sPDCCH set X_m are numbered in a frequency-first time-second manner from 0 to $N_{os}^{X_m} N_{RB}^{X_m} - 1$, where $N_{os}^{X_m}$ is the number of configured symbols, and $N_{RB}^{X_m}$ is the number of RBs for the CRS-based sPDCCH RB set.

Offline consensus:
For a CRS-based sPDCCH RB set, the frequency-first, time-second mapping is performed from lower RB to higher RB for the first symbol, and from higher RB to lower RB for the second symbol.
NOTE: After deciding all resource elements for a candidate, the symbols are mapped to REs (k,l) in order of k increasing first and then l increasing.

Agreement: For a DMRS-based sPDCCH, sREGs within an sPDCCH set X_m are numbered in a time-first frequency-second manner from 0 to $N_{os}^{X_m} N_{RB}^{X_m} - 1$, where $N_{os}^{X_m}$ is the number of symbols, and $N_{RB}^{X_m}$ is the number of RBs for the DMRS-based sPDCCH RB set.

Proposal 2: The granularity of RB allocation for configuring an sPDCCH RB set is 1 RB.
- Note that based on Proposal 7, more discussions is needed for the DMRS-based sPDCCH.

Agreement: For DMRS-based sPDCCH, the number of sREGs forming an sCCE is 4 in a 2-symbol sPDCCH and is 6 in a 3-symbol sPDCCH.

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Proposal 9: There is no consensus on supporting a 2-port DMRS-based sPDCCH in this WI.

Proposal 10: If a 2-port DMRS-based sPDCCH is supported, it is only used for distributed sCCE-to-sREG mapping.

Proposal 11: If a 2-port DMRS-based sPDCCH is supported, it is implemented via antenna hopping using two ports within an sREG.

Proposal 12: If a 2-port DMRS-based sPDCCH is supported, the 2 ports are multiplexed via OCC-2 in the time domain.

Proposal 13: The DMRS density for a 2-port DMRS-based sPDCCH is the same as that of the single port DMRS-based sPDCCH.

Proposal 18: FFS whether the size of the UE's sPDCCH search space is required to be limited.

Agreement: The DL DMRS pattern for sPDCCH associated with 2/3os and 7os sTTI, is reused from 2/3os sPDSCH.

R1-1718291 sPDCCH design Motorola Mobility, Lenovo

6.2.1.2.2.3 Search space for sTTI operation

Considering the location of sPDCCH candidates for different aggregation levels per user, the configuration of sPDCCH candidates, etc

R1-1717132 Search space for sTTI Huawei, HiSilicon

R1-1717149 Summary of email discussion [90-07] on sPDCCH search space Huawei, HiSilicon

Agreement: DMRS-based sPDCCH can be operated in MBSFN subframe and non-MBSFN subframe

Agreement: The frequency resources of a configured RB set are identical across all sTTIs.

Agreement: For a given RB set, and a given sTTI index in the subframe, the configured number of sPDCCH candidates per aggregation level is associated with one of up to two sets. The sTTIs where the first set is applied are indicated by a bitmap (i.e. 5 bits corresponding to sTTI 1 to sTTI 5 respectively for each value). The sTTIs where the second set is applied are deduced from the complement. For example, if bitmap '11001' is signaled, set 1 applies to sTTI index 1,2,5 and set 2 to sTTI index 3,4.

Agreement:

- For localized CRS-based sPDCCH, the sREG corresponding to an sCCE index n are given by

$$n \cdot N_{sREG}^{sCCE} + j$$

Where n=0,…,N_(sCCE,p)-1. N_(sCCE,p) is the number of sCCE in sPDCCH RB set p, and j=0,…, N_{sREG}^{sCCE} -1. N_{sREG}^{sCCE} is the number of sREG per sCCE

Agreement:

- For localized DMRS-based sPDCCH, the sREG corresponding to an sCCE index n are given by

$$n \cdot N_{sREG}^{sCCE} + j$$

Where n=0,…,N_(sCCE,p)-1. N_(sCCE,p) is the number of sCCE in sPDCCH RB set p, and j=0,…, N_{sREG}^{sCCE} -1. N_{sREG}^{sCCE} is the number of sREG per sCCE

Agreement:

- For CRS-based sPDCCH and distributed configuration, the sREG corresponding to an sCCE index n are given by

$$n \bmod \left\lfloor \frac{N_{sREG}^{symb}}{N_{sREG}^{sCCE}} \right\rfloor + \left\lfloor \frac{n * N_{sREG}^{sCCE}}{N_{sREG}^{symb}} \right\rfloor * N_{sREG}^{symb} + i * \left\lfloor \frac{N_{sREG}^{symb}}{N_{sREG}^{sCCE}} \right\rfloor$$

Where n=0,…,N_(sCCE,p)-1 and N_(sCCE,p) is the number of sCCE in sPDCCH RB set p. i=0,…, N_sREG^sCCE-1, where N_sREG^sCCE is the number of sREG per sCCE. N_sREG ^symb is the number of sREGs per each configured OFDM symbol in the sPDCCH RB set.

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Agreement:

- For distributed DMRS-based sPDCCH, the sREG corresponding to an sCCE index n are given by

$$n \cdot N_{sREG}^{sCCE} + j$$

- For DMRS-based sPDCCH, the logical sCCEs corresponding to a distributed sPDCCH candidate *m* of the sPDCCH search space at aggregation level L are given by:

$$\left(Y_p^L + \left\lfloor \frac{m \cdot N_{SCCE,p}}{L \cdot M_p^L} \right\rfloor\right) \bmod \left\lfloor \frac{N_{SCCE,p}}{L} \right\rfloor + i \cdot \left\lfloor \frac{N_{SCCE,p}}{L} \right\rfloor$$

NOTE: The selection of the localized DMRS and CRS based sPDCCH is based on technical merit.

Proposed offline consensus:
For localized DMRS-based sPDCCH, the logical sCCEs corresponding to a sPDCCH candidate *m* of the sPDCCH search space at aggregation level L are given by:

- Alt 1: $L\left\{\left(Y_{p,k}^L + \left\lfloor \frac{m \cdot N_{\mathrm{sCCE,p,k}}}{L \cdot M_{\mathrm{p,k}}^{(L)}} \right\rfloor\right) \bmod \left\lfloor N_{\mathrm{sCCE,p,k}} / L \right\rfloor\right\} + i$ (EPDCCH equation)
- Alt 2: $\left\{\left(Y_{p,k}^L + L\left\lfloor \frac{m \cdot N_{\mathrm{sCCE,p,k}}}{L \cdot M_{\mathrm{p,k}}^{(L)}} \right\rfloor\right) \bmod \left\lfloor N_{\mathrm{sCCE,p,k}} / L \right\rfloor\right\} + i$

Proposed offline consensus:
For CRS-based sPDCCH, the logical sCCEs corresponding to a sPDCCH candidate *m* of the sPDCCH search space at aggregation level L are given by:

- Alt 1: $L\left\{\left(Y_{p,k}^L + m\right) \bmod \left\lfloor N_{sCCE,p,k} / L \right\rfloor\right\} + i$ (PDCCH equation)
- Alt 2: $\left\{\left(Y_{p,k}^L + Lm\right) \bmod \left\lfloor N_{sCCE,p,k} / L \right\rfloor\right\} + i$
- Alt 3: $\left\{\left(Y_{p,k}^L + L\left\lfloor \frac{m \cdot N_{\mathrm{sCCE,p,k}}}{L \cdot M_{\mathrm{p,k}}^{(L)}} \right\rfloor\right) \bmod \left\lfloor N_{\mathrm{sCCE,p,k}} / L \right\rfloor\right\} + i$

Proposed offline consensus:
The mapping of the modulated data symbols on the sREGs is frequency-first, time-second for both localized and distributed sPDCCCH mapping. Solving the ambiguity between different ALs is FFS.

R1-1717163	Search space for sTTI	Ericsson
R1-1717251	On search space for sTTI operation	LG Electronics
R1-1717322	Search spaces for sPDCCH	Intel Corporation
R1-1717446	On search space design for sPDCCH	Nokia, Nokia Shanghai Bell
R1-1717534	Remaining issues on Search space for sTTI operation	Samsung
R1-1717700	Remaining issues of search space for sTTI operation	ZTE, Sanechips
R1-1718104	Search space for sTTI operation	Qualcomm Incorporated
R1-1718292	Search space for sTTI operation	Motorola Mobility, Lenovo

6.2.1.2.2.4 sPDCCH multiplexing with data

Email discussion on remaining details of sPDCCH multiplexing with data (Nokia(Karol), from 20th Oct to 3rd of Nov)

R1-1717133	sPDCCH multiplexing with data	Huawei, HiSilicon
R1-1717164	Multiplexing sPDCCH with sPDSCH/PDSCH	Ericsson
R1-1717252	Consideration on multiplexing sPDCCH with data	LG Electronics
R1-1717447	Summary of email discussion [90-08] on sPDCCH multiplexing with data, including sPDCCH resource reuse scheme	Nokia, Nokia Shanghai Bell

Offline conclusion:
For 2/3os sTTI, TDM of CRS-based sPDCCH [RB-set] with DMRS-based sPDSCH is not supported.

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Proposed offline consensus:
Reuse of unused sPDCCH resources by rate-matching around at least the sPDCCH scheduling sPDSCH (FFS: Rate-matching around the RB set by configuration) is intended to be supported.

Proposed offline consensus:

Alt 1:
- If not configured by higher layers, UE only rate-matches around the sDCI scheduling the sPDSCH
  - If configured by higher layers, UE rate-matches around the sPDCCH RB set configured for rate-matching

Alt 1A:
- If not configured by higher layers, UE only rate-matches around the sDCI scheduling the sPDSCH
  - If configured by higher layers, UE rate-matches around the sPDCCH RB set which does not contain sDCI scheduling the sPDSCH

Alt 2:
- If not configured by higher layers, UE rate-matches around all sPDCCH RB sets
  - If configured by higher layers, UE only rate-matches around the sDCI scheduling the sPDSCH

Alt 3:
- If not configured by higher layers, UE only rate-matches around the sPDCCH RB set containing the sDCI scheduling the sPDSCH
  - If configured by higher layers, UE rate-matches around the sPDCCH RB set configured for rate-matching

Alt 4:
- If not configured by higher layers, UE only rate-matches around the sDCI scheduling the sPDSCH
  - If configured by higher layers, UE rate-matches around the sPDCCH RB set containing the sDCI scheduling the sPDSCH.
  - If configured by higher layers, UE rate-matches around the sPDCCH RB set configured for rate-matching

Alt 5:
- Other solution

Proposed offline consensus:
Dynamic mechanism for reuse of unused sPDCCH resources by explicit indication in sDCI scheduling the sPDSCH is intended to be supported. Details are FFS.

Proposed conclusion:
If the rate-matching of sPDSCH around the DL assignment scheduling the sPDSCH is supported, the ambiguity problem of detecting transmitted AL can be solved by using different mapping principle, e.g. sREG-to-sCCE or symbols-to sREG, for different ALs.

Proposal 2:
Select between two alternatives at RAN1#90b
- Alternative 1: Support TDM between 1-symbol-long CRS-based sPDCCH [RB-set] and DMRS-based sPDSCH in 2-OS sTTI and TDM between 2-symbol-long CRS-based sPDCCH and DMRS-based sPDSCH in 3-OS sTTI
  - FFS on how to inform a UE about rate-matching around potential sPDSCH DMRS
- Alternative 2: Support only FDM between 1-symbol-long CRS-based sPDCCH [RB-set] and DMRS-based sPDSCH in 2-OS sTTI and FDM between 2-symbol-long CRS-based sPDCCH and DMRS-based sPDSCH in 3-OS sTTI

Proposal 4: The dynamic reuse mechanism of sPDCCH, using explicit indication in the sPDSCH assignment, is part of the default sTTI operation. Details are FFS.

Proposal 5: Select at RAN1#90bis one of the following 3 reuse mechanisms:
- Option 1: Indicate the last used logical sCCE/sCCE-group within PDCCH RB-set(s) configured to the UE for monitoring in a given sTTI.
- Option 2: Separate the sCCEs, in RB-sets configured to the UE for monitoring, into N groups of sCCEs. Indicate by single bit per each group of sCCEs, whether sPDSCH is mapped or not into the group of sCCEs.
  - FFS on the sCCE grouping mechanism
- Option 3: Indicate by 1 bit for each sPDCCH RB-set, configured to UE for monitoring, whether sPDSCH is mapped or not.
  - Reuse mechanism operates on the unit of RB-set

Proposal 6: In case the Option 3 of Proposal-5 is selected, inconsistent L1 signalling indication for two overlapping RB-sets can be supported. FFS how to treat the overlapping resource of two overlapping RB-sets in case of inconsistent signalling.

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Proposal 7: In case the Option 2 of Proposal-5 is agreed, inconsistent L1 signalling indication for two overlapping sCCE groups can be supported. FFS how to treat the overlapping resource of two overlapping sCCE groups in case of inconsistent signalling.

R1-1717448	On multiplexing of sPDCCH and sPDSCH, and sPDCCH resource reuse	Nokia, Nokia Shanghai Bell
R1-1717535	Remaining issues on sPDCCH multiplexing with data	Samsung
R1-1717701	sPDCCH multiplexing with sPDSCH	ZTE, Sanechips
R1-1718105	sPDCCH multiplexing with data	Qualcomm Incorporated
R1-1718293	sPDCCH multiplexing with data	Motorola Mobility, Lenovo

6.2.1.2.3 UL control channel design

6.2.1.2.3.1 sPUCCH design

Including sPUCCH design in terms of remaining details of format design, format selection, resource management and SR design.

Email approval on remaining details of sPUCCH design (including HARQ-ACK bundling for {2,7}), (ZTE(Xianghui), from 20th of Oct to 3rd of Nov)

R1-1717134	sPUCCH design	Huawei, HiSilicon
R1-1717165	Design aspects of sPUCCH	Ericsson
R1-1717236	sPUCCH Design for shortened TTI	Nokia, Nokia Shanghai Bell
R1-1717253	Remaining issues on sPUCCH design	LG Electronics
R1-1717536	Remaining issues on sPUCCH design	Samsung

R1-1717702 Summary of email discussion 90-09 on sPUCCH format design ZTE, Sanechips

Agreement: HARQ-ACK bundling across different TTI lengths is not supported

Agreement: The maximum payload size is X=11 for PF3-based 7-OS sPUCCH format carrying more than 2 bits ACK/NACK and SR (if any).

Agreement:

- The channel coding scheme for PF4-based 2-OS sPUCCH format carrying more than 2 bits ACK/NACK and SR (if any) is defined as:
  - Up to 11 bits: Single RM coding
  - 12-22: Dual RM
  - More than 22 bits: TBCC+8bit-CRC

Agreement: The maximum number of PRBs is 8 for PF4-based 2-OS sPUCCH format carrying more than 2 bits ACK/NACK and SR (if any).

Agreement:

- When a UE is to transmit UCI in a 2/3-symbol sPUCCH, sPUCCH format selection between sequence-based sPUCCH and PF4-based sPUCCH is based on the following rules.
  - For SR (if any) and up to 2 bits HARQ-ACK, the UE shall use sequence-based sPUCCH.
  - For SR (if any) and more than 2 bits HARQ-ACK, the UE shall use PF4-based sPUCCH.
  - FFS the possible ambiguity of the number of HARQ-ACK and SR bits between eNB and UE

Agreement:

- For PF1-based 7-OS sPUCCH format, the cyclic shifts on different sPUCCH symbols and the OCC in different slots can be different for a given UE. Cyclic shift randomization and OCC variations are re-used from 1 ms operation to support multiplexing with legacy PUCCH format 1/1a/1b/2.
  - Note: the OCC is not applied when frequency hopping is enabled.

Conclusion:

- Sequence-based 2/3OS sPUCCH format can be CDMed with PF1a/1b-based 7-OS sPUCCH format with/without frequency hopping by using different cyclic shifts on each symbol.

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Agreement: For PF3-based 7-OS sPUCCH format the cyclic shifts of the DMRS and the OCC used in different slots follow the principle of PUCCH format 3.

Agreement: When 1/2-bit HARQ-ACK is to be transmitted on 2/3-OS sPUCCH and there is a negative SR in the same sTTI, HARQ-ACK is transmitted on sPUCCH resource for HARQ-ACK.

Agreement:

- When more than 2 bits HARQ-ACK are to be transmitted on 2/3-OS sPUCCH and there is a positive/negative SR in the same sTTI
  - When there is a positive SR:
    - SR and HARQ-ACK are transmitted on sPUCCH resource for HARQ-ACK.
  - When there is negative SR:
    - SR and HARQ-ACK are transmitted on sPUCCH resource for HARQ-ACK.

Proposed agreement:
HARQ-ACK bundling across DL sTTI is not supported when configured with {2,7} sTTI operation.

Agreement: 7-OS sPUCCH format selection:

If sPF3 and sPF4 are configured:
- 1-2 bits HARQ, sPUCCH format 1a/1b;
- 3-11 bits HARQ, sPUCCH format 3
- 12 bits HARQ or more, sPUCCH format 4

If only sPF4 is configured:
- 1-2 bits HARQ, sPUCCH format 1a/1b;
- 3 bits HARQ or more, sPUCCH format 4

If only sPF3 is configured
- 1-2 bits HARQ, sPUCCH format 1a/1b;
- 3-11 bits HARQ, sPUCCH format 3

Proposal 6:
For PF4-based 2-OS sPUCCH format carrying more than 2 bits ACK/NACK and SR (if any), IFDMA is not supported.

Proposed agreement:
- When a UE is to transmit UCI in a 7-symbol sPUCCH, the following sPUCCH format selection is adopted for TDD HARQ-ACK feedback or FDD-TDD HARQ-ACK feedback for primary cell FS2:
  - Reuse the rules adopted in eCA for TDD, except that the UE shall use PF3-based sPUCCH for cases originally using PUCCH Format 1b with channel selection.

Agreement: The earlier agreement related to 1-bit HARQ-ACK and SR for sequence based sPUCCH is changed as per below:

Two sPUCCH resources are configured for SR and 1-bit HARQ-ACK~~+HARQ and two sPUCCH resources are configured for only HARQ.~~

- When positive SR and 1-bit HARQ-ACK are to be transmitted on 2/3-symbol sPUCCH in the same sTTI, one resource is used for SR+ACK and another is used for SR+NACK~~, one of the options can be supported~~

Agreement: When only positive SR is to be transmitted on 2/3-symbol sequence based 1-bit sPUCCH, the SR is transmitted on the sPUCCH resource that is used to transmit SR+NACK

Agreement: The periodicity of sSR sent on 7OS sPUCCH is set as one of from {0.5ms, 1ms, 2ms, 5ms, 10ms}

Agreement: The periodicity of sSR sent on 2/3-OS sPUCCH is set as one of from {1 sTTI, 2 sTTI, 3 sTTI, 4 sTTI, 5 sTTI, 1ms, 5ms, 10 ms}

Observation 3: It seems better to first specify the use cases for 2-bit HARQ-ACK+SR transmission in sequence based 2/3-OS sPUCCH, e.g.
- Case 1: The 2-bit HARQ-ACK is for 2 code-words of sPDSCH.
- Case 2: The 2-bit HARQ-ACK is comprised of 1-bit sHARQ-ACK and 1-bit HARQ-ACK.
- Case 3: The 2-bit HARQ-ACK is for 2 carriers.

Proposal 18:

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For 2-bit HARQ-ACK+SR transmission in sequence based 2/3-OS sPUCCH, option 3 is adopted, i.e. four sPUCCH resources are configured for SR+HARQ-ACK and four sPUCCH resources are configured for only HARQ-ACK.

R1-1717703 Remaining issues on sPUCCH format design ZTE, Sanechips
R1-1718106 sPUCCH design Qualcomm Incorporated

6.2.1.2.3.2 UCI on sPUSCH

Proposals from e-mail discsussion on sPDSCH/sPUSCH design in R1-1717150

Agreement: Re-use the legacy mapping rule of UCI on 1ms PUSCH for UCI mapping on 1-slot sPUSCH.

R1-1718885 WF on remaining issues of beta offset for sPUSCH LG Electronics, NTT DOCOMO, Ericsson

Agreement: For UCI on sPUSCH:

- The HARQ-ACK offset values are independently configured for 7-OS sPUSCH and 2/3-OS sPUSCH.
- If CSI transmission on sPUSCH is supported, the beta offset values for CSI are independently configured for 7-OS sPUSCH and 2/3-OS sPUSCH.

Proposed offline consensus:
For UCI mapping on 2/3-symbol sPUSCH with 1 data symbol, the HARQ-ACK is mapped from the end of the symbol by puncturing sPUSCH data REs, and RI and PMI/CQI are mapped from the start of the symbol in the order of RI first, PMI/CQI second, which are rate matched by sPUSCH data.

Proposal 37: For UCI mapping on 2/3-symbol sPUSCH, the protection priority is HARQ-ACK > RI >PMI/CQI > data.

Proposal 39: For UCI mapping on 2/3-symbol sPUSCH with 2 data symbol, the HARQ-ACK is mapped from the lowest frequency index of the data symbol closest to the DMRS by puncturing UL-SCH REs, RI is mapped from the lowest frequency index of another data symbol by rate matching and PMI/CQI are mapped from the largest frequency index in the time first frequency second manner, which are rate matched by UL-SCH data.

R1-1717136 UCI on sPUSCH Huawei, HiSilicon
R1-1717166 UCI on sPUSCH with short TTI Ericsson
R1-1717237 UCI on sPUSCH Nokia, Nokia Shanghai Bell
R1-1717254 UCI transmission on sPUSCH LG Electronics
R1-1717323 UCI transmission on sPUSCH Intel Corporation
R1-1717537 UCI on sPUSCH Samsung
R1-1717704 UCI transmission on sPUSCH in sTTI ZTE, Sanechips
R1-1718107 UCI on sPUSCH Qualcomm Incorporated

6.2.1.2.3.3 CSI reporting for sTTI

Email discussion of remaining details of CSI reporting (Qualcomm(Kianoush), from 20th of Oct to 3rd of Nov)

R1-1717127 CSI feedback for short TTI Huawei, HiSilicon
R1-1717167 On CSI reporting for sTTI Ericsson
R1-1717238 On CSI Reporting for sTTI Nokia, Nokia Shanghai Bell
R1-1717255 Discussion on CSI for sTTI operation LG Electronics
R1-1717538 Remaining issues on CSI reporting for sTTI Samsung
R1-1718073 CSI reporting for sTTI operation ITRI
R1-1718108 CSI reporting for sTTI Qualcomm Incorporated
R1-1718119 Summary of the email discussion [90-10] on sTTI CSI reporting Qualcomm Incorporated

Offline consensus:

- Only aperiodic CSI reporting is intended to be supported for the sTTI operation in Rel-15 WI with up to 3-bit trigger.
  - FFS: Restrictions

Proposed offline consensus:
For enabling fast CSI reporting (if supported), the CSI reference resource is defined based on the sTTI length.

Proposed offline consensus:

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- Under the 2-symbol sTTI operation, the sTTI reference resource is defined based on the CSI reporting timing, and can be a 2-symbol or a 3-symbol sTTI. If based on the timing, a 3-symbol sTTI is a reference resource, for CSI computation, TBS scaling shall be performed.
    - FFS on the details of the TBS scaling.

Proposed offline consensus:

- If A-CSI is triggered from sDCI, the sTTIs in MBSFN subframes are not considered as valid downlink sTTIs for TM1-8**.**

Offline consensns:
The A-CSI triggered by sDCI is reported via sPUSCH.

Offline consensus:
For A-CSI triggered by sDCI, the reporting timeline is the same as the sPUSCH scheduling timeline.

Proposed offline consensus:
A DCI only triggers a CSI reporting on PUSCH and sDCI only triggers a CSI reporting on sPUSCH.

Offline consensus:
A zero power/non-zero power CSI-RS configuration with an increased periodicity as compared to the legacy LTE is not supported/introduced.

Offline consensus:
For the sTTI based aperiodic CSI reporting, the subband sizes are increased at least for 2/3os sTTI as compared to those of the legacy LTE.

- The subband size is FFS.

Proposal 6: The UE shall assume no CSI-RS overhead over the reference resource.

Proposal 5: Over the reference resource, the UE shall derive the control overhead based on the configured RB sets.

Proposal 7: The UE shall assume no DMRS overhead over the reference resource if it is not configured with one of the DMRS-based TMs.

Proposal 8: The UE shall assume the CRS overhead over the reference resource in one of the following ways:

- The CRS overhead is dependent on the presence of the CRS in the reference resource.
- A fixed CRS overhead shall be assumed over all reference resources.
    - FFS on how to define a fixed CRS overhead.

Proposal 12: For a bandwidth class with a single CC, the max. number of CSI processes supported on a CC within a band with PDSCH TM10 is reported separately for the 1ms TTI and sTTI operations.

Proposal 13: For a bandwidth class with multiple CCs, the max. number of CSI processes supported on a single CC within a band with PDSCH TM10 is reported separately for the 1ms TTI and sTTI operations.

Proposal 14: For a bandwidth class with multiple CCs, the max. number of CSI processes supported on all CCs within a band with PDSCH TM10 is reported separately for the 1ms TTI and sTTI operations.

Proposal 15: For the sTTI operation, the UE capability which indicates the maximum number of CSI processes to be updated per UE across CCs is reported separately from that of the 1ms TTI operation.

- Maximum number of CSI processes to be updated indicated in the UE capability signaling should not be less than X. FFS X.

Proposal 18: Under the 2-symbol sTTI operation, if CFI = 2 or 3, sTTI#0 is not a valid DL sTTI.

Proposal 19: If a UE is configured with TM1-9 or TM10 with a single CSI process for a serving cell, then the triggering sTTI, if it is a valid DL sTTI, is the reference resource.

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Proposal 20: If a UE is configured with TM1-9 or TM10 with a single CSI process for a serving cell, if the triggering sTTI is a not valid DL sTTI, the former sTTI is considered as a reference resource.

Proposal 21: If a UE is configured with TM10 and multiple CSI processes for a serving cell, the definition of the sTTI reference resource is FFS.

Proposal 22: Select between two alternatives at RAN1#90bis
- Alternative 1: For the sTTI operation, all the aperiodic legacy CSI reporting modes are supported.
  - FFS on reporting restrictions.
- Alternative 2: For the sTTI operation, the aperiodic CSI reporting modes 1-2, 2-2 and 3-2 are not supported.
  - FFS on further reduction of the aperiodic CSI reporting modes.

Proposal 25: The ratio of the PDSCH EPRE to CSI-RS EPRE for 1ms TTI and sTTI are:
- Option 1: Identical.
- Option 2: Set separately.

Proposal 27: Whether some restrictions on the number of back-to-back CSI reporting triggers should be introduced or not is FFS.

R1-1718272 Views on on short CSI reporting in sTTI KT Corp.
R1-1718294 CSI aspects of shortened TTI Motorola Mobility, Lenovo

6.2.1.2.3.4 sPUCCH power control

Email approval on remaining issues of sPUSCH/sPUCCH PC + sTTI/TTI collisions (LGE(Hyunho), from 20th of Oct to 3rd of Nov)

Proposals from e-mail discussion on UL collision handling and power control in R1-1717247

Agreement:
- For sPUCCH, the power control equation is reused from the PUCCH power control equation for 1ms TTI.
  - FFS on separate hadling of 2os or 3os sTTI

Agreement: For sPUCCH, the parameter P_{O_sPUCCH} for sTTI operation is the same value configured as for 1ms TTI.

Agreement: For sPUCCH, the parameter of $\Delta_{F\_sPUCCH}(F)$ is defined relative to PUCCH format 1a (as in legacy) and separately configured for sTTI operation from 1ms TTI operation.

Agreement: The delta_F values can be configured by higher layer signalling in the range

sPUCCH format	Proposed parameter range
2/3os sPUCCH, format 1a	5,6,7,8,9,10,11,12
7os sPUCCH, format 1a	1,2,3,4,5,6,7,8
2/3os sPUCCH, format 1b	6,7,8,9,10,11,12,13
7os sPUCCH, format 1b	3,4,5,6,7,8,9,10
7os sPUCCH, format 3	4,5,6,7,8,9,10,11
2/3os sPUCCH, format 4 (RM)	15,16,17,18,19,20,21,22
2/3os sPUCCH, format 4 (TBCC)	13,14,15,16,17,18,19,20
7os sPUCCH, format 4 (RM)	13,14,15,16,17,18,19,20
7os sPUCCH, format 4 (TBCC)	10,11,12,13,14,15,16,17

Agreement:
- For sPUCCH, in order to derive $\Delta_{TF,sPUCCH,c}(i)$ the existing equation for 1ms TTI is reused with modification of the definition on BPRE as $\Delta_{TF,sPUCCH,c}(i) = 10\log_{10}\left(2^{1.25 BPRE_{sPUCCH}(i)} - 1\right)$, where $BPRE_{sPUSCH}$ is the sum of total number of UCI bits including CRC bits on sPUCCH format 4 divided by the number of REs for sPUCCH.

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Agreement:
- For sPUCCH, the current $h(n_{CQI}, n_{HARQ}, n_{SR})$ for format 3 definition is reused.
  - To derive $h(n_{CQI}, n_{HARQ}, n_{SR})$, the sum of HARQ-ACK bits for PDSCH as well as those for sPDSCH carried by sPUCCH should be taken into account if PUCCH/PUSCH is collided with sPUCCH within the same subframe on a given carrier.

Agreement: Tx diversity in sPUCCH format 1/1a/1b/3 is defined as in legacy PUCCH and is a separate UE capability between 1 ms and sTTI.

Agreement: $\Delta_{TxD}(F')$ is separately configured for sTTI operation using the same parameter range as for 1 ms operation.

Agreement: For sPUCCH, only the TPC from sDCI is considered.

Agreement:
- For PUCCH, only the TPC from DCI is considered.
  - NOTE: This is legacy behaviour and has no impact to the specification

R1-1717146 sPUCCH power control Huawei, HiSilicon
R1-1717168 sPUCCH power control Ericsson
R1-1717539 Remaining issues on sPUCCH power control Samsung
R1-1718109 sPUCCH power control Qualcomm Incorporated

6.2.1.2.4 DL data channel design

6.2.1.2.4.1 sPDSCH design

Including aspects related to sPDSCH resource allocation, TM, TBSs.

Email approval on remaining details of sPDSCH/sPUSCH design, UCI mapping on sPUSCH (Huawei(Yubo), 20th Oct to 3rd of Nov)

R1-1717137 sPDSCH design Huawei, HiSilicon

R1-1717150 Summary of email discussion [90-11] on sPDSCH/sPUSCH design Huawei, HiSilicon

sPDSCH resource allocation and sRBG size:

Agreement: Resource allocation type 0 indicating non-contiguous sRBGs using a bitmap is supported for sPDSCH scheduling.

Agreement: The sRBG size for resource allocation type 0 is defined as per below table for both 2/3os and 7os sTTI using an sPRG size of 2:

5 MHz	10 MHz	15 MHz	20 MHz
6	6	12	12

Agreement: In case of 1.4 MHz or 3 MHz system bandwidth, the RBG size is re-used from legacy and the PRG size is 2 for sTTI operation.

Agreement: Resource allocation type 2 indicating contiguous resource units is supported for sPDSCH scheduling for 5 MHz, 10 MHz, 15 MHz and 20 MHz is supported with the sRBG size and starting position according to the table below.

	5 MHz	10 MHz	15 MHz	20 MHz
sRBG size	4	6	4	4
Starting point granularity	2	6	4	4

Agreement: The used resource allocation type is not dependent on transmission mode

Proposed agreement: The used resource allocation type is configured by
- Alt 1: RRC configuration of a single RA type
- Alt 2: Dynamically switched
- Alt 3: RRC configuration of type 0 and/or type 2

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sPDSCH CW:

Agreement: Confirm the working assumption that single codeword for sPDSCH is supported.

sPDSCH Transmission modes configuration and fallback:

Agreement:
- DL transmission modes for sTTI and 1ms TTI are configured independently.
  - NOTE: This does not require sTTI specific CSI reporting

Proposed offline consensus:
For sPDSCH transmission, a transmission scheme corresponding to the configured transmission mode, and a robust transmission scheme, such as Table 7.1-5 in TS 36.213 are supported.

Proposal 20:
The indication of fallback to a robust transmission scheme (if supported) for sPDSCH transmission is down-selected between 1-bit flag in sDCI and different sDCI formats.

Observation 10:
The transmission mode of sPDSCH in MBSFN subframes is for further study.

sPDSCH TBS:

Agreement: The TBS scaling principle is the same for UL and DL data

Agreement:
- For sPUSCH and sPDSCH, the value in the legacy TBS is scaled according to TBS*α with the resulting TBS rounded off to the closest valid TBS.
  - NOTE: The α value can be the same or different for different sTTI lengths and for sPUSCH and sPDSCH
  - The TBS scaling is performed assuming the same number of layers within a codeword for PDSCH and sPDSCH.

Agreement: For 1-slot sTTI, the DL TBS scaling factor is 0.5.

Agreement: The DL TBS scaling factor for 2/3-symbol sTTI is 1/6.

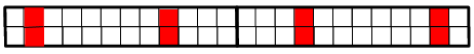
R1-1717169	On sPDSCH design	Ericsson
R1-1717186	On details of short PDSCH design	Nokia, Nokia Shanghai Bell
R1-1717256	Remaining issues on sPDSCH	LG Electronics
R1-1717324	On the details of sPDSCH designs	Intel Corporation
R1-1717540	Remaining issues on sPDSCH design	Samsung
R1-1717705	sPDSCH transmission in sTTI	ZTE, Sanechips
R1-1718110	sPDSCH design	Qualcomm Incorporated

6.2.1.2.4.2 DL DMRS design

Including aspects related to number of layers and DMRS patterns.

R1-1717150 Summary of email discussion [90-11] on sPDSCH/sPUSCH design Huawei, HiSilicon

Agreement:
- Up to 4-layers is supported for 2/3os sPDSCH. The DMRS pattern is defined over two RB, mapped over 4 sub-carriers (see figure below for up to 2-layers). In case of 3 or 4-layer transmission, the UE is not expected to receive DMRS more than once over two consencutive 2/3os sTTIs.



Proposed agreement:

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- Alt 1: The same shift of the DMRS is applied for all DMRS positions within a non-MBSFN subframe
- Alt 2: The same shift of the DMRS is applied only in sTTIs where the DMRS is colliding with CRS
- Alt 3: The same shift of the DMRS is applied for all DMRS positions for all subframes

Proposed offline consensus:
For 2/3-symbol and **7os** sPDSCH, when a DMRS pair is colliding with a CRS in any sTTI index of the subframe, the colliding DMRS pair(s) in all sTTI index in the subframe is/are shifted to the next or to the previous REs in frequency domain.

Agreement: For 2/3-symbol sPDSCH, avioding collision between DMRS and CSI-RS can be handled by eNB configuration without spec impacts.

Agreement: For DMRS of 2/3-symbol sPDSCH, the DMRS sharing across slots within a subframe is supported.

Agreement: For DMRS of 2/3-symbol sPDSCH, the DMRS sharing among 3 consecutive sTTIs is not supported.

Agreement: For 1-slot DMRS based sPDSCH, up to 4 layers transmission is supported for TM 9/10 and up to 2 layers transmission is supported for TM 8.

Agreement: For the first 1-slot sPDSCH in a subframe, one pair of DMRS are placed in OFDM symbol index #3 and #4, of slot 0.

Agreement: For the second 1-slot sPDSCH in a subframe, one pair of DMRS are placed in OFDM symbols index #2 and #3, of slot 1.

Agreement: For 1-slot sPDSCH, only a single pair of DMRS in time is supported.

Agreement: For up to 2 layers transmission of 1-slot sPDSCH, the DMRS is placed on 3 subcarriers spaced by 4 subcarriers within an RB.

Agreement: For 4 layers transmission of 2/3os (if supported) and 1-slot DMRS-based sPDSCH, the pairs for 2 layers are repeated in frequency

Agreement: For DMRS of 1-slot sPDSCH, avoiding collision between DMRS and CSI-RS can be handled by eNB configuration without spec impacts.

Agreement: The time-domain position for DL DMRS of 3-symbol sPDSCH is placed in the first two symbols

R1-1717138	DL DMRS design for short TTI	Huawei, HiSilicon
R1-1717170	DL DMRS design	Ericsson
R1-1717257	Consideration on DL DMRS for sTTI	LG Electronics
R1-1717449	On details of DMRS design for 2-OS and 7-OS DL shorter TTI	Nokia, Nokia Shanghai Bell
R1-1717541	DL DMRS design	Samsung
R1-1717706	DL DMRS design in sTTI	ZTE, Sanechips
R1-1718111	DL DMRS design	Qualcomm Incorporated

6.2.1.2.5 UL data channel design

6.2.1.2.5.1 sPUSCH design

Including aspects related to sPUSCH resource allocation, TM, TBS.

Proposals from e-mail discussion on sPDSCH/sPUSCH design in R1-1717150

sPUSCH Resource allocation and granularity

Agreement: The resource allocation type 1 is not supported for scheduling of sPUSCH.

Agreement: The sRBG size and starting point granularity for 2/3os and 7os sPUSCH is as per table below.

	5 MHz	10 MHz	15 MHz	20 MHz
sRBG size	4	4	4	4
Starting point granularity	4	4	4	4

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Agreement: For resource allocation in:
- DL: The last sRBG is increased to cover the system bandwidth.
- UL: Only multiples of the sRBGs size can be allocated to sPUSCH

sPUSCH Transmission modes configuration and fallback

Agreement: UL transmission modes for sTTI and 1ms TTI are configured independently.

Proposed offline consensus:
For sPUSCH transmission, a transmission scheme corresponding to the configured transmission mode, and a robust transmission scheme, such as Table 8-3 in TS 36.213 are supported.

Proposal 31:
The indication of fallback to a robust transmission scheme for sPUSCH transmission is down-selected between 1-bit flag in sDCI and different sDCI formats.

sPUSCH TBS

Agreement: For 1-slot sPUSCH, the TBS scaling factor is 0.5.

Agreement: The TBS scaling factor for 2/3-symbol sPUSCH is 1/12 and 2/12 for 1 and 2 data symbols in sPUSCH respectively.

R1-1717139	sPUSCH design	Huawei, HiSilicon
R1-1717171	Design aspects of sPUSCH	Ericsson
R1-1717450	On details of short PUSCH design	Nokia, Nokia Shanghai Bell
R1-1717542	Remaining issues on sPUSCH design	Samsung
R1-1717707	sPUSCH transmission in sTTI	ZTE, Sanechips
R1-1718112	sPUSCH design	Qualcomm Incorporated

6.2.1.2.5.2 UL DMRS design

Including aspects related to sPUSCH number of layers and UL DRMS signalling.

Proposals from e-mail discussion on sPDSCH/sPUSCH design in R1-1717150

Proposal 25:
For 2/3-symbol sPUSCH, IFDMA RPF=1 is supported.

Agreement: For 1-slot sPUSCH, IFDMA with RPF=1 and 2 is supported. FFS configuration.

Agreement: For 2/3os and 1-slot sPUSCH, single codeword sPUSCH transmission for up to 4 layers is supported. The UE will indicate the number of supported layers for sPUSCH as UE capability, independent of UL sTTI length. No new precoder in the UL is defined.

Agreement: If 1-slot sPUSCH with 4 layers is supported, DMRS port multiplexing is supported by different cyclic shifts for RPF=1, and by combination of combs and cyclic shifts for RPF=2.

Observation 8: Whether any other DMRS and data combination is supported needs further study.

Observation 9: The indication of UL DMRS related aspects by sDCI needs further study.

R1-1717140	UL DMRS design for sPUSCH	Huawei, HiSilicon
R1-1717172	On UL DMRS for short TTI	Ericsson
R1-1717239	UL DMRS Design for sTTI	Nokia, Nokia Shanghai Bell
R1-1717543	UL DMRS design	Samsung
R1-1718113	UL DMRS design	Qualcomm Incorporated

6.2.1.2.5.3 sPUSCH power control

Including in addition to sPUSCH power control, and also the power handling in case of CA.

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Proposals from e-mail discussion on UL collision handling and power control in R1-1717247

Agreement: For sPUSCH, the power control equation is reused from the PUSCH power control equation for 1ms TTI.
- FFS on sTTI specific parameter definition and configurations

Agreement: For sPUSCH, the scaling parameter for path-loss estimate $\alpha_c(j)$ for sTTI operation is reused from the parameter for 1ms TTI.

Proposed offline consensus:
The PHR transmitted on sPUSCH shall be reported for all carriers (irrespective of TTI length). PHR for sTTI is calculated using the same principle as for 1 ms operation.

Agreement:
Simultaneous transmission of different TTI lengths across different carriers are allowed only if a UE reports the capability. A common capability/configuration is defined regardless of UL TTI length combinations. The capability is defined per band/band combination. The UE capability is not separated per combination of different channel types (e.g., {PUSCH, sPUSCH}, {PUCCH, sPUCCH}, {PUSCH, sPUCCH}, {sPUSCH, PUCCH},{sPUSCH,sPUSCH},{sPUSCH,sPUCCH},{sPUCCH,sPUCCH}).

Proposed offline consensus:
Regarding UE behaviour in case simultaneous transmission of different TTI lengths across different carriers is allowed/supported but when the UE is power-limited, RAN1 down-selects between the following alternatives:
- **Alt 1**: A guaranteed power for each TTI length is reserved. The power of the earlier transmission (e.g., longer TTI) can be at most {Pcmax – the guaranteed power of the later transmission} and the power of the later overlapped transmission (e.g., shorter TTI) is determined by {Pcmax – the required power of the earlier transmission}. (like PCM2 in DC)
- **Alt 1a:** A guaranteed power for each TTI length is reserved, in case the TTI is scheduled.
  - The power of the earlier transmission (e.g., longer TTI) can be at most {Pcmax – the guaranteed power of the later transmission} and the power of the later overlapped transmission (e.g., shorter TTI) is determined by {Pcmax – the required power of the scheduled earlier transmission}
- **Alt 2**: In case a UE is power-limited, TTI channel(s) with lower priority (e.g., longer TTI) is(are) dropped/stopped until the condition that the UE becomes non-power-limited is met.
  - Consider the TTI length (e.g., shorter TTI > longer TTI), channel type (e.g., PUCCH > PUSCH with UCI > PUSCH without UCI), UCI type (e.g., HARQ-ACK/SR> CSI> data > SRS), and cell index (e.g., lower cell index > higher cell index)

Agreement: For sPUSCH, the configured P_0 (for 1 ms operation) is reused for sTTI operation.

Agreement: For sPUSCH, the power offset value depending on MCS $\Delta_{TF,sPUSCH,c}(i)$ for sTTI operation is derived by reusing the existing parameter for 1ms TTI.

Agreeemnt: For sPUSCH, only the TPC from sDCI is considered.

Agreement: For PUSCH, only the TPC from DCI is considered.
- NOTE: This is legacy behaviour and has no impact to the specification

R1-1717142	sPUSCH power control	Huawei, HiSilicon
R1-1717173	sPUSCH power control and PHR report for sTTI	Ericsson
R1-1717258	Discussion on power control for sPUSCH	LG Electronics
R1-1717544	Remaining issues on sPUSCH power control	Samsung
R1-1717708	sPUSCH power control	ZTE, Sanechips
R1-1718074	Uplink power control related issues for sTTI operation	ITRI
R1-1718114	sPUSCH power control	Qualcomm Incorporated

6.2.1.2.6 FS2 aspects

Email approval on remaining issues for 1 ms + FS2 (sTTI and 1 ms) + FS3 (Samsung(Jeongho), from 20th Oct to 3rd of Nov)
Email approval on UL HARQ RTT for FS2 including sending an LS to RAN2 (Ericsson(Laetitia), from 18th of Oct to 25th of Oct)

R1-1717144	TDD-specific design for short TTI	Huawei, HiSilicon
R1-1717174	FS2 aspects of short TTI	Ericsson

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R1-1717545 Remaining issues on FS2 aspects for sTTI Samsung

R1-1717546 Summary of [90-13] Email discussion on remaining issues of FS2 including HARQ timing and UL scheduling tables Samsung

Agreement: DMRS-based and CRS-based sPDSCH are supported in the first slot of the DwPTS, except for SSC 0 and 5.

Agreement: DMRS-based and CRS-based sPDSCH are supported in the second slot of the DwPTS for SSC 3,4,8.

Proposed agreement: Friday, still no consensus
DMRS-based and CRS-based sPDSCH in the second slot of the DwPTS for SSC 1,2,6,7 is supported.

Agreement: Support sPUCCH in UpPTS only for SSC 10.

Agreement: Support HARQ-ACK on sPUSCH in UpPTS for SSC 10.

Agreement:
Transmission of sDCI to schedule sPUSCH is supported in X-symbol sTTI, where the X-symbol sTTI denotes the part of DwPTS in the second slot of a special subframe and X is the number of symbols of DwPTS in the second slot.

If HARQ-ACK transmission for sPDSCH is supported (Proposal D) in UpPTS for SSC 10,
Proposal F-1:
For SSC 0-9, the following pre-defined table is used for the timing between sPDSCH and HARQ-ACK. In the following table describing k, HARQ-ACK is transmitted in slot n, where the corresponding sPDSCH transmitted in n-k.

TDD UL/DL	slot number *n*																			
Conf.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
0					4	4	4	4							4	4	4	4		
1					6,5	5,4	4	4							6,5	5,4	4	4		
2					8,7,12,11	7,6,5,4									8,7,12,11	7,6,5,4				
3					14,13,12	12,11,10	10,9	9,8	8,7	7,6										
4					16,15,14,13	13,12,11,10	10,9,8,7	7,6,5,4												
5					18,17,16,15,14,13,12, 22,21	12,11,10,9,8,7,6,5,4														
6					6	6	6	6	6	6					4	4	4	4		

If HARQ-ACK transmission for sPDSCH is supported (Proposal D) in UpPTS for SSC 10,
Proposal F-2:
For SSC 10, the following pre-defined table is used for the timing between sPDSCH and HARQ-ACK. In the following table describing k, HARQ-ACK is transmitted in slot n, where the corresponding sPDSCH transmitted in n-k.

TDD UL/DL	slot number *n*																			
Conf.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
0					4	4	4	4							4	4	4	4		
1				5	5	5	5	5						5	5	5	5	5		
2				7,6,11	6,5	5,4								7,6,11	6,5	5,4				
3				13,12	12,11	11,10	10,9	9,8	8,7	7										
4				15,14,13	13,12,11	11,10,9	9,8,7	7,6,5												
5				17,16,15, 14,13,21	13,12,11, 10,9,8	8,7,6,5,4														
6				5	5	5	5	5							4	4	4			

Agreement:

- For SSC 1,2,3,4,6,7,8, the following pre-defined table is used for the timing between UL grant and sPUSCH for TDD UL/DL configuration 1-5. In the following table describing k, sPUSCH is transmitted in slot n+k, where the corresponding UL grant is received in slot n.

TDD UL/DL	slot number *n*																			
Configuration	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1	4	4	4	4							4	4	4	4						

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2	4	4								4	4								
3	6	6	6	6														6	6
4	4	4	4	4															
5	4	4																	

Proposed offline consensus G-2:
For SSC 1,2,3,4,6,7,8, the following pre-defined table is used for the timing between UL grant and sPUSCH for TDD UL/DL configuration 0 and 6. In the following table describing k, sPUSCH is transmitted in slot n+k, where the corresponding UL grant is received in slot n.

TDD UL/DL	slot number *n*																		
Configuration	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
0	4	4,5	5,6,	6							4	4,5	5,6,	6						
6	6	6	6	6							4	4	4	4					6	6

Proposed offline consensus:
For SSC 0,5,9,10, the following pre-defined table is used for the timing between UL grant and sPUSCH for TDD UL/DL configuration 1-5. In the following table describing k, sPUSCH is transmitted in slot n+k, where the corresponding UL grant is received in slot n. The red-colored font is for SSC 10.

TDD UL/DL	slot number *n*																		
Configuration	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1	5	5	5						5	5	5	5	5						5	5
2	4	4								4	4	4								4
3	7	7	7														7	7	7	7
4	5	5	5																5	5
5	4	4																		4

Proposal G-3:
For SSC 0,5,9,10, the following pre-defined table is used for the timing between UL grant and sPUSCH for TDD UL/DL configuration 0 and 6. In the following table describing k, sPUSCH is transmitted in slot n+k, where the corresponding UL grant is received in slot n. The red-colored font is for SSC 10.

TDD UL/DL	slot number *n*																		
Configuration	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
0	4,5	5,6	6,7,11								4,5	5,6	6,7,11							
6 (SSC 0,5,9)	6	6	6,7								4	4	4,5						6	6
6 (SSC 10)	5,6	6,7	7,11								4	4	4,5						5	5

R1-1717709 TDD-specific considerations on sTTI ZTE, Sanechips
R1-1717894 Discussion on HARQ timing for shortened TTI in TDD CMCC
R1-1718115 FS2 aspects Qualcomm Incorporated

6.2.1.2.7 Other

R1-1717128 sTTI combinations in CA scenario Huawei, HiSilicon
R1-1717135 sPUCCH resource allocation Huawei, HiSilicon
R1-1717143 TBS determination for short TTI Huawei, HiSilicon
R1-1717148 Discussion on sDCI2 Huawei, HiSilicon
R1-1717175 TBS scaling for short TTI Ericsson
R1-1717176 UE capabilities for sTTI Ericsson

R1-1717179 SPS for sTTI Ericsson
R1-1717147 SPS for short TTI Huawei, HiSilicon
R1-1717756 Draft LS reply on SPS for short TTI Huawei

R1-1719060 [Draft] LS reply on SPS for short TTI Huawei
R1-1719154 LS reply on SPS for short TTI Source: RAN1; To: RAN2
Decision: The LS is approved.

Email approval on SPS details (Huawei(Yubo), 27th of Oct until 10th of Nov)

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R1-1717180 Multi-sTTI scheduling Ericsson
R1-1717755 Discussion on SR in shortened TTI scenario Huawei, HiSilicon
R1-1718071 On power control for different UL sTTI lengths Huawei, HiSilicon

6.2.1.3 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.

R1-1717141 Maximum TA and processing time reduction Huawei, HiSilicon
R1-1717155 Summary of Email discussion [90-14] on max TA, processing time and {2,7} sTTI issues Nokia, Nokia Shanghai Bell

Agreement: Define a single maximum TA value for reduced processing time operation of 1ms TTI (i.e. no UE capability for different maximum TA support).

Agreement: The minimum processing time assumption for subslot sTTI operation is configured by RRC.

Agreement: For {2,7} sTTI operation, the UL grant for 7OS sPUSCH in a certain slot can be sent in either one of three defined subslot DL sTTIs.

- NOTE: The UE is expected to only receive one UL grant from the set of 2/3-symbol sTTIs mapped to a single UL slot sTTI

Agreement:

- For {2,7} sTTI operation, the sPDSCH HARQ-Ack of subslot sPDSCH is mapped to the earliest possible slot UL sTTI. The HARQ-Ack of subslot sPDSCH in sTTI#x of SF#N is to be mapped on the 1-slot UL sTTI in slot/sTTI#y of SF#N+n for a minimum processing time assumption of k subslot sTTIs.
  - y=mod{[(x+k)/3],2}
  - n=[[(x+k)/3]/2]

Proposed offline consensus:
Support 16 UL and 16 DL HARQ processes for shorter TTI operation for FS1 independently of the UL/DL sTTI combination as well as for the slot sTTI operation of FS2.

- NOTE: The soft buffer definition is not changed

Observation:
The maximum timing advance value for shortened processing time of 1ms TTI and slot sTTI operation need not to be equal.

Proposal 1:
The maximum TA for reduced processing time operation of 1ms TTI, slot and subslot based sTTI operation is defined as by the legacy definition in terms of carrier aggregation operation, i.e. besides TA≤TAmax and RTD≤MRTD no other restrictions apply.

Agreement: Define two sets of two processing timing assumptions for subslot TTI operation for different maximum TA support.

- Set 1 is defined with minimum timing n+4 with TA1/n+6 with TA1+4os
- Set 2 is defined with minimum timing n+6 with TA2/n+8 with TA2+4os
- FFS if different/same UEs can indicate support for different sets of processing timing assumptions.

Offline consensus: Friday, the following is agreed:
Agreements:

- For subslot TTI operation related to timing advance operation, the UE signals its capability for 2/3os sTTI between set 1 and set 2 for:
  - 1 os CRS based sPDCCH
  - 2 os CRS based sPDCCH
  - DMRS based sPDCCH

  FFS: UE capability dependent on RS type for data.
- The maximum timing advance supported is:
  - 1 ms, short processing time: 200 us
  - 7os: 310 us

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- 2/3os:
  - TA1: 67 us
  - TA2: 167 us
- In all above TTI length configurations and processing time configurations, the gap between first UL and latest DL carrier is less than TA_{max} given above (expected impact on 3GPP TS 36.133). Details FFS.

Email approval on LS to RAN4 related to the above agreement and its impact to the RAN4 specifciations (Nokia(Klaus), from 18th Oct to 25th Oct)

Proposal 6:
For {2,7} sTTI operation, the UL grant for slot based sPUSCH in slot#x of SF#N can be sent from either one of (downselect at RAN1#90bis)

- Alt 1:
  - For x=0: in sTTI#4 of SF#N-3, sTTI#5 of SF#N-3 or sTTI#0 of SF#N-2
  - For x=1: in sTTI#1, sTTI#2 or sTTI#3 of SF#N-2
- Alt 2: sTTI#3x, sTTI#3x+1 or sTTI#3x+2 of SF#N-2

Note: The UE is expected to only receive one UL grant from the set of 2/3-symbol sTTIs mapped to a single UL slot sTTI.

Proposal 7:
For {2,7} sTTI operation, in terms of HARQ-Ack multiplexing of 2/3OS sPDSCH on 1-slot PUCCH, decide at RAN1#90bis between

- Option 1: HARQ-Ack multiplexing without (temporal/carrier domain) bundling
- Option 2: HARQ-Ack multiplexing with time-domain bundling using DAI FS2 mechanism
  - Detailed bundling mechanism is FFS
  - Carrier domain bundling is FFS

Proposed RAN1 conclusion:
There is no consensus to support fast SRS triggering (i.e. the minimum timing of SRS request to SRS transmission is less than 4 ms) as part of this WI.

R1-1717177 On maximum TA and reduced processing time for short TTI Ericsson
R1-1717187 On maximum timing advance and processing time and {2,7} issues Nokia, Nokia Shanghai Bell
R1-1717547 Remaining issues on reduction of maximum TA and processing time Samsung
R1-1718116 Maximum TA and processing time Qualcomm Incorporated

6.2.1.4 *Other*

R1-1717178 Draft CR to 36.300 Ericsson

R1-1719067 Draft LS on updates to TS36.300 for short TTI and short processing time
R1-1719153 Draft LS on updates to TS36.300 for short TTI and short processing time (revision of R1-1719067)
Friday
Decision: R1-1719153 is endorsed and final LS is approved in R1-1719205.

R1-1718117 Link evaluation of DL data transmission under symbol-dependent puncturing/interferenceQualcomm Incorporated

6.2.2 Enhancements to LTE operation in unlicensed spectrum - *WID in RP-170848*

R1-1719122 Chairman's notes of AI 6.2.2 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 incorporated below.

6.2.2.1 *Multiple starting positions in a subframe for DL*

R1-1717113 Support for multiple starting positions in a subframe for DL on SCell with frame structure 3 Huawei, HiSilicon
R1-1717119 Multiple starting and ending positions for LAA DL Ericsson Japan K.K.
R1-1717188 On multiple DL starting positions in a subframe for feLAA Nokia, Nokia Shanghai Bell
R1-1717259 Discussion on multiple starting positions for LAA DL LG Electronics

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R1-1717325 On the additional downlink starting positions in a subframe for FS3 Intel Corporation
R1-1717548 Multiple starting positions for DL Samsung
R1-1718014 Discussion on multiple starting positions in a subframe for DL NEC

R1-1718015 Discussion on additional starting positions for DL in LAA Broadcom, Brocade, CableLabs, Comcast, Hewlett Packard Enterprise

Conclusion: no consensus to introduce additional DL starting points

R1-1718120 Multiple starting positions in a subframe in DL Qualcomm Incorporated

6.2.2.2 *Multiple starting and ending positions in a subframe for UL*

Remaining aspects including control signaling, channel access, etc.

R1-1717114 Support for partial subframe transmission for UL on SCell with frame structure 3 Huawei, HiSilicon
R1-1717120 Remaining issues on multiple starting and ending points for LAA UL Ericsson Japan K.K.

R1-1717189 Multiple starting and ending positions in a subframe for UL Nokia, Nokia Shanghai Bell
R1-1717260 Discussion on multiple starting and ending positions for LAA UL LG Electronics
R1-1717326 Remaining details on uplink starting and ending positions in a subframe for FS3 Intel Corporation
R1-1717549 Multiple starting and ending positions for UL Samsung
R1-1718018 Discussion on additional starting and ending positions for UL in LAA Broadcom, Brocade, CableLabs, Comcast, Hewlett Packard Enterprise
R1-1718121 Multiple starting and ending positions in a subframe in UL Qualcomm Incorporated
R1-1718164 Demodulation of PUSCH in partial subframe transmission NTT DOCOMO, INC.
R1-1718274 Channel access on additional starting position in a subframe for UL on LAA Scell WILUS Inc.

R1-1718866 WF on Mode1 for UL partial subframe Huawei, HiSilicon

Proposals:
- For Mode 1, select one of the options:
  - Opt1: UL grant indicates if the corresponding UL subframe applies Mode 1 or not, i.e, the first slot of the subframe can be punctured depending on LBT outcome
    - FFS if additional overhead is needed in the UL grant.
      - Alt1: add new bit(s) in UL grant for indication
      - Alt2: some joint encoding of the indication bit field. E.g., 2bits for indicating states of R14 operation, Mode 1, Mode 2, and ending partial
    - For multi-subframe scheduling the indication applies to all subframes within the corresponding UL burst.
  - Opt 2: RRC signalling is used to enable/disable Mode 1, i.e., the first slot of the subframe can be punctured depending on LBT outcome
    - For multi-subframe scheduling Mode 1 applies to all subframes.

Email discussion on partial UL subframes until Nov 15th: Huawei (Liyuan)

6.2.2.3 *Autonomous uplink access with Frame Structure type 3*

6.2.2.3.1 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 signalling

R1-1717115 On resource allocation for AUL Huawei, HiSilicon
R1-1717121 on AUL Support on LAA sCell Ericsson Japan K.K.
R1-1717261 Resource allocation and control siganling for autonomous UL access LG Electronics
R1-1717327 A framework to enable autonomous uplink access Intel Corporation
R1-1717411 Resource allocation for autonomous UL access TCL
R1-1717550 Resource allocation for autonomous UL access Samsung
R1-1718122 Resource allocation for automonous UL access Qualcomm Incorporated
R1-1718301 Resource allocation for autonomous UL access Lenovo, Motorola Mobility
R1-1718369 Resource Allocation for Autonomous UL Access Nokia, Nokia Shanghai Bell

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Email discussion on AUL resource allocation until Nov 15th: Nokia (Timo)

6.2.2.3.2 HARQ for autonomous uplink access

Including necessary enhancements to DL and UL control signaling

R1-1717116	On HARQ operation for AUL	Huawei, HiSilicon
R1-1717123	on HARQ design for AUL	Ericsson Japan K.K.
R1-1717241	HARQ for Autonomous Uplink Access	Nokia, Nokia Shanghai Bell
R1-1717262	HARQ operation for autonomous UL access	LG Electronics
R1-1717328	Consideration on HARQ for autonomous uplink access	Intel Corporation
R1-1717551	HARQ for autonomous UL access	Samsung
R1-1718123	HARQ for autonomous UL access	Qualcomm Incorporated

R1-1719034 WF on HARQ design for AUL Ericsson, Nokia, Lenovo, Motorola Mobility

Agreement: Only Asynchronous HARQ is supported for AUL

Agreement:
- Asynchronous AUL HARQ feedback and retransmissions are supported for AUL transmissions.
  - Timing relationship between AUL transmission and corresponding UL HARQ feedback is not fixed
  - Timing relationship between UL HARQ feedback and corresponding retransmission is not fixed.
  - NOTE : UE does not expect HARQ feedback earlier than 4 subframes after the corresponding AUL transmission

Agreement:
- AUL downlink feedback information ("AUL-DFI") is specified to carry at least AUL HARQ feedback
  - Bitmap with one HARQ-ACK-bit for each AUL-configured HARQ process per TB (FFS: whether spatial bundling is used)
    - The HARQ feedback includes pending feedback for several uplink transmissions from the same UE.
  - RV are not included in the AUL-DFI
  - Align size of DFI with e.g. DCI 0A, or DCI 1C (FFS)
  - Support transmission of AUL-DFI on unlicensed cell as well as any other scheduling cell
  - AUL-DFI shall contain HARQ-ACK feedback for SUL transmissions using AUL-enabled HARQ IDs
    - AUL is not allowed for SUL retransmission
  - AUL-DFI includes a field indicating TPC for PUSCH (2 bits), applicable for both AUL and SUL transmissions
    - e.g. applied similarly as TPC in DCI 3/3A in terms of timing
  - FFS: RNTI for AUL-DFI

Agreement:
- Any HARQ process that is transmitted by SUL is not eligible for AUL retransmissions
  - Applies to SUL first transmissions as well as for scheduled retransmissions of an earlier AUL transmissions of the same TB
  - UE may only use such a HARQ process for AUL if the corresponding AUL-DFI indicated ACK

Agreement:
- Confirm the working assumption that both scheduled and autonomous retransmission are supported for AUL transmissions.
  - Scheduled retransmission is triggered by:
    - Reception of UL grant indicating same HARQ process ID, same TBS, and NDI non-toggled.
      - FFS: the UE behaviour in case of TBS mismatch
      - FFS: timing relationship between SUL retransmission grant and AUL-DFI
  - UE may autonomously retransmit after:
    - Reception of NACK feedback via the AUL-DFI for explicit AUL HARQ feedback
    - No indication is received from eNB (neither rescheduling UL grant nor AUL-DFI) for X subframes since the transmission of a given HARQ process
      - FFS: value of X
      - FFS: whether X is fixed or configurable
      - Note: X is not related to CWS update procedure

Agreement:
- UE determines the HARQ process ID, NDI and RV for Autonomous UL transmissions.
  - FFS RV sequence followed by the UE

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Agreement:
- New UCI for AUL operation:
  - includes at least: HARQ ID, new data indicator, and redundancy version.
    - FFS: CRC attachment and scrambling
    - FFS: indication of UE specific ID
  - is transmitted together with every PUSCH in AUL transmission.

Email discussion on AUL HARQ until Nov 15th: Ericsson (Reem)

6.2.2.3.3 Channel access for autonomous UL access

R1-1719131 WF on CW update for Autonomous UL in FeLAA Broadcom

R1-1717263 Channel access procedure for autonomous UL access LG Electronics
R1-1717117 On channel access for AUL Huawei, HiSilicon
R1-1717122 on Channel Access for AUL Ericsson Japan K.K.
R1-1717242 On Channel Access for Autonomous UL Access Nokia, Nokia Shanghai Bell
R1-1717329 Consideration on channel access mechanism for autonomous uplink access Intel Corporation
R1-1717552 Channel access for autonomous UL access Samsung
R1-1718124 Channel access mechanism for autonomous UL access Qualcomm Incorporated
R1-1718275 Channel access for autonomous UL transmission in FeLAA WILUS Inc.
R1-1718300 HARQ and Control Signalling for Autonomous Uplink Lenovo, Motorola Mobility

Email discussion on AUL channel Access until Nov 15th: Intel (JJ)

6.2.2.3.4 Other

R1-1718125 Miscellaneous aspects Qualcomm Incorporated

6.2.3 3GPP V2X Phase 2 - *WID in RP-171740*

R1-1719123 Chairman's notes of AI 6.2.3 3GPP V2X Phase 2 Ad-Hoc chair (Huawei)
The document was presented by Philippe Sartori of Huawei.
Decision: The document is endorsed, and content incorporated below.

6.2.3.1 Carrier Aggregation (up to 8 PC5 carriers)

6.2.3.1.1 Mode-4 support

Including changes to the sensing procedure

Joint or independent sensing:
R1-1717730 On Mode-4 Support for CA Ericsson

Agreement: 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
Note: T2 values may be discussed, and potentially modified, when discussing latency reduction

R1-1717553 mode-4 support in V2X CA Samsung

Joint or independent resource selection:
R1-1717789 Discussion on carrier aggregation for mode 4 in V2X phase 2 CATT
R1-1718890 WF on CA resource selection CATT, Samsung
R1-1718936 WF on resource (re)selection for Mode 4 PC5 CA LGE, Huawei
R1-1719139 WF on carrier selection rules Huawei, HiSilicon, ZTE, NTT DOCOMO, Nokia, NSB, Samsung, Panasonic

Working assumption:
- For a given MAC PDU, RAN1 assumes that a single carrier is provided by higher layer for its transmission.
- From RAN1 perspective, the following factors can be taken into account for TX carrier selection.
  - CBR
  - UE capability (e.g. number of TX chains, implementation related aspects such as power budget sharing capability, TX chain retuning capability)
- For a given MAC PDU, a single carrier is used for transmission and potential retransmission of this MAC PDU.

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- From RAN1 perspective, once a carrier is selected, the same carrier is used for all MAC PDUs of the same sidelink process at least until resource reselection is triggered for that same sidelink process based on Rel-14 triggering conditions.
    - Note that the UE is not precluded to switch transmission chains between component carriers for different sidelink processes

Note that companies can bring contributions on new triggering conditions for resource (re) selection

Agreement: send LS to RAN2 to inform them of working assumption (Yi-Huawei)
Friday
R1-1719150 [draft] LS to RAN2 on carrier selection for Rel-15 V2X Huawei
Discussion: One commented that the above note was missing – rapporteur → no need including the note, that note is not part of the WA
Decision: The document is endorsed and final LS is approved in R1-1719151

R1-1719028 WF on resource selection procedure for Mode 4 PC5 CA LG Electronics, ZTE, Huawei, Nokia, NSB, NTT DOCOMO, Samsung, Panasonic, CATT, NEC

Conclusion: Continue discussion on whether address the following issue for resource selection for mode-4 CA:

- UE's limited TX capability
    - TX chain switching time
- Half duplex problem
- TX power budget constraint

Agreement: send LS to RAN4 (Alex-Intel) to ask their inputs of the following:

- Switching time for intra-band and inter-band due to TX switching and interruption time at the receiver
- Feasibility of simultaneous transmission on intra-band, non-contiguous carriers. RAN1 requests feedback of impact of MPR and maximum psd imbalance between carriers.

Friday
R1-1719158 [Draft] LS to RAN4 on resource selection for Mode-4 sidelink CA Intel Corporation
Decision: The document is endorsed and final LS is approved in R1-1719159

Carrier selection rules:
R1-1717775 Discussion on UE behaviour of mode 4 in case of multiple carriers Panasonic
R1-1718036 Mode 4 support in eV2X carrier aggregation Guangdong OPPO Mobile Telecom
R1-1718928 WF on carrier selection rules Huawei, HiSilicon, ZTE, Sanechips, LG Electronics
Power sharing/dropping rules:
R1-1717330 Sidelink carrier aggregation for mode-4 LTE V2V communication Intel Corporation
R1-1717002 Discussion on sensing and resource (re)selection for carrier aggregation Huawei, HiSilicon
R1-1718929 WF on power sharing issue for Rel-15 CA Huawei, HiSilicon, LG Electronics
Conclusion: discuss further power allocation between carriers/upling at RAN1#91

R1-1718126 Carrier Aggregation for V2X Phase 2 Qualcomm Incorporated
R1-1717099 Sensing and resource selection in SL CA ZTE, Sanechips
R1-1717264 Discussion on carrier aggregation in sidelink mode 4 operation LG Electronics
R1-1717415 Resource selection for V2X systems supporting CA ASTRI, TCL Communication Ltd.
R1-1717765 Mode 4 support for V2X carrier aggregation Nokia, Nokia Shanghai Bell
R1-1718081 Discussion on V2X Sidelink CA Scheduling Issues ITRI
R1-1718165 On carrier aggregation using mode 4 resource selection NTT DOCOMO, INC.
R1-1718268 Discussion on carrier aggregation in mode 4 sidelink operation Sony

6.2.3.1.2 Synchronization

R1-1717766 Discussion on synchronization for V2X carrier aggregation Nokia, Nokia Shanghai Bell
R1-1718037 Synchronization in eV2X carrier aggregation Guangdong OPPO Mobile Telecom
R1-1717100 Synchronization in Sidelink CA ZTE, Sanechips
R1-1717265 Discussion on synchronization for sidelink CA LG Electronics
R1-1718895 WF on synchronization in sidelink CA LG Electronics, NTT Docomo, Nokia, NSB, NEC
R1-1719134 WF on timing for sidelink CA Huawei, HiSilicon, Ericsson, Intel, Qualcomm, ITRI, Samsung, OPPO, ZTE

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Working assumption:
- From the transmitting UE perspective, a single synchronization reference is used for all aggregated carriers
  - When a UE transmits multiple MAC PDUs on multiple carriers, timing on all transmission carriers is aligned

R1-1718891 **WF on Synchronization for carrier aggregation in eV2X CATT**

R1-1718927 WF on SLSS/PSBCH transmission for sidelink CA Huawei, HiSilicon, ITRI, ZTE, Samsung, CATT, Ericsson, OPPO
R1-1719141 WF on SLSS/PSBCH transmission and reception in sidelink CA LG Electronics, NTT Docomo, Nokia, NSB, Qualcomm
R1-1717007 Discussion on synchronization for carrier aggregation on sidelink Huawei, HiSilicon
R1-1717331 Synchronization aspects for LTE V2V sidelink carrier aggregation Intel Corporation
R1-1717554 Synchronization in V2X CA Samsung
R1-1717731 On Synchronization Aspects for PC5 CA Ericsson
R1-1717790 Discussion on synchronization for carrier aggregation in V2X Phase 2 CATT
R1-1718082 Discussion on Synchronization for Sidelink Carrier Aggregation in V2X Phase 2 ITRI
R1-1718166 Discussion on synchronization for carrier aggregation NTT DOCOMO, INC.

6.2.3.1.3 Others

R1-1717555 Other considerations on V2X CA Samsung
R1-1717732 On TX carrier selection Ericsson

6.2.3.2 Support for 64-QAM

R1-1718916 **WF on rate-matching for Rel-15 V2X LG Electronics, Huawei, HiSilicon, Intel**

Agreement:
- For PSSCH, specifications support rate-matching applied over the last symbol for all modulation orders.
  - Rate-matching is applied for all MCSs
  - Use of Rel-15 format is signaled in the SCI (FFS signaling details)

Note: When a Rel-15 UE transmits a message that needs to be received by Rel-14 UEs, it shall use the Rel-14 format.

Agreement: For the last symbol of PSSCH, rate-matching is always applied when the Rel-15 MCS table is used. Puncturing is always applied when the Rel-14 MCS table is used.

Agreement: confirm the WA of last meeting: No change to the 5-bit MCS field in existing SCI-1 is needed to support 64QAM

R1-1717733 **Supporting 64QAM on PC5 Ericsson**
R1-1717332 **Support of 64QAM for LTE V2V sidelink communication Intel Corporation**
R1-1717003 **Discussion on solving the code rate issue for supporting 64QAM Huawei, HiSilicon**
R1-1717791 **Discussion on 64QAM modulation scheme in V2X Phase 2 CATT**

Agreement:
- Introduce a modified MCS table, with TBS scaling applied
  - A value of 1 is not precluded for TBS scaling
  - FFS scaling factor value, and if coding rates >0.932 are allowed
  - WA: One scaling factor is applied to all MCS values

Note: for communication of Rel-15 UEs with Rel-14 UEs, the Rel-14 MCS table is used

R1-1717101 Support for 64 QAM ZTE, Sanechips
R1-1717266 Discussion on 64QAM support in PC5 operation LG Electronics
R1-1717556 High order modulation in V2X Samsung
R1-1717767 On 64QAM for V2X Sidelink Nokia, Nokia Shanghai Bell
R1-1717773 Discussion on supporting 64QAM modulation for V2X phase 2 Panasonic
R1-1718038 64QAM support for eV2X Guangdong OPPO Mobile Telecom
R1-1718127 Support of 64-QAM for V2X Phase 2 Qualcomm Incorporated

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6.2.3.3 Feasibility and gain of PC5 operation with Transmit Diversity

6.2.3.3.1 Transmit diversity solutions

For both PSSCH and PSCCH

R1-1718773 **Transmit Diversity for V2X Phase 2** **Qualcomm Incorporated** (Revision of R1-1718128)
R1-1717008 **Performance evaluation of transmit diversity for eV2X** **Huawei, HiSilicon**
R1-1717757 **Low PAPR SFBC for V2X transmit diversity** **Mitsubishi Electric RCE**
R1-1717734 Transmit diversity solutions for Rel-15 PSCCH and PSSCH transmissions Ericsson
R1-1717792 Discussion on Tx diversity schemes in PC5 CATT
R1-1717267 Discussion on transmit diversity support in PC5 based V2X LG Electronics
R1-1718930 **WF on two-port Transmit Diversity design** **Huawei, HiSilicon, Nokia, Nokia Shanghai Bell, ZTE, Sanechips, Ericsson, CATT**

Agreement:
- For PSCCH, small delay CDD can be used on PSCCH
  - FFS whether the cyclic delay value is specified or left for UE implementation

R1-1719140 WF on two-port DMRS design Huawei, HiSilicon, Nokia, Nokia Shanghai Bell, Ericsson
R1-1717004 Transmit diversity solutions for PSSCH and PSCCH Huawei, HiSilicon
R1-1717102 Discussion on transmit diversity for PC5 ZTE, Sanechips
R1-1717333 Candidate transmit diversity schemes for LTE V2V sidelink communication Intel Corporation
R1-1717557 Transmit diversity schemes for PSCCH and PSSCH Samsung
R1-1717768 Transmit diversity schemes for V2X Nokia, Nokia Shanghai Bell
R1-1717792 Discussion on Tx diversity schemes in PC5 CATT
R1-1718039 Transmit diversity scheme in eV2X Guangdong OPPO Mobile Telecom
R1-1718167 Transmission diversity solutions NTT DOCOMO, INC.

6.2.3.3.2 Evaluation results

For both PSSCH and PSCCH

R1-1717103 Evaluation results of TxD ZTE, Sanechips
R1-1717334 Evaluation of candidate transmit diversity schemes for LTE V2V sidelink communication Intel Corporation
R1-1717558 Evaluation results for Tx diversity for PSSCH Samsung
R1-1717758 Low PAPR SFBC evaluations for V2X Mitsubishi Electric RCE
R1-1717769 Evaluation of transmit diversity schemes for V2X Nokia, Nokia Shanghai Bell
R1-1717793 Evaluations for Tx diversity schemes in PC5 CATT
R1-1718168 Evaluation results for transmission diversity schemes NTT DOCOMO, INC.

6.2.3.3.3 Other

R1-1717559 Impact of transmit diversity on PC5 interface Samsung
R1-1717560 Control signaling for Tx diversity transmission of PSSCH Samsung
R1-1717735 DMRS design for two port PSSCH transmission Ericsson

6.2.3.4 Other

Latency reduction:
R1-1717006 Discussion on latency reduction for eV2X Huawei, HiSilicon
R1-1717106 Consideration for latency reduction ZTE, Sanechips
R1-1717268 Discussion on other remaining issues for V2X Phase 2 LG Electronics
R1-1717335 Resource selection latency reduction for LTE V2V sidelink communication Intel Corporation
R1-1717561 Discussion on latency smaller than 20 Samsung
R1-1717736 Reducing time-to-transmit for V2X Ericsson
R1-1718040 Latency reduction for eV2X Guangdong OPPO Mobile Telecom
R1-1718129 Reduction of time between packet arrival and transmisison Qualcomm Incorporated
R1-1718170 Reducing the maximum time between packet arrival and selected resource for data transmission NTT DOCOMO, INC.
R1-1718945 WF on reducing the maximum time between packet arrival and resource selected for transmission LG Electronics, ZTE

Resource pool sharing:
R1-1717005 Discussion on resource pool sharing for eV2X Huawei, HiSilicon

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R1-1717107 Consideration for resource sharing between mode 3 and mode 4 ZTE, Sanechips
R1-1717217 On mode 3 and mode 4 pool sharing NEC
R1-1717336 Sidelink resource pool sharing for eNB-controlled and UE-autonomous V2V transmission modes Intel Corporation
R1-1717562 Resource pool sharing among mode 3/4 UEs Samsung
R1-1717737 Resource pool sharing between mode 3 and mode 4 UEs Ericsson
R1-1717774 Discussion on resource pool sharing between UEs in mode 3 and UEs in mode 4 Panasonic
R1-1717794 Discussion on resource pool sharing between mode 3 and mode 4 CATT
R1-1718041 Resource pool sharing between mode 3 and mode 4 Guangdong OPPO Mobile Telecom
R1-1718083 Discussion on Sharing Resource Pool for eNB-Controlled and UE-Autonomous in V2V Communication ITRI
R1-1718130 Resource pool sharing between Mode 3 and Mode 4 Qualcomm Incorporated
R1-1718169 Resource pool sharing between UEs using mode 3 and UEs using mode 4 NTT DOCOMO, INC.
R1-1718946 WF on resource pool sharing between UEs using Mode 3 and 4 LG Electronics, NTT DOCOMO

Short TTI:
R1-1717105 Discussion on Short TTI for PC5 ZTE, Sanechips
R1-1717770 On sTTI for V2X Sidelink Nokia, Nokia Shanghai Bell
R1-1717795 Discussion on shorten TTI in PC5 CATT
R1-1717796 Evaluations for shorten TTI in PC5 CATT
R1-1718084 Considerations of Short TTI Design for V2X Phase 2 ITRI

6.2.4 Enhancements for high capacity stationary wireless link and introduction of 1024 QAM for LTE - *WID in RP-171738*

R1-1719125 Chairman's notes of AI 6.2.4 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 incorporated below.

R1-1717413 Draft LS on HCS Huawei
Conclusion:
Update the LS to include agreements related to RAN2/4 work such as UE categories, RRC configurations, and UE capability and the mapping of 1024QAM – Huawei (Yubo).
Friday
R1-1719184 Draft LS on HCS Huawei
Decision: The document is endorsed and final LS is approved in R1-1719217.

6.2.4.1 Support for 1024QAM for DL channels

R1-1717337 On support of 1024QAM Intel Corporation
R1-1717443 CQI and MCS table design for 1024QAM ZTE, Sanechips
R1-1718131 Introduction of 1024QAM for PDSCH Qualcomm Incorporated

Agreement: 1024QAM supports peak data rates of at least 120Mbps per layer per 20 MHz CC

R1-1718990 WF on 1024QAM Huawei, HiSilicon, ZTE, Sanechip

Agreements:
- UE capability for support of 1024QAM is reported per band/band combination.
- Introduce new DL UE categories based on a subset of LTE DL Categories 11~20
  - FFS on which DL category/categories.
  - Note: other new UE DL category/categories are not precluded.
- Joint RRC configuration of CQI/MCS table to support 1024QAM is supported for UE.
  - Per CC and per CSI subframe set if configured
  - FFS: Per codeword in addition

Agreements:
- Adopt the following modulation definition for 1024QAM at least for initial transmissions:

$$x = \frac{1}{\sqrt{682}}(1-2b_i)\left[16-(1-2b_{i+2})\left[8-(1-2b_{i+4})\left[4-(1-2b_{i+6})[2-(1-2b_{i+8})]\right]\right]\right]$$

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$$+ j\frac{1}{\sqrt{682}}(1-2b_{i+1})\left[16-(1-2b_{i+3})\left[8-(1-2b_{i+5})[4-(1-2b_{i+7})[2-(1-2b_{i+9})]]\right]\right]$$

- FFS: whether same is used for re-transmission

Agreement:
- Introduce at least 2 new entries in CQI table for 1024 QAM
- For introduction of 1024QAM CQI table:
  - Remove N entries from the 256QAM table.
  - Add N entries for 1024QAM.
- For introduction of 1024QAM MCS table:
  - Remove M entries from the 256QAM table while maintaining (close to) uniformly spaced SE, while keeping the lowest MCS
  - Add M new entries for 1024QAM, with (close to) uniformly spaced SE
    - Including 1 entry to support re-transmission with 1024 QAM

R1-1717108	Discussion on support of DL 1024QAM	Huawei, HiSilicon
R1-1717444	CQI table signaling for 1024QAM	ZTE, Sanechips
R1-1718016	Design details of 1024QAM	Nokia, Nokia Shanghai Bell

6.2.4.2 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

R1-1718978 **WF on DMRS density reduction** **Huawei, HiSilicon, Qualcomm, China Telecom, Nokia, NSB**
Note: Applicable to PDSCH with C-RNTI

R1-1717109	Discussion on DM-RS Overhead Reduction	Huawei, HiSilicon
R1-1717338	Overhead reduction for DM-RS	Intel Corporation
R1-1717445	Consideration on DMRS Overhead Reduction	ZTE, Sanechips
R1-1717785	Remaining issues on DM-RS overhead reduction	China Telecommunications
R1-1718017	DL DM-RS overhead reduction	Nokia, Nokia Shanghai Bell
R1-1718132	DMRS Overhead reduction	Qualcomm Incorporated
R1-1718262	On remaining details for DMRS overhead reduction	Ericsson

6.2.5 Even further enhanced MTC for LTE - *WID in RP-171427*

R1-1719126 **Chairman's notes of AI 6.2.5 Even further Enhanced MTC for LTE** **Ad-Hoc chair (Ericsson)**
The document was presented by Johan Bergman of Ericsson.
Decision: The document is endorsed, and content incorporated below.

6.2.5.1 Reduced system acquisition time

Physical layer aspects of improved cell search and/or system information acquisition performance

R1-1716968	Cell search and system information acquisition improvements in eFeMTC	Huawei, HiSilicon
R1-1716995	Reduced system acquisition time for MTC	Ericsson
R1-1717196	Further study on system acquisition time reduction for MTC	ZTE, SaneChips
R1-1717220	Reducing system acquisition time for efeMTC	Nokia, Nokia Shanghai Bell
R1-1717270	System information acquisition time enhancement in MTC	LG Electronics
R1-1717339	System acquisition time reduction for efeMTC	Intel Corporation
R1-1717563	ePSS/eSSS to reduce acquisition time	Samsung
R1-1718133	Reduced system acquisition time	Qualcomm Incorporated

R1-1718907 **WF on Enhanced PHY Resynchronization for efeMTC** **Ericsson, Nokia, NSB, Sierra Wireless**
R1-1718988 **WF on Assessment Assumptions for Enhanced Resynchronization in efeMTC** **Ericsson, Nokia, NSB, Sierra Wireless**

Agreements:
- Additional assumptions that can be used for evaluation of improved cell search and/or system information acquisition performance for UEs with apriori information (on top of the assumptions for evaluation of reduced system acquisition time already agreed in R1-1706583):

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- Carrier and cell are assumed to be known to the UE.
- The system information is assumed to be unchanged.
- UE power consumption model from the power saving signal evaluation assumptions in R1-1714992
- RTC timing drift model from the power saving signal evaluation assumptions in R1-1714992
- Scenarios B and C from the power saving signal evaluation assumptions in R1-1714992
- Further scenario D: 4-hour Power Saving Mode (PSM)

- Additional evaluation metrics that should be reported if the proponent of a proposed solution think they are relevant and significantly impacted by the proposed solution (on top of the metrics listed in R1-1706583):
  - Performance impact on legacy UEs
  - UE power consumption impact
  - Inter-cell interference sensitivity
- Additional assumptions that are used in the evaluation should be declared.

6.2.5.2 Early data transmission

Physical layer aspects of support for data transmission during the random access procedure

R1-1716969	On early data transmission for eFeMTC	Huawei, HiSilicon
R1-1716996	Early data transmission for MTC	Ericsson
R1-1717214	On early data transmission for eMTC	ZTE, SaneChips
R1-1717221	Data transmission during random access procedure	Nokia, Nokia Shanghai Bell
R1-1717276	Data transmission during random access procedure in MTC	LG Electronics
R1-1717564	Discussion on early data transmission for eMTC	Samsung
R1-1717869	Early data transmission for efeMTC	Intel Corporation

Agreements:

- From RAN1 point of view, it is feasible to support early UL data transmission in Msg3 from a BL/CE UE using some TBS value(s) from the TBS range specified for BL/CE UEs in Rel-13 with a maximum total TBS of 1000 bits.
  - Note: For Msg3 for Rel-13 BL/CE UEs, the maximum total TBS is 712 bits in CE mode A and 328 bits in CE mode B.
  - FFS if and how there will also be a larger supported maximum total TBS (than 1000 bits)
  - The detailed value(s) should consider the payload size of early data packets from RAN2.
- From RAN1 perspective, the physical layer design will assume eNB is not required to always provide a grant of a larger TBS for Msg3 and can decide to just provide a grant corresponding to Rel-13 Msg3 TBS instead.

Capture the above agreements in the corresponding NB-IoT LS and ask RAN2 to provide input on what TBS range is needed for the payload sizes considered by RAN2.
Friday: Joint LS with NB-IOT. Approved in R1-1719100 in 6.2.6.

6.2.5.3 Downlink channel power efficiency

Physical signal/channel that can be efficiently decoded or detected prior to decoding MPDCCH/PDSCH

R1-1716970	On 'wake-up signal' for eFeMTC	Huawei, HiSilicon
R1-1716997	Downlink channel power efficiency for MTC	Ericsson
R1-1717210	Power consumption reduction for physical channels for eMTC	ZTE, SaneChips
R1-1717222	Wake-up signal for efeMTC	Nokia, Nokia Shanghai Bell
R1-1717279	Discussion on the power saving signal/channel in MTC	LG Electronics
R1-1717340	Power saving signal for efeMTC	Intel Corporation
R1-1717456	Remaining issues for wake-up signal for efeMTC	vivo
R1-1717565	DL power consumption reduction for eMTC	Samsung
R1-1717763	Idle Mode Power Efficiency Reduction	Sierra Wireless, S.A.
R1-1718065	Considerations on the DL power consumption reduction for efeMTC	Guangdong OPPO Mobile Telecom
R1-1718135	Efficient monitoring of DL control channels	Qualcomm Incorporated
R1-1718263	Power Saving Signal Evaluations	Sony

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' with new periodic sync signal
    - 'Wake-up signal or DTX' without new periodic sync signal
  - Study till the next meeting how to ensure sufficient sync performance.

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- Consider potential synergies with the WI objective on Reduced system acquisition time.
- Consider impacts from mobility.

6.2.5.4 Uplink HARQ-ACK feedback

Design of MPDCCH-based explicit HARQ-ACK feedback, and further input on the benefits and feasibility of early PUSCH termination

R1-1716971 On HARQ-ACK feedback for PUSCH in eFeMTC Huawei, HiSilicon
R1-1716998 Uplink HARQ-ACK feedback for MTC Ericsson
R1-1717223 Uplink HARQ-ACK feedback in efeMTC Nokia, Nokia Shanghai Bell
R1-1717271 Discussion on early termination of uplink repetitions for MTC LG Electronics
R1-1717341 HARQ-ACK feedback for efeMTC UL transmission Intel Corporation
R1-1717439 Discussion on UL HARQ-ACK feedback Lenovo, Motorola Mobility
R1-1717566 Uplink HARQ-ACK feedback for eMTC Samsung
R1-1718136 Uplink HARQ-ACK feedback Qualcomm Incorporated
R1-1718171 Views on UL HARQ-ACK feedback design NTT DOCOMO, INC.
R1-1718264 Explicit uplink HARQ-ACK feedback for efeMTC Sony

R1-1718899 WF on early PUSCH termination ZTE, Sanechips, LGE, Intel, Huawei, HiSilicon, Sony, Lenovo, Motorola Mobility, Ericsson, Nokia, Nokia Shanghai Bell

Agreement:
- Early termination of PUSCH transmission is supported at least in FD-FDD and TDD by the following:
  - MPDCCH for UL grant for scheduling new UL data
  - MPDCCH for explicit HARQ-ACK feedback

R1-1717197 Further considerations on UL HARQ-ACK feedback for MTC ZTE, SaneChips

Agreement:
- For explicit HARQ-ACK feedback for early termination of MPDCCH monitoring:
  - Explicit HARQ-ACK feedback for a single UE is carried in a DCI with the same DCI size as DCI format 6-0A/B. The DCI is carried on MPDCCH in UE-specific search space.
- For explicit HARQ-ACK feedback for early termination of PUSCH transmission:
  - Explicit HARQ-ACK feedback for a single UE is carried in a DCI with the same DCI size as DCI format 6-0A/B. The DCI is carried on MPDCCH in UE-specific search space.
  - FFS: Explicit HARQ-ACK feedback for multiple UEs is carried in a DCI

Draft LS to RAN2 in R1-1719057 capturing the agreements (Huiying, ZTE)
Friday
R1-1719057 [DRAFT] LS on Uplink HARQ-ACK feedback to Rel-15 BL/CE UEs ZTE
Decision: The document is endorsed and final LS is approved in R1-1719206.

6.2.5.5 Increased PDSCH spectral efficiency

Remaining details of CQI table for 64QAM support

R1-1716999 Increased PDSCH spectral efficiency for MTC Ericsson
R1-1717198 Remaining issue on support of 64QAM for unicast PDSCH for MTC ZTE, SaneChips
R1-1717224 Remaining issue on supporting DL 64QAM for efeMTC Nokia, Nokia Shanghai Bell
R1-1718265 CQI reporting for efeMTC supporting 64QAM Sony

R1-1718137 Summary of email discussion on 64-QAM CQI table Qualcomm Incorporated

Agreement:
- RAN1 to design a solution to configure a UE with CSI reference resource comprising more than one subframe and 64QAM simultaneously.
- RAN1 to discuss the detailed solutions among the following options, where other options are not precluded:
  - Option A: For *csi-NumRepetitionCE-r13* > 1, the UE assumes a CSI reference resource of 1 for 64QAM and *csi-NumRepetitionCE-r13* > 1 for other modulation schemes.
  - Option B: Redesign CQI table to have a more even spread of SNR values.

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6.2.5.6 Increased PUSCH spectral efficiency

Design of sub-PRB allocation

R1-1716972	On PUSCH spectral efficiency enhancement	Huawei, HiSilicon
R1-1717000	Increased PUSCH spectral efficiency for MTC	Ericsson
R1-1717199	Detailed sub-PRB allocation design for MTC	ZTE, SaneChips
R1-1717215	Sub-PRB allocation for MTC PUSCH	Sharp
R1-1717225	Design of PUSCH Sub-PRB Allocation	Nokia, Nokia Shanghai Bell
R1-1717342	Design of sub-PRB PUSCH for efeMTC	Intel Corporation
R1-1717567	Discussion on sub-PRB allocation for eFeMTC	Samsung
R1-1717762	Sub-PRB Design Analysis	Sierra Wireless, S.A.
R1-1717783	Increased PUSCH spectral efficiency for eMTC	China Telecommunications
R1-1718138	Increased PUSCH spectral efficiency	Qualcomm Incorporated
R1-1718266	Sub-PRB transmissions in efeMTC for improved PUSCH spectral efficiency	Sony

R1-1718921 WF on Sub-PRB for eFeMTC Sierra Wireless, Ericsson, Nokia, NSB, KT Corp, Sony, AT&T, Verizon, Qualcomm

R1-1719001 WF on Sub-PRB Support in Mode A for eFeMTC Sierra Wireless, AT&T, Verizon, Orange, NTT Docomo, Nokia, NSB, Qualcomm, Sony

Agreement:

- Sub-PRB shall be supported at least in CE Mode B
- Working assumption: Sub-PRB shall be supported in CE Mode A.
  - RAN1 will prioritize optimization of Sub-PRB for CE Mode B over optimization of Sub-PRB for CE Mode A.
- For Sub-PRB, the maximum total number of (valid) subframes of transmission is:
  - 32 subframes for CE Mode A
  - 2048 subframes for CE Mode B
- FFS: Supported transport block sizes and numbers of repetitions (for each supported CE Mode)
- Sub-PRB rate matching is performed across a resource unit (RU) spanning multiple subframes
  - The RU length depends on number of subcarriers in the Sub-PRB allocation
  - FFS: RE mapping
  - FFS: whether more than one RU is allocated per transport block
- For Sub-PRB, increasing DMRS shall not be supported
- For Sub-PRB allocation in connected mode,
  - The Sub-PRB feature is configured/enabled by RRC signaling
  - The Sub-PRB resource allocation shall be signaled by DCI
- FFS: Support of Sub-PRB allocation in Msg3

R1-1719000 WF#2 on Sub-PRB for eFeMTC Sierra Wireless
Also supported by Ericsson and Sony

Agreement:

- When the Sub-PRB feature is configured/enabled in connected mode in CE mode B,
  - DCI format 6-0B shall support both sub-PRB allocation and allocation of at least 1 PRB.
  - Sub-PRB allocation shall support a maximum TBS of at least [504] bits.

6.2.5.7 Other

R1-1717001	Flexible PDSCH/PUSCH resource allocation for MTC	Ericsson
R1-1719055	**WF on Flexible PDSCH-PUSCH resource allocation for MTC**	**Ericsson, Orange, NTT DOCOMO**
R1-1718139	Modulation enhancements for eMTC	Qualcomm Incorporated
R1-1718273	Improved Channel and Timing Estimation for efeMTC	Fraunhofer IIS

6.2.6 Further enhancements of NB-IoT - *WID in RP-172063*.

R1-1719127 Chairman's notes of AI 6.2.6 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 incorporated below.

Friday: Huawei warned the group that Rel-15 NB-IoT draft CRs for the ongoing power consumption reduction objectives will be prepared after next meeting (RAN1#91 – Reno). These draft CRs should be provided to RAN#78.

Petitioners' Exhibit 1007, p. 654
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6.2.6.1 *Latency and power consumption reduction*

Where solutions are specified, draft CRs to be provided to RAN#78

6.2.6.1.1 Power consumption reduction for paging and connected-mode DRX

Physical signal/channel that can be efficiently decoded or detected prior to decoding NPDCCH/NPDSCH.

6.2.6.1.1.1 Wake-up signal functions

Including: with or not with DTX; with or not with synchronization function; information conveyed; connected mode DRX, etc.

R1-1716973 **On functions of power saving signal Huawei, HiSilicon**
R1-1717207 **Power consumption reduction for physical channels for NB-IoT ZTE, SaneChips**
R1-1717272 **Discussion on power saving signal/channel function LG Electronics**
R1-1718140 Wake-up signal functions Qualcomm Incorporated
R1-1717009 Wake-up signal functions Ericsson
R1-1717226 Functions of wake-up signal Nokia, Nokia Shanghai Bell
R1-1717343 The function scope of wake-up signal for feNB-IoT Intel Corporation
R1-1717457 Remaining details on wake-up signal functions for feNB-IoT vivo
R1-1718062 On wake-up signal functionalities Guangdong OPPO Mobile Telecom
R1-1718919 WF on power saving signal/channel for connected mode DRX LG Electronics, Huawei, HiSilicon, ZTE, Sanechips
R1-1718943 **Way Forward on wake up signal function Huawei, HiSilicon**
R1-1719012 **WF on Wake-up Signal Functions Ericsson, Samsung, Qualcomm, Intel, Sony**

Agreements:

- Working assumption: WUS/DTX is adopted for the power saving signal for IDLE mode paging;
- The UE is configured with a transmission duration of WUS by higher layers
- The WUS signal may be decoded with or without relying on prior synchronization
  - Whether the UE needs to acquire (further) synchronization using NPSS/NSSS to decode the NPDCCH following the WUS is FFS
  - The power saving of using existing synchronization signal to achieve sync and using WUS for synchronization should be compared.
  - For RAN#78 timeline, RAN4 can assume the UE is synchronized prior to the WUS
  - After RAN#78, RAN1 and RAN4 will conduct additional work to allow the assumption that the UE is not synchronized prior to the WUS (with the same WUS signal design) for 144 dB MCL; and will study to allow the assumption that the UE is not synchronized prior to the WUS (with the same WUS signal design) for 154, 164 dB MCL
    - Status of work on 'Relaxed monitoring for cell reselection' in RAN2/4 should be considered

6.2.6.1.1.2 Wake-up signal configurations and procedures

How many UEs and POs the signal applies to; resource allocation; timing relationships to NPDCCH/NPDSCH.

R1-1717208 **Discussion on wake up signal configuration for NB-IoT ZTE, SaneChips**
R1-1716985 **On configurations and procedures of power saving signal Huawei, HiSilicon**
R1-1717010 **Wake-up signal configurations and procedures Ericsson**
R1-1717344 **Configurations of wake-up signal for feNB-IoT Intel Corporation**
R1-1717227 Wake-up signal configurations and procedures Nokia, Nokia Shanghai Bell
R1-1718063 On wake-up signal transmission Guangdong OPPO Mobile Telecom
R1-1718141 **Wake-up signal configurations and procedures Qualcomm Incorporated**
R1-1717568 Discussion on Wake up signal configuraion Samsung
R1-1717273 Discussion on power saving signal/channel configurations and procedures LG Electronics
R1-1717922 Avoiding the impact on MME SoftBank Corp.
R1-1718944 **Way Forward on Wake-up signal configurations and procedures Huawei, HiSilicon**

Agreements:

- RAN1 assumes that introduction of WUS does not alter PO/PF definition
- At least in a UE's DRX cycle:
  - WUS supports at least being applied to all the UEs monitoring WUS associated to a PO in a ~~cell~~ NB-IoT carrier;
    - FFS: eNB can configure WUS being applied to a group of more than one of the UEs associated to a PO in a ~~cell~~ NB-IoT carrier
    - Send LS to request RAN2 input on feasibility of UE groups for WUS. (Xiaolei, HiSilicon, prepare draft LS in R1-1719102)

Friday

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R1-1719102 **[Draft] LS on wake-up signal configuration and procedures for NB-IoT and BL/CE UEs in Rel-15** **HiSilicon**

Decision: The document is endorsed and final LS is approved in R1-1719207. Consequently, the above agreement is modified as shown.

Working assumption:

- At least in a UE's DRX cycle, how the UE knows the WUS time location, is:
  - A WUS has a time location which is configurable with respect to the associated PO(s) location(s)

Agreements:

- At least in a UE's DRX cycle, one WUS informs UE whether to monitor the PO in a single DRX cycle
- Include in the LS to RAN2, to request input on the feasibility of WUS applying to more than one PO in a PTW for eDRX case

6.2.6.1.1.3 Detailed design of wake-up signal

Design of the physical signal, evaluations, etc.

R1-1716986	On detailed design and evaluations of power saving signal	Huawei, HiSilicon
R1-1717209	Details design of wake up signal for NB-IoT	ZTE, SaneChips
R1-1718142	Wake-up signal design	Qualcomm Incorporated
R1-1717274	Design of power saving signal/channel	LG Electronics
R1-1717345	Wake-up signal design for feNB-IoT	Intel Corporation
R1-1718064	On wake-up signal design	Guangdong OPPO Mobile Telecom
R1-1717228	Considerations for design of wake-up signal	Nokia, Nokia Shanghai Bell
R1-1717011	Detailed design of wake-up signal	Ericsson
R1-1717458	Views on design of wake-up signal for feNB-IoT	vivo

R1-1718942 Way Forward on detailed design of wake up signal Huawei, HiSilicon, LGE

Agreements:

- WUS signal is at least cell-specific;
  - FFS scrambling of WUS including time varying scrambling
- Long ZC sequence based signal is considered as the starting point for WUS signal:
  - FFS: whether the sequence can span over multiple subframes
  - FFS: whether accumulated multiplication is applied between sub-sequences from the long ZC sequence to reduce the impact of frequency error;
  - FFS: Support transmit diversity for NB-IoT WUS
  - FFS: NSSS like signal is used as the wake-up signal

R1-1718941 WF on Wake-up Signal Transmission in NB-IoT Qualcomm, Ericsson

6.2.6.1.2 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.

R1-1717014	Data transmission during random access procedure for NB-IoT	Ericsson
R1-1717213	On early data transmission for NB-IoT	ZTE, SaneChips
R1-1717229	Data transmission during random access procedure	Nokia, Nokia Shanghai Bell
R1-1717275	Data transmission during random access procedure in NB-IoT	LG Electronics
R1-1717569	Discussion on early data transmission for NB-IoT	Samsung
R1-1717724	Early data transmission in RACH for NB-IoT	Huawei, HiSilicon
R1-1717871	Early data transmission for feNB-IoT	Intel Corporation
R1-1718143	Physical layer aspects of data transmission during random access procedure	Qualcomm Incorporated

R1-1719014 Way Forward on early data transmission in NB-IoT Huawei, HiSilicon (Revision of R1-1718950)

Agreements:

- From RAN1 point of view, it is feasible to support early UL data transmission in Msg3 from an NB-IoT UE using some TBS value(s) from the TBS range specified for NB-IoT in Rel-13 with a maximum total TBS of 1000 bits.

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- FFS if and how there will also be a larger supported maximum total TBS
- The detailed value(s) should consider the payload size of early data packets from RAN2.

- From RAN1 perspective, the physical layer design will assume eNB is not required to always provide a grant of a larger TBS for Msg3 and can decide to just provide a grant for 88 bits instead
- Send LS to RAN2 informing the above (Xiaolei, HiSilicon, R1-1719100) (including eMTC agreements)

R1-1719100 **[Draft] LS on agreements on early data transmission during random access procedure for NB-IoT and BL/CE UEs in Rel-15** **HiSilicon [TSG RAN WG1]**
Decision: LS is approved in R1-1719103, with the following changes
In Rel-13/14, the TBS for Msg3 is:

- 88 bits for NB-IoT UEs
- Maximum 712 bits for BL/CE UEs in CE mode A
- Maximum 328 bits for BL/CE UEs in CE mode B

In RAN1#90bis, the following were agreed in RAN1 regarding data transmission during the random access procedure for NB-IoT:

- *From RAN1 point of view, it is feasible to support early UL data transmission in Msg3 from an NB-IoT UE using some TBS value(s) from the TBS range specified for NB-IoT in Rel-13 with a maximum total TBS of 1000 bits.*
  - *FFS if and how there will also be a larger supported maximum total TBS*
  - *The detailed value(s) should consider the payload size of early data packets from RAN2.*
- *From RAN1 perspective, the physical layer design will assume eNB is not required to always provide a grant of a larger TBS for Msg3 and can decide to just provide a grant for 88 bits instead.*

~~Note that for Msg3 for Rel-13 Cat. NB-1 UEs, the maximum total TBS is 88 bits.~~
RAN1 also agreed the following ~~agreements~~ for early data transmission during the random access procedure for BL/CE UEs:

- *From RAN1 point of view, it is feasible to support early UL data transmission in Msg3 from a BL/CE UE using some TBS value(s) from the TBS range specified for BL/CE UEs in Rel-13 with a maximum total TBS of 1000 bits.*
  - ~~*Note: For Msg3 for Rel-13 BL/CE UEs, the maximum total TBS is 712 bits in CE mode A and 328 bits in CE mode B.*~~
  - *FFS if and how there will also be a larger supported maximum total TBS (than 1000 bits)*
  - *The detailed value(s) should consider the payload size of early data packets from RAN2.*
- *From RAN1 perspective, the physical layer design will assume eNB is not required to always provide a grant of a larger TBS for Msg3 and can decide to just provide a grant corresponding to Rel-13 Msg3 TBS instead.*

6.2.6.2 Reduced system acquisition time

Where solutions are specified, draft CRs to be provided to RAN#78

R1-1718134 Physical layer aspects of eary data transmission Qualcomm Incorporated

6.2.6.2.1 Cell search

R1-1716980 Reduction of NB-IoT synchronization time Huawei, HiSilicon
R1-1717019 On NB-IoT Cell Search Improvement for System Acquisition Time Reduction Ericsson
R1-1717200 Consideration on cell search enhancement for NB-IoT ZTE, SaneChips
R1-1717230 Reducing cell search time for feNB-IoT Nokia, Nokia Shanghai Bell
R1-1717277 Cell search latency enhancement LG Electronics
R1-1718144 Enhancements to cell search Qualcomm Incorporated

6.2.6.2.2 System Information

R1-1716987 Reduction of NB-IoT System Information acquisition time Huawei, HiSilicon
R1-1717020 On MIB-NB and SIB1-NB acquisition time reduction Ericsson
R1-1717201 Improving system information acquisition performance for NB-IoT ZTE, SaneChips
R1-1717231 Reducing system acquisition time for feNB-IoT Nokia, Nokia Shanghai Bell
R1-1717278 System information acquisition latency enhancement LG Electronics
R1-1717346 System information acquisition time reduction for feNB-IoT Intel Corporation
R1-1718145 Enhancements to system information acquisiton Qualcomm Incorporated

R1-1718952 **WF on System information acquisition improvement** **LG, Huawei**
Also supported by: HiSilicon, Neul

Agreements:

- SIB1-NB can be additionally transmitted in subframe(s) other than Rel.13 existing SIB1-NB transmission subframes on the anchor-carrier.
  - Additional SIB1-NBs are transmitted on subframe #3

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- The periodicity of additional SIB1-NB transmissions is 20 ms and in the same radio frame as legacy transmission
- FFS the supported number(s) of additional transmissions of SIB1-NB
- There is no signalling of the number of additional SIB1-NB transmissions
- The TBS, coding, and modulation of additional SIB1-NB repetitions are the same as the existing ones for Rel.13 SIB1-NB
  - FFS scrambling
- FFS: The sequence of coded bits-to-subframe allocation of additional SIB1-NB transmission can be interleaved compared to the existing SIB1-NB transmission

- When additional SIB1-NBs are transmitted, the subframe(s) carrying additional SIB1-NB(s) can be declared as invalid downlink subframe by downlinkBitmap
  - Rel.15 UEs interpret invalid downlink subframes whose indices are corresponding to additional SIB1-NBs transmissions but not carrying additional SIB1-NB (and NSSS) as valid downlink subframes
- Additional SIB1-NB transmission can be configured by eNB, and the presence of additional SIB1-NB can be indicated by one of unused bits in MIB-NB
- FFS if additional SIB1-NB transmissions are also supported on non-anchor carriers

6.2.6.3 TDD

R1-1718149 Coexistence with NR Qualcomm Incorporated

6.2.6.3.1 Downlink aspects

E.g. DL frame structure, NPSS/NSSS/NPBCH, etc.

R1-1716982 On downlink TDD NB-IoT Huawei, HiSilicon
R1-1717021 On the DL of NB-IoT TDD Ericsson
R1-1717202 Detailed design on downlink aspects to support TDD NB-IoT ZTE, SaneChips
R1-1717232 Downlink aspects of TDD support in NB-IoT Nokia, Nokia Shanghai Bell
R1-1717280 Discussion on DL aspects in TDD NB-IoT LG Electronics
R1-1717347 Design of synchronization signals and system information for TDD support in feNB-IoT Intel Corporation
R1-1717440 Views on TDD downlink aspect for R.15 NBIoT Lenovo, Motorola Mobility
R1-1717570 Discussion on DL common channel/signal for TDD NB-IoT Samsung
R1-1718146 Downlink aspects of TDD Qualcomm Incorporated
R1-1718172 Views on downlink aspects to support NB-IoT TDD NTT DOCOMO, INC.
Late submission

R1-1718900 WF on system information transmission for TDD NB-IoT ZTE, SaneChips

Agreement:
- TDD UL:DL configuration 0 is not supported in TDD NB-IoT in Rel-15

Working assumption:
- TDD UL:DL configuration 6 is not supported in TDD NB-IoT in Rel-15

Agreements
- MIB-NB is transmitted on the same NB-IoT carrier as NPSS/NSSS.
- The single NB-IoT carrier for all the other SIBs than SIB1-NB, when not the anchor carrier, is:
  - In a PRB indicated by SIB1-NB with exact signaling design left to RAN2 including whether to signal anything in case these other SIBs are on the anchor carrier

Agreements:
- It is supported that SIB1-NB is transmitted only on the anchor carrier
  - In at least subframe #0 in odd frames
- It is supported that SIB1-NB can be transmitted on non-anchor carrier, FFS details
  - It is necessary to consider SFN wraparound as part of FFS
- Periodicity of SIB1-NB in TDD is the same as FDD (i.e. 2560ms)
- One transport block of SIB1-NB is transmitted over 8 SIB1-NB subframes (i.e. same as FDD)

R1-1718973 Summary on NPSS, NSSS and NPBCH transmission in TDD NB-IoT Huawei, HiSilicon

Agreements:
- For NPSS, NSSS and NPBCH transmission in TDD:

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- NPSS is transmitted on subframe #5 in every radio frame
- NSSS is transmitted on subframe #0 in every even-numbered radio frame
- NPBCH is in subframe 9 in every radio frame on the same carrier as NPSS/NSSS.

R1-1718974 Way Forward on NPSS and NSSS signal design in TDD NB-IoT Huawei, HiSilicon, Qualcomm, Ericsson, Intel, Samsung, IITH, CEWiT, IITM, Tejas Networks, Reliance Jio,Sharp, Lenovo and Motorola Mobility
Also supported by ZTE, SaneChips.

Agreements:

- Confirm the working assumptions from RAN1#90, i.e. NPSS uses the lower 11 subcarriers in one subframe and the same cover code for TDD as FDD.
  - The NPSS and NSSS sequences for TDD are the same as FDD.
  - TDD and FDD NB-IoT are distinguished by the relative location of NPSS and NSSS.

Working assumption to be automatically confirmed if RAN4 reply LS to R1-1715304 does not raise a problem:

- TDD NB-IoT will support all LTE special subframe configurations

6.2.6.3.2 Uplink aspects

E.g. UL frame structure, NPRACH, NPUSCH, etc.

R1-1717022 On the UL of NB-IoT TDD Ericsson
R1-1717712 NPRACH design aspects for the support of TDD NB-IoT CEWiT
R1-1716983 On uplink TDD NB-IoT Huawei, HiSilicon
R1-1717233 Uplink aspects of TDD support in NB-IoT Nokia, Nokia Shanghai Bell
R1-1717348 Discusssion on the UL aspects for TDD support in feNB-IoT Intel Corporation
R1-1717203 Detailed design on uplink aspects to support TDD NB-IoT ZTE, SaneChips
R1-1717216 Discussion on NB-IoT TDD-UL Sharp
R1-1717281 Discussion on UL aspects in TDD NB-IoT LG Electronics
R1-1717571 Discussion on UL channel for TDD NB-IoT Samsung
R1-1717987 NPRACH design for NB-IoT TDD IITH
R1-1718147 Uplink aspects of TDD Qualcomm Incorporated
R1-1719095 Way Forward on NPUSCH for NB-IoT TDD Ericsson, LGE

Agreements:

- NPUSCH transmissions with 15 kHz subcarrier spacing are supported in all supported UL/DL configurations for NB-IoT TDD.
- 3.75 kHz is also supported, in UL/DL configurations #1, [#3], #4, with the same definition of NB-slot and resource unit as FDD
- FFS if there any need for any other subcarrier spacing and/or slot structure for TDD
  - This needs to take into consideration the co-existence of NPRACH and NPUSCH.

R1-1719096 WF on TDD NPRACH ZTE , Sanechips, Ericsson

Agreements:

- TDD NPRACH supports at least 3.75KHz subcarrier spacing single-tone with frequency hopping.
  - FFS if also 5 kHz subcarrier spacing is supported e.g. for UL-DL configuration #2
- NPRACH formats using G symbol groups with back-to-back transmission followed by a guard time (FFS guard time duration) are supported for 1, 2, and 3 contiguous uplink subframes
  - An NPRACH format is associated with one value of N (the number of symbols per symbol group) and CP duration
  - G is FFS, and G≥2
- P (number of symbol groups in a preamble) is even.
  - For the G symbols groups that are transmitted back-to-back with 3.75 kHz subcarrier spacing, 3.75 kHz and 22.5 kHz hopping distances are supported.
    - FFS the details of the hopping pattern
    - FFS the hopping distance and pattern if 5 kHz subcarrier spacing is supported
  - For the hopping between discontinuous transmissions within one preamble
    - FFS hopping distance and hopping pattern
- Cell specific pseudo-random hopping is used between NPRACH preamble repetitions
  - FFS details

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6.2.6.3.3 Common aspects

E.g. Relaxations of MCL, latency, capacity targets; UL:DL configurations, special subframe, HARQ, etc.

R1-1717988 Views on common aspects IITH
R1-1717204 Detailed design on common aspects to support TDD NB-IoT ZTE, SaneChips
R1-1717234 Common Aspects of NB-IoT TDD Operation Nokia, Nokia Shanghai Bell
R1-1717349 Overall design for TDD support in feNB-IoT Intel Corporation
R1-1717023 On the other aspects of TDD for NB-IoT Ericsson
R1-1716981 Common aspects for TDD NB-IoT Huawei, HiSilicon
R1-1717282 Discussion on common aspects in TDD NB-IoT LG Electronics
R1-1717441 Views on common issue for TDD NBIoT Lenovo, Motorola Mobility
R1-1717572 Discussion on NB-IoT TDD configuration Samsung
R1-1718148 General considerations on TDD design Qualcomm Incorporated
R1-1719101 WF on TDD configurations LG Electronics, Ericsson

6.2.6.4 Other

Contributions on other Part A objectives can be submitted here.

R1-1716974 Use cases and design for physical layer scheduling request Huawei, HiSilicon
R1-1717012 Physical layer scheduling request for NB-IoT Ericsson
R1-1717206 Detailed design on physical layer SR for NB-IoT ZTE, SaneChips
R1-1717283 Discussion on Scheduling request in NB-IoTLG Electronics
R1-1717573 Discussion on scheduling request for NB-IoT Samsung
R1-1718151 Physical layer scheduling request Qualcomm Incorporated
R1-1716975 On support of semi-persistent scheduling Huawei, HiSilicon
R1-1717013 Semi-persistent scheduling for NB-IoT Ericsson
R1-1717205 Physical layer aspects on SPS in NB-IoT ZTE, SaneChips
R1-1718173 Views on SPS activation and deactivation mechanism NTT DOCOMO, INC.
Late submission
R1-1716976 Remaining details of NB-IoT measurements improvement Huawei, HiSilicon
R1-1717015 Narrowband measurement accuracy improvements for NB-IoTEricsson
R1-1717284 RRM measurement enhancement in NB-IoT LG Electronics
R1-1717764 Discussion on candidates for measurement improvement for NB-IoT ZTE, SaneChips
R1-1718153 Improvement of PHY measurements Qualcomm Incorporated
R1-1716977 NPRACH enhancement for cell radius extension Huawei, HiSilicon
R1-1717017 NPRACH range enhancements for NB-IoT Ericsson
R1-1717211 NPRACH range enhancement ZTE, SaneChips
R1-1718154 NPRACH support for large cell access Qualcomm Incorporated
R1-1716978 On NPRACH false alarm reduction due to inter-cell interference Huawei, HiSilicon
R1-1717016 NPRACH false alarm reduction for NB-IoT Ericsson
R1-1717212 NPRACH reliability enhancement for NB-IoT ZTE, SaneChips
R1-1717285 Preamble structure for NPRACH enhancement LG Electronics
R1-1717286 Resource configuration for NPRACH enhancement LG Electronics
R1-1718155 NPRACH Reliability Ehnancement Qualcomm Incorporated
R1-1716979 On the support of NB-IoT small cell Huawei, HiSilicon
R1-1717018 NB-IoT small cell support Ericsson
R1-1718152 Support of small cells Qualcomm Incorporated
R1-1718150 Modulation enhancements for NB-IoT Qualcomm Incorporated

6.2.7 Enhanced Support for Aerial Vehicles - *SID in RP-171050*

R1-1719128 Chairman's notes of AI 6.2.7 Enhanced Support for Aerial VehiclesAd-Hoc chair (Ericsson)
The document was presented by Siva Muruganathan of Ericsson.
Decision: The document is endorsed, and content incorporated below.

6.2.7.1 Baseline Evaluation Results

Baseline performance evaluations for agreed simulation cases and scenarios; Evaluation results presented here for DL and UL.

R1-1717350 Baseline evaluation results for UMa AV Intel Corporation
R1-1718019 Baseline evaluation results for LTE aerials ZTE,Sanechips

R1-1718872 WF on baseline results Ericsson, Intel, Sequans

Petitioners' Exhibit 1007, p. 660
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Agreement: Proposals on slides 4-10 of R1-1718872 are agreed with the following changes.
- On Slide 4: Also list Source 2 results for 20% RU
- On Slide 6: Add the following sentence to the conclusions:
- "The downlink throughput degradation for aerial UEs is more significant than the downlink throughput degradation for terrestrial UEs."
- On Slide 8: Remove Source 4 from observation for 20% RU

R1-1718904 WF on interference problem statement in the UL of aerial scenarios Huawei, HiSilicon, Ericsson, Sequans

Agreement: Capture the observations in Slides 3-4 of R1-1718904 in TR36.777 with the following clarification:
- Fast fading model used by Source 3 is Alternative 2 from TR36.777.

R1-1718795 Baseline evaluation results for UMa-AV Ericsson (Revision of R1-1717852)
R1-1718156 Baseline performance evaluations for UL and DL Qualcomm Incorporated
R1-1718256 Baseline evaluation for drones Huawei, HiSilicon
R1-1718295 Baseline Evaluation Results for Aerial Vehicles Sequans Communications

6.2.7.2 DL Interference Mitigation

On DL interference mitigation schemes and performance evaluations

R1-1719047 WF on Interference mitigation for aerial vehicles Intel, Sequans, Nokia, Nokia Shanghai Bell

Agreement:
- The throughput performance of the following potential solutions for interference mitigation is further evaluated in RAN1#91
  - Directional Tx/Rx antenna pattern at the Aerial UE, considering the following assumptions on main lobe steering capabilities
    - Incapable of tracking the serving cell LOS direction
    - Capable of tracking the serving cell LOS direction
      - FFS: on feasibility of implementation of tracking the serving cell LOS direction

R1-1719050 WF on downlink interference mitigation Ericsson, LGE
R1-1718913 WF on downlink interference mitigation Huawei, HiSilicon, Sequans Communications

Agreement:
- Capture FD-MIMO results and observations from R1-1719050 Slide 3 of R1-1719050 in the TR

Conclusion:
- Further evaluate Rel-13 and Rel-14 coverage extension for aerial UEs in poor downlink SINR for common and control channels
  - Other coverage extension techniques for aerials are not precluded
  - The impact on throughput performance and latency are further analysed/evaluated in RAN1#91
    - FFS on whether power consumption needs to be considered
- The throughput performance and latency of the following network coordination schemes are further evaluated in RAN1 #91 meeting
  - Joint transmission for control, data, associated signals
    - Considering geographical separation of coordinating cells
  - Resource reservation
  - ABS, control/data muting
  - Other options and combinations are not precluded
  - FFS on whether power consumption needs to be considered

Note1: Optionally, the impact of handover and RLF may also be considered in the evaluation
Note 2: Companies are encouraged to provide detailed considerations on the resource usage and reference signal

Further offline discussion on evaluation methodology for coverage extension for aerial UEs – Xingqin (Ericsson)
Friday

Petitioners' Exhibit 1007, p. 661
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R1-1719030 WF on evaluation methodology of coverage extension Ericsson, NTT DOCOMO, Nokia, NSB, Huawei, HiSilicon, ZTE, Sanechips

Agreement: For evaluation of coverage extension for aerial UEs, companies should state the interference margin used in the evaluation

R1-1716965	Potential DL enhancements for drones	Huawei, HiSilicon
R1-1717351	On Interference Mitigation schemes for DL	Intel Corporation
R1-1717868	On DL Interference Mitigation	Ericsson
R1-1718157	DL interference mitigation schemes	Qualcomm Incorporated
R1-1718267	Height parameter and CRS collision for aerial vehicle	Sony
R1-1718296	Downlink Interference Mitigation for Aerial Vehicles	Sequans Communications

6.2.7.3 UL Interference Mitigation

On UL interference mitigation schemes and performance evaluations

R1-1719031 WF on uplink interference mitigation Ericsson, LGE

Agreement:
- Proposals on Slides 3 and 9 are agreed.
- Proposals on Slides 4-7 are agreed with the following changes on Slide 4:
  - FFS: whether solutions on Aerial UE specific P0 may have standard impact (e.g., identification and/or detection of Aerial UE),
  - For solution on Aerial specific P0, note on "This is a standard transparent scheme" is to be removed.
- More power control-based mechanisms for uplink interference mitigation are not precluded and can be further evaluated (i.e., throughput performance) in RAN1#91

R1-1716966	Potential UL enhancements for drones	Huawei, HiSilicon
R1-1717287	Interference Mitigation for Aerial Vehicles	LG Electronics
R1-1717352	On Interference Mitigation schemes for UL	Intel Corporation
R1-1718796	On UL interference mitigation	Ericsson (Revision of R1-1717872)
R1-1717895	Discussion on Interference Mitigation for Aerial Vehicles	CMCC
R1-1718020	Potential enhancements on UL interference mitigation	ZTE,Sanechips
R1-1718158	UL interference mitigation schemes	Qualcomm Incorporated
R1-1718174	Views on interference mitigation schemes for aerials	NTT DOCOMO, INC.
R1-1718297	UL Interference Mitigation for Aerial Vehicles	Sequans Communications

6.2.7.4 Interference Detection

On interference detection schemes and RSRP statistics for aerial vehicles

R1-1716990 Interference detection for aerial vehicles Nokia, Nokia Shanghai Bell
Late submission
R1-1718762 Downlink interference detection for aerial vehicles Nokia, Nokia Shanghai Bell
Revision of R1-1716991
R1-1718175 Views on interference detection schemes for aerials NTT DOCOMO, INC.

R1-1718896 WF on interference detection NTT DOCOMO, Ericsson

Conclusion:
- RAN1 has discussed the followings for interference detection:
  - Measurement report with RSRP/CSI-RSRP of serving cell and neighbor cells for interference detection for both downlink and uplink
    - FFS: How many cells can be accurately measured
    - FFS: the case of different Rx and Tx antennas at the UE
    - Note: RAN1 performed simulations assuming ideal RSRP without considering measurement errors.
    - Necessary enhancement on measurement report is up to RAN2
  - interference detection based on SRS or any other uplink signal
    - Note: Simulation results are not provided to RAN1

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- ICIC (OI and HII)
  - Note: Simulation results are not provided to RAN1
- Measurement resports with RSRQ/RSSI for interference detection
- Other solutions are not precluded
- Note: further decision on which techniques are feasible requires RAN2 input.
- Note: Solutions above could be jointly used.

R1-1719109 WF on observations for RSRP statistics in interference detection NTT DOCOMO Inc., Nokia, Nokia Shanghai Bell

Agreement:
Proposals on Slides 2-8 in R1-1719109 are agreed with the additional change and note below:
On slide 2: only RSRP statisctics in Appendix are captured in TR, and the observations to be captured to be discussed further.
Note: Sources 1-4 do not use aligned asumptions for their RSRP statistics, and the results may be updated in RAN1#91 with aligned assumptions.

Draft LS to RAN2 on RSRP statistics – Shinpei (NTT DOCOMO)
Friday
R1-1719051 Summary of RSRP statistics NTT DOCOMO
R1-1719052 [Draft] LS on RAN1 observation on RSRP statistics for aerial vehicles NTT DOCOMO
Decision: The document is endorsed and final LS is approved in R1-1719209.

R1-1716964 Considerations on interference detection for drones Huawei, HiSilicon
R1-1717873 On interference detection schemes and RSRP statistics for aerial vehicles Ericsson
R1-1718021 Simulation results for UL interference mitigation ZTE,Sanechips
R1-1718159 Interference detection schemes Qualcomm Incorporated
R1-1718298 Interference Detection of Aerial Vehicles Sequans Communications
R1-1718763 Uplink interference detection for aerial vehicles Nokia, Nokia Shanghai Bell
R1-1718905 WF on RSRP statistics for interference detection Nokia, Nokia Shanghai Bell

6.2.7.5 Evaluation Results on Reliability

Present evaluation results of latency for reliability taking into account RAN1 agreements from RAN1#90

R1-1717874 Reliability evaluation of LTE networks with low altitude aerial vehicles Ericsson

R1-1719032 WF on reliability performance of command and control traffic Ericsson, LGE

Agreement: Proposals on Slides 3 and 4 are agreed with the following changes:
- On Slide 3, capture addional note that the requirement on reliability is 99.9% which is achieved with 25 PRBs case for heights of 30m, 50m, 100m, and 300m.

6.2.7.6 Other

R1-1719110 WF on measurement results Ericsson, Qualcomm

Agreement: RAN1 related measurement results can be captured in the TR

Email Discussion on what type of field measurement results and how to capture in TR – Zhilan (Nokia, NSB)

Email Discussion on TP for Agreements from RAN1#90bis – Siva (Ericsson)

R1-1716967 Positioning for drones Huawei, HiSilicon
R1-1717288 Vertical Location for Aerial Vehicles LG Electronics
R1-1718797 Preliminary field measurement results on LTE connected aerials Ericsson
Late submission

6.2.8 UE positioning accuracy enhancements for LTE - *WID in RP-171508*

R1-1719130 Chairman's notes of AI 6.2.8 on UE positioning accuracy enhancements for LTE Ad-Hoc chair (Nokia)

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The document was presented by Timo Lunttila of Nokia.
Decision: The document is endorsed, and content incorporated below.

R1-1718160 Mitigating Movement of a UE during Positioning using IMUs Qualcomm Incorporated

Conclusion: "IMU positioning" has no RAN1 impacts.

R1-1717771 On RAN1 finalization of the WI Ericsson India Private Limited
R1-1716993 Discussion of UE Measurement to Support IMU Positioning Nokia, Nokia Shanghai Bell
R1-1717118 Consideration on additional measurements for IMU positioning Huawei, HiSilicon

6.2.9 Ultra Reliable Low Latency Communication for LTE - *WID in RP-171489*

R1-1719124 Chairman's notes of AI 6.2.9 Ultra Reliable Low Latency Communication for LTE Ad-Hoc chair (Ericsson)
The document was presented by Laetitia Falconetti of Ericsson.
Decision: The document is endorsed, and content incorporated below.

R1-1717191 Work plan for Ultra Reliable Low Latency Communication for LTE Ericsson, Nokia, Nokia Shanghai Bell

6.2.9.1 Targeted reliability and latency requirements

Target requirements in terms of reliability and latency combinations for both wide and local area deployments

R1-1717110 Overview of LTE URLLC Huawei, HiSilicon
R1-1717190 On URLLC for LTE target setting Nokia, Nokia Shanghai Bell
R1-1717289 Discussion on reliability and latency requirements for LTE URLLC LG Electronics
R1-1717451 Use cases and target requirements for URLLC Ericsson
R1-1717574 Discussion on KPIs for LTE URLLC Samsung
R1-1717710 Discussion on HRLLC requirements and possible solutions ZTE, Sanechips
R1-1718161 Targeted reliability and latency requirementsQualcomm Incorporated

Agreement: URLLC for LTE should target the requirement defined by ITU, i.e., 10-5 error probability in transmitting a layer 2 PDU of 32 bytes within 1 ms. Additional less stringent requirements can be considered.

Agreement: In addition to (10-5, 1ms, 32 bytes packet), URLLC for LTE should target the requirement of 10-4 error probability in transmitting a layer 2 PDU of 32 bytes within 10 ms.

Conclusion:
It is expected that UEs can have URLLC traffic only and can have both eMBB and URLLC traffic.

6.2.9.2 Evaluations scenarios

Including evaluations scenarios and metrics used to verify that the defined reliability and latency requirements are met

R1-1717111 Evaluation assumption and preliminary results for LTE URLLC Huawei, HiSilicon
R1-1717290 Consideration on evaluation assumptions for LTE URLLC LG Electronics
R1-1717452 Evaluation scenarios for URLLC Ericsson
R1-1717575 Discussion on evaluation scenarios for LTE URLLC Samsung
R1-1717711 Evaluation scenarios and assumptions for HRLLCZTE, Sanechips
R1-1718162 Evaluations scenarios Qualcomm Incorporated

Agreements: For LTE URLLC evaluation, reliability is used as metric. The reliability definition from NR in 3GPP TR 38.802 is reused.

- Definition: Reliability is defined as the success probability R of transmitting X bits within L seconds, which is the time it takes to deliver a small data packet from the radio protocol layer 2/3 SDU ingress point to the radio protocol layer 2/3 SDU egress point of the radio interface, at a certain channel quality Q (e.g., coverage-edge).
  - Spectral efficiency should be considered.
  - The latency bound L includes transmission latency, processing latency, retransmission latency and queuing/scheduling latency (including scheduling request and grant reception if any).
- Evaluation method:

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- Use Link level simulation based on ITU methodology (i.e. a step-wise approach)
  - The fulfilment of the reliability target is verified in link level simulations at a reference SINR, i.e. Q, resulting from system level simulations.
    - FFS:
      - The simulation assumptions to derive the reference SINR, i.e. Q
      - The reference SINR is calibrated among companies
- Other link level simulation methodologies not focussing on the ITU requirement are not precluded.
  - FFS details
- The error probability should be provided for a range of SNR

NOTE: The ITU evaluation methodology for reliability is defined in section 7.1.5 of "Guidelines for evaluation of radio interface technologies for IMT-2020" from ITU Radiocommunication Study Groups.

Email approval on the system level evaluation assumptions and methodology to compute the reference SINR, Q. The email approval discussion is kicked off at the latest one week before the deadline.
Deadline: 3rd November
Driver: Ericsson (Mårten)

Email discussion on the link level evaluation assumptions taking as basis the NR URLLC assumptions defined in TR38.802. The email discussion should also address the FFS related to other link level methodologies. The email discussion is kicked off at the latest two weeks before the deadline.
Deadline: 15th November
Driver: Huawei (Yubo)

Draft LS to RAN2 informing about the agreements made in this RAN1 meeting related to LTE URLLC. Source: Ericsson [RAN1] (Laetitia)
Friday
R1-1719070 [DRAFT] LS on Ultra Reliable Low Latency Communication for LTE Ericsson
Decision: The document is endorsed and approved in R1-1719210.

6.2.9.3 Other

R1-1717112	Potential enhancements for LTE SR procedure	Huawei, HiSilicon
R1-1717453	Techniques for reliability	Ericsson
R1-1717454	Evaluation of latency in LTE	Ericsson
R1-1717455	Techniques for low latency	Ericsson

7 NR - WID in RP-172115

Refer to RP-172108 for work plan.

RAN1 NR specs: Endorsement of the latest drafts
R1-1718318 TS 38.211 v1.0.2 NR; Physical channels and modulation Ericsson
Decision: The draft TS is endorsed as v1.1.0 in R1-1719105 as baseline for further updates.

R1-1718782 TS 38.213 v1.0.2 NR; Physical layer procedures for control Samsung
Decision: The draft TS is endorsed as v1.1.0 in R1-1719107 as baseline for further updates.

R1-1718808 TS 38.214 v1.0.2 NR; Physical layer procedures for data Nokia
Decision: The draft TS is endorsed as v1.1.0 in R1-1718819 as baseline for further updates.

TS 38.212 (endorsed over email reflector in R1-1716928) is endorsed as v1.1.0 in R1-1719106 as baseline for further updates.

TS 38.215 (endorsed over email reflector in R1-1716931) is endorsed as v1.1.0 in R1-1719108 as baseline for further updates.

No change regarding TS 38.201/TS 38.202.

RAN2 maintained TS 38.300
R1-1718619 Draft RAN1 input to TS 38.300 Nokia, Nokia Shanghai Bell
Friday
R1-1718828 Draft RAN1 input to TS 38.300 Nokia, Nokia Shanghai Bell

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RAN1 NR specs: next steps
Spec editors to update each spec based on this meeting's agreements and working assumptions by 11/1, for further comments and updates by 11/10

RRC parameters list
Email discussion/approval of RRC parameters prepared by 11/1, to be commented and updated by 11/10 – Daniel (Ericsson)

UE feature list
R1-1719200 UE features list for NR NTT DOCOMO
Companies are encouraged to provide comments to Kazuaki offline

eV2X evaluation methodology
Email discussion on eV2X evaluation methodology till next meeting – Hanbyul (LGE)
Email discussion (including whether or not to send)/approval on an LS to send to 5GAA (and others) regarding asking feedback of eV2X evaluation methodology till 10/27 – Hanbyul (LGE)

R1-1718177 Work plan for Rel-15 NR WI NTT DOCOMO, INC.

7.1 Initial access and mobility

R1-1718680 Open issues on RRC parameters for Initial access and mobility Ericsson

7.1.1 Remaining Details on Synchronization signal

Including wideband CC related aspects.

R1-1718864 **Summary of 7.1.1 Remaining Details on Synchronization signal** **Ericsson** (Revision of R1-1718788)
Decision: The document is noted.

Proposal to confirm the working assumption:
- For indication in RMSI:
  - Alt.1: Group-Bitmap(8 bits) + Bitmap in Group (8 bits)
    - A Group is defined as consecutive SS/PBCH blocks
    - Bitmap in Group can indicate which SS/PBCH block is actually transmitted within a Group, where each Group has the same pattern of SS/PBCH block transmission, and Group-Bitmap can indicate which Group is actually transmitted

Agreement:
- The following working assumption is confirmed:
  - For other channels, the UE assumes SS/PBCH block transmission according to the signalling in RMSI
    - FFS: Confirm for each channel
    - The signalling in RMSI is only for the associated SS/PBCH block

Agreements:
- The network can indicate a set of SS blocks to be measured within the SMTC measurement duration (connected mode only)
  - The indication is per frequency layer
  - The UE is not required to measure SS blocks not indicated as transmitted
  - If there is no indication, the default value is that all SS blocks within the SMTC measurement duration
  - The signaling method is applicable to both intra- and inter-frequency measurements
- For connected mode:
  - The signaling is via RRC and a full bitmap with length L
- For idle mode
  - No indication from gNB
  - Note: this means that all SS blocks within the SMTC measurement duration

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Wednesday
R1-1719016 **Summary of 7.1.1 Remaining Details on Synchronization signal** **Ericsson**

R1-1719020 **WF on PBCH design** **Qualcomm Inc.**
R1-1718976 **Way Forward on SSB** **Intel**
R1-1718989 **Summary on Number of SS Entries** **Samsung**
Continue discussion offline aiming to converge on whether or not to have PBCH bandwidth reduction, change of # of PSS sequences, etc. and if so, the details (also taking into account other potential impacts, e.g., DM-RS sequence generation, etc.)

Thursday
R1-1719146 **Summary of 7.1.1 Remaining Details on Synchronization signal** **Ericsson**

Agreements:
- For both sub-6 and above-6, reduce the PBCH to X PRB per symbol and add Y PBCH PRBs to SSS symbol with no other redesign
  - Working assumption:
    - X=20
    - Y=2*(24-X)
  - Same mapping rule(frequency-first, time-second) for data and DMRS is applied
  - Working assumption: The same DMRS density in the PBCH PRB in the SSS symbols is assumed
  - For sub-6: Single SCS assumption with the exception of bands with LTE/NR DL coexistence and 5 MHz minimum bandwidth (band 5 and band 66)
  - For above-6: RAN1 assumes a single SCS per band. If dual SCS is deemed critically necessary by RAN4 for a band, the total number of hypothesis shall not be increased, or insignificantly increased compared to single SCS
  - After initial cell selection, the UE is expected to find a single SCS per frequency layer
  - (Working assumption) The EPRE offset between SSS RE and PBCH DM-RS RE is 0 dB
- Reply LS to RAN4 – Asbjorn (Ericsson) (R1-1719162)

R1-1719162 **[Draft] Reply LS on NR minimum carrier bandwidth and SS block numerology** **Ericsson**
Decision: The document is endorsed and final version approved in R1-1719165.

R1-1717030	Remaining details of Synchronization Signal Design	ZTE, Sanechips
R1-1717048	Remaining Details on NR SS Blocks	Huawei, HiSilicon
R1-1717353	Remaining Details of SS Blocks	Intel Corporation
R1-1717459	Remaining issues for SSB design	vivo
R1-1717576	Remaining details on synchronization signal	Samsung
R1-1717713	On remaining details of synchronization signal	Fujitsu
R1-1717740	Cell searching with multiple SS blocks in wideband CC	Spreadtrum Communications
R1-1717786	Multiple SS block transmissions in a wideband carrier	ASUSTEK COMPUTER (SHANGHAI)
R1-1717797	Actually transmitted SS block and SS blocks in wideband	CATT
R1-1717925	Remaining Details on SS/PBCH block transmission	LG Electronics
R1-1718058	Remaining details on SS block transmissions	Guangdong OPPO Mobile Telecom
R1-1718179	Discussion on remaining details on NR-SS	NTT DOCOMO, INC.
R1-1718328	Discussion on RAN1 Changes Required to Support Multiple SS Block Numerologies	MediaTek Inc.
R1-1718378	NR minimum carrier bandwidth and SS block numerology	AT&T
R1-1718458	Optimization on the SSB Bitmap in Group indication in RMSI	Xiaomi Technology
R1-1718463	On remaining details of SS/PBCH block	ITL
R1-1718472	On Remaining Issues of Synchronization Signal	InterDigital, Inc.
R1-1718526	Remaining details on synchronization signal design	Qualcomm Incorporated
R1-1718611	Remaining details related to SS blocks	Nokia, Nokia Shanghai Bell
R1-1718663	Remaining details on SS Blocks	Sony
R1-1718710	Remaining Details on Synchronization signal	Ericsson
R1-1718818	WF on the Numerology of SS Block	Samsung
R1-1718951	Summary on Supporting Multiple SCSs for SS Block	Samsung
R1-1719041	WF on Supporting Multiple SCSs for SS Block	Samsung

7.1.2 Remaining Details on Broadcast signal/channel

7.1.2.1 Remaining details on NR-PBCH

R1-1718789 **Summary of 7.1.2.1 Remaining details on NR-PBCH** **Ericsson**

Agreements:

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- (working assumption) NR-PBCH has a payload size of 56 bits (including CRC)
- 10-bit SFN is carried by NR-PBCH
- (working assumption) 4-bit PRB grid offset is carried by NR-PBCH

Agreements:
- A single bit is used in NR-PBCH for indicating the numerology for RMSI, Msg.2/4 for initial access and broadcasted OSI
  - For sub-6GHz
    - 0: 15kHz
    - 1: 30kHz
  - For >6GHz
    - 0: 60kHz
    - 1: 120kHz

Proposals:
- **Aim to conclude how to indicate half-frame indication this week**
  - One-bit half frame indication is part of PBCH payload
    - For 3GHz and below, half frame indication is further implicitly signaled as part of PBCH DMRS for max L=4
- Also to concluded DM-RS initialization for PBCH

Wednesday
- Alt.1: One-bit half frame indication is part of PBCH payload
  - For 3GHz and below, half frame indication is further implicitly signaled as part of PBCH DMRS for max L=4
    - Supported by LGE, Huawei, HiSilicon, NTT DOCOMO, ZTE, Sanechips, ITL, Ericsson, InterDigital
    - Object Qualcomm, Samsung, Intel, MotoM, Lenovo, CATT
- Alt.2: One-bit half frame indication is part of PBCH payload
    - Supported by Qualcomm, Samsung, MotoM, Lenovo, CATT, Ericsson, MediaTek, vivo, Xiaomi, OPPO, Nokia, Nokia Shanghai Bell
    - Object LGE, NTT DOCOMO, ZTE, Sanechips, ITL, Intel
- Alt.3: One-bit half frame indication is part of PBCH payload, and when CSI-RS for measurement has a periodicity of 20ms or larger, the UE assumes the network is "synchronous" for the purpose of measurement
  - For 3GHz and below, half frame indication is further implicitly signaled as part of PBCH DMRS for max L=4
    - Supported by Intel, LGE, ZTE, Sanechips, ITL
    - Object Qualcomm, Samsung

Agreements:
- One-bit half frame indication is part of PBCH payload, and when CSI-RS for measurement has a periodicity of 20ms or larger, the UE assumes the network is "synchronous" for the purpose of measurement
  - For 3GHz and below, half frame indication is further implicitly signaled as part of PBCH DMRS for max L=4

Agreement:
- (working assumption) For PBCH 1st scrambling initialization, clarify that C_init = N^cell_ID

Proposal: For PBCH 2nd scrambling initialization, discuss further offline also considering potential impact CORESET for RMSI operation

Wednesday
PBCH 2nd scrambling initialization
- Alt.1: initialization based on cell ID only and is identical in SS/PBCH blocks
  - Supported by Huawei, HiSilicon, vivo, Qualcomm, Nokia, Nokia Shanghai Bell
  - Object MediaTek, LGE
- Alt. 2: initialization based on both cell ID and 3 LSB of SS/PBCH block index
  - Supported by ZTE, Sanechips, Samsung, Sequans, NTT DOCOMO, MediaTek, ITL, InterDigital, Ericsson
  - Object Huawei, HiSilicon

Agreement
- For PBCH 2nd scrambling initialization:
  - initialization based on both cell ID and 3 LSB of SS/PBCH block index

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Proposal: Continue offline discussion on DM-RS initialization for PBCH

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Thursday

R1-1719161 **Summary of 7.1.2.1 Remaining details on NR-PBCH** **Ericsson**

Agreements:

- The initialization for PBCH DMRS is:

$$c_{init} = 2^{11} \cdot (\acute{I}_{SSB} + 1) \cdot (\lfloor N_{ID}/4 \rfloor + 1) + 2^{6} \cdot (\acute{I}_{SSB} + 1) + \mathrm{mod}(N_{ID}, 4)$$

  - For max L=4, $\acute{I}_{SSB} = I_{SSB} + 4HF$ where *HF*=0 in the first half frame of a radio frame and *HF*=1 in the second half frame of a radio frame
  - For max L=8, and max L=64 $\acute{I}_{SSB} = I_{SSB}$

Agreements:

- The 2nd PBCH scrambling is a Gold sequence initialized by cell ID.
  - C_init = [NCell_ID]
  - The X LSB bits of SS block index are used to determine a sequential non-overlapping portion of the sequence.
  - Generate a Gold sequence of length (2^X)*M where M is the number of bits to be scrambled
  - Partition the generated sequence into 2^X non-overlapping portions
  - X LSB bits of SS block index uniquely identify indices of each of the non-overlapping portion of the sequence
    - X = 2 for max L=4, i.e., 1st and 2nd LSB bits of SS block index.
    - X = 3 for max L=8 or 64, i.e., 1st, 2nd and 3rd LSB bits of SS block index

(b2)	(b1)	(b0)	Seq index used for each PBCH
0	0	0	0 ~ M-1
0	0	1	M ~ 2M-1
0	1	0	2M ~ 3M-1
0	1	1	3M ~ 4M-1
1	0	0	4M ~ 5M-1
1	0	1	5M ~ 6M-1
1	1	0	6M ~ 7M-1
1	1	1	7M ~ 8M-1

R1-1717031 Remaining details of NR-PBCH Design ZTE, Sanechips
R1-1717049 Remaining issues in PBCH Huawei, HiSilicon
R1-1717218 On half-frame indication NEC
R1-1717354 Remaining Details of NR PBCH Intel Corporation
R1-1717460 Remaining aspects on NR-PBCH contents and payload vivo
R1-1717714 On half-radio frame indication Fujitsu
R1-1717728 Scrambling sequence design for PBCH Sequans Communications
R1-1717798 Remaining details on NR-PBCH CATT
R1-1717926 Remaining Details on PBCH design and contents LG Electronics
R1-1718180 Discussion on remaining details on NR-PBCH and PBCH-DMRS NTT DOCOMO, INC.
R1-1718329 Remaining details on PBCH MediaTek Inc.
R1-1718464 On remaining details of NR-PBCH design ITL
R1-1718473 On Remaining Issues for NR-PBCH InterDigital, Inc.
R1-1718527 Remaining details on NR-PBCH Qualcomm Incorporated
R1-1718612 Remaining details on NR-PBCH Nokia, Nokia Shanghai Bell
R1-1718711 Remaining details on NR-PBCH Ericsson
R1-1718817 Remaining details on NR-PBCH Samsung
R1-1718875 WF on time index indication for half radio frame LG Electronics, InterDigital, ITL, KT, NTT DOCOMO, ZTE, Sanechips
R1-1719058 WF on 2nd PBCH data scrambling MediaTek

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7.1.2.2 Remaining details on Remaining minimum system information

R1-1718772 **Offline summary for Al 7.1.2.2 Remaining details on Remaining minimum system information** **CATT**

Agreements:
- UE minimum bandwidth in the context of confinement of RMSI and CORESET containing PDCCH scheduling RMSI is defined as the largest bandwidth that all UEs must support regardless of UE capability, which is at least no less than the SS/PBCH bandwidth.
- Bandwidth for RMSI and and CORESET containing PDCCH scheduling RMSI supports at least the same bandwidth as SS/PBCH (e.g.,[24 PRBs]).
- Note: The UE minimum bandwidth will be finally determined by RAN4.
- LS to RAN4 – Ren Da (CATT) (R1-1718915)

Wednesday:
R1-1718915 **[draft] LS on UE minimum bandwidth CATT**
Decision: The document is endorsed and final LS is approved in R1-1719039, with the following update:
- By updating the action to "RAN1 respectfully asks RAN4 whether RAN4 sees any issues with the above agreements, and if so, to provide guidance accordingly".

Agreements:
- The initial active DL BWP is defined as frequency location and bandwidth of RMSI CORESET and numerology of RMSI.
  - PDSCH delievering RMSI are confined within the initial active DL BWP

Proposals:
- NR supports FDM transmission between SS/PBCH block and RMSI (CORESET/NR-PDSCH)
  - There is no latency requirement for UE to acquire RMSI if the combined bandwidth for SS/PBCH block and RMSI (CORESET/NR-PDSCH) exceeds the UE capability
- Discuss further considering the impact of indicating RMSI location, applicability of sync acquired from SS/PBCH to RMSI, etc.

Proposals:
- RAN1 makes the down-selection of one of the following alternatives:
  - Alt. 1: UE always assumes the DMRS of NR-PDCCH and NR-PDSCH for RMSI is QCLed with the corresponding SS/PBCH block
  - Alt. 2: UE assumes the DMRS of NR-PDCCH and NR-PDSCH for RMSI is QCLed with the corresponding SS/PBCH block unless indicated otherwise by the network. The indication (1 bit) is included in PBCH of the SS/PBCH block.

Wednesday:
R1-1719033 **Offline summary for Al 7.1.2.2 Remaining details on Remaining minimum system information** **CATT**

Proposals:
- NR supports FDM transmission between SS/PBCH block and RMSI (CORESET/NR-PDSCH), where the sync information acquired from SS/PBCH can be applied to RMSI
  - There is no latency requirement for UE to acquire RMSI if the combined bandwidth for SS/PBCH block and RMSI (CORESET/NR-PDSCH) exceeds the UE capability
- UE assumes the DMRS of NR-PDCCH transmitted in the CORESET for RMSI and the DMRS of NR-PDSCH for RMSI/broadcast OSI is QCLed with the corresponding (cell-defining) SS/PBCH block.
- FFS: the impact of indicating RMSI location, etc.

Thursday
R1-1719145 **Offline summary for Al 7.1.2.2 Remaining details on Remaining minimum system information** **CATT**

Agreements:
- UE assumes the DMRS of NR-PDCCH transmitted in the CORESET for RMSI and the DMRS of NR-PDSCH for RMSI/broadcast OSI is QCLed with the corresponding SS/PBCH block

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- FFS: On the details on the associations between SS blocks and monitoring windows (if introduced) for RMSI CORESETs/broadcast OSI .

Proposals:

- Within an RMSI TTI duration, there are x periodic monitoring window(s) associated with an SS/PBCH block. Each window has duration of y consecutive slot(s).
  - The values of x, y, and the monitoring window periodicity
    - {x, y} = [{1, 1}, {4, 1}, {8, 1}, {1, 2}]
      - FFS other values
  - FFS: whether it is allowed to configure the overlapping monitoring windows associated with different SS/PBCH blocks

Agreements:

- NR supports FDM transmission of QCLed SS/PBCH block and RMSI (CORESET/NR-PDSCH), when
  - there is no latency requirement for UE to acquire RMSI if the combined bandwidth for SS/PBCH block and RMSI (CORESET/NR-PDSCH) exceeds the UE capability, and
  - the number of RMSI CORESETs to monitor within a slot is 1, and
  - the number of slots of a CORESET corresponding to an SS/PBCH block is 1 within a monitoring window for RMSI CORESET (NR-PDCCH)
    - FFS: whether the number of slots of a CORESET corresponding to an SS/PBCH block can be larger than 1

Friday

R1-1719198 Offline summary for Al 7.1.2.2 Remaining details on Remaining Minimum System Information
CATT

Agreements:

- There is an RMSI PDCCH monitoring window associated with an SS/PBCH block, which recurs periodically.
  - Each window has duration of x consecutive slot(s).
    - FFS: x is e.g., 1/2/4
    - FFS: whether x is frequency band dependent
    - FFS: whether x is configured in PBCH.
  - The period, y, of the monitoring window can be the same as or different from the period of the SS/PBCH block burst set.
    - FFS: y is e.g., 10/20/40/80/160 ms
    - FFS: whether y is frequency band dependent
    - FFS: whether y is configured in PBCH
    - FFS: whether y is dependent on RMSI TTI
  - FFS: whether there is a dependency between the period of the monitoring window and the period of the SS/PBCH block burst set.
  - FFS: whether it is allowed to configure the overlapping monitoring windows associated with different SS/PBCH blocks
  - FFS: Monitoring window time offset
- From RAN1's perspective, the considered values of the RMSI TTI for down-selection are 80ms and 160ms.

Proposals:

- The maximum number of bits for CORESET and RMSI timing configuration in PBCH is 8 bits excluding the subcarrier spacing.
- (Working assumption) PBCH contents, except the SSB index, should be the same for all SS/PBCH blocks within an SSB burset set for the same center frequency
- CORESET and RMSI configuration should consider the following properties:
  - bandwidth (PRBs)
  - frequency position (frequency offset relative to SS/PBCH block)
  - A set of OFDM symbol indices in a slot corresponding to a CORESET
  - CORESET transmission periodicity
    - Note that this CORESET may also carry control scheduling other channels
  - RMSI timing configuration (including CORESET monitoring window periodicity)
- Email discussion/approval till 10/27 – Da Ren (CATT)

R1-1717032 Remaining details of RMSI ZTE, Sanechips

Petitioners' Exhibit 1007, p. 671
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R1-1717050 RMSI Delivery Huawei, HiSilicon
R1-1717355 RMSI Contents and Delivery Mechanism Intel Corporation
R1-1717461 Discussion on Remaining Minimum System Information vivo
R1-1717578 Remaining details on remaining minimum system information delivery Samsung
R1-1717799 Remaining details on RMSI CATT
R1-1717862 Discussion on RMSI delivery Lenovo, Motorola Mobility
R1-1717876 Discussion on common CORESET design CMCC
R1-1717927 RMSI delivery and CORESET configuration LG Electronics
R1-1718067 Discussion on the RMSI delivery Guangdong OPPO Mobile Telecom
R1-1718181 Discussion on remaining details on RMSI delivery NTT DOCOMO, INC.
R1-1718330 Further discussion on RMSI transmission MediaTek Inc.
R1-1718379 Remaining details of RMSI delivery AT&T
R1-1718474 On Remaining Issues of Remaining Minimum System Information Delivery InterDigital, Inc.
R1-1718528 Remaining system information delivery consideration Qualcomm Incorporated
R1-1718613 On Remaining System Information Delivery Nokia, Nokia Shanghai Bell
R1-1718664 Remaining details on remaining minimum system information Sony
R1-1718712 Remaining details on Remaining minimum system information Ericsson
R1-1718777 Discussion on the RMSI delivery Guangdong OPPO Mobile Telecom

7.1.2.3 Other system information delivery

R1-1718792 Summary on A.I. 7.1.2.3: Remaining details on other system information delivery Samsung

Agreements:
- The following parameters for broadcast OSI CORESET are explicitly signaled in the corresponding RMSI.
  - SI window configuration, e.g., time offset, duration, and periodicity
- The following parameters for broadcast OSI CORESET are the same as those for the corresponding RMSI CORESET.
  - frequency location, bandwidth, and numerology
  - FFS: whether above parameters are identical for RMSI CORESETs configured by PBCH in all SS/PBCH blocks which defines a cell from UE perspective.
- FFS: other parameters

Agreement:
- For connected mode UEs, non-broadcast on-demand (i.e. dedicated) OSI transmission is up to gNB scheduling, i.e., no specific handling for non-broadcast on-demand (i.e. dedicated) OSI CORESET

R1-1717033 OSI Delivery ZTE, Sanechips
R1-1717579 Remaining details on other system information delivery Samsung
R1-1717800 OSI delivery CATT
R1-1717863 Disucussion on OSI delivery Lenovo, Motorola Mobility
R1-1717928 Other system information delivery LG Electronics
R1-1718068 Discussion on the on demand SI Guangdong OPPO Mobile Telecom
R1-1718331 Further discussion on OSI delivery MediaTek Inc.
R1-1718380 Remaining details of OSI delivery AT&T
R1-1718475 On Other System Information Delivery InterDigital, Inc.
R1-1718529 Other system information delivery consideration Qualcomm Incorporated
R1-1718614 On Other System Information Delivery Nokia, Nokia Shanghai Bell
R1-1718713 Other system information delivery Ericsson
R1-1718778 Discussion on the on demand SI Guangdong OPPO Mobile Telecom

7.1.3 Paging design

R1-1718771 Summary on Paging Huawei, HiSilicon

Agreements:
- At least Option 1 (*Paging scheduling DCI followed by Paging Message*) is supported
  - From RAN1 perspective, paging scheduling DCI and Paging Message are sent at least~~always sent~~ in the same slot
  - From RAN1 perspective, NR supports LTE-like UE grouping where UE is specifically configured of its PO/slot. This is considered part of Option 1.
    - Details of UE grouping are up to RAN2
- LS to RAN2 to inform the above agreements – Teck (Huawei)

Petitioners' Exhibit 1007, p. 672
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R1-1718926 **[Draft] LS on NR Paging Mechanisms Huawei**
Discussion: Above agreement is ammended as shown.
Decision: The document is endorsed and final LS is approved in R1-1719164 with the following update:
- Update the note to "Note that in RAN1#86bis, the following agreements were made:
  - NR supports at least same-slot and cross-slot scheduling for DL."

Agreement: Paging Message numerology is the same as RMSI.

Proposals:
- At least some parameters for Paging scheduling CORESET are explicitly signaled
  - RAN1 understands this includes at least periodicity for the UE to monitor the paging scheduling CORESET
  - Up to RAN2 to decide whether such information is in RMSI or OSI
- The following parameters for Paging scheduling CORESET are the same as those for the corresponding RMSI CORESET.
  - frequency location, bandwidth, and numerology
  - FFS: whether above parameters are identical for RMSI CORESETs configured by PBCH in all SS/PBCH blocks which defines a cell from UE perspective.
- FFS: other parameters

Thursday

Agreements:
- At least some parameters for Paging Occasions are explicitly signaled.
  - RAN1 understands this includes at least periodicity for the UE to monitor the paging scheduling DCI.
- Up to RAN2 to decide whether the above such information is in RMSI or OSI
- FFS: whether to support FDM of Paging Occasions and it's configuration

R1-1709037 **Offline summary for Al 7.1.3 on Paging for NR Huawei, HiSilicon**

Agreements:
- UE may assume QCL between SS Blocks, Paging DCIs and Paging Messages
  - FFS: The details on the associations between SS blocks and possible subsets of Paging DCI/Messages.

Agreements:
- NR supports both slot and non slot based PDSCH transmissions for Paging delivery
  - For the non-slot based transmission, 2, 4 and 7 OFDM-symbol duration for the Paging PDSCH is supported
- FFS: Support of non-slot for PDCCH for Paging delivery

R1-1717034 Paging design ZTE, Sanechips
R1-1717052 Finalization of NR Paging Huawei, HiSilicon
R1-1717219 Discussion on NR paging NEC
R1-1717356 NR Paging Design Intel Corporation
R1-1717462 Remaining details on NR paging design vivo
R1-1717580 Paging design Samsung
R1-1717726 Reduced overhead paging design Sequans Communications
R1-1717750 Paging consideration Spreadtrum Communications
R1-1717772 Discussion on paging design for NR Panasonic
R1-1717801 NR Paging Channel CATT
R1-1717877 Discussion on NR paging design CMCC
R1-1717929 Paging design in NR LG Electronics
R1-1718059 On NR paging design and transmission Guangdong OPPO Mobile Telecom
R1-1718182 Discussion on NR paging design NTT DOCOMO, INC.
R1-1718332 Further discussion on paging design MediaTek Inc.
R1-1718358 NR paging based on paging indication InterDigital, Inc.
R1-1718530 Paging design consideration Qualcomm Incorporated
R1-1718615 Paging in NR Nokia, Nokia Shanghai Bell
R1-1718695 NR paging design Motorola Mobility, Lenovo
R1-1718714 Paging design Ericsson
R1-1718758 Design Considerations for Paging in NR Convida Wireless LLC

Petitioners' Exhibit 1007, p. 673
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7.1.4 Physical random access channel and random access procedure

R1-1718261 Wrong naming of coupling loss IAESI, Thales, Fairspectrum, VTT

7.1.4.1 Remaining details on PRACH formats

R1-1718770 Summary of AI 7.1.4.1, Remaining details on PRACH formats ZTE, Sanechips

Agreements:
- Confirm working assumption of cyclic shift values for preamble format 3
- Confirm working assumption, L = 139 is adopted as the sequence length for the RACH Preamble Formats using the short sequence

Agreement: For FDD, RACH resources can be mapped onto UL slots irrespective of the time locations of SS/PBCH block

Wednesday
R1-1718932 Summary of AI 7.1.4.1, Remaining details on PRACH formats ZTE, Sanechips

Agreements:
- NR-RACH configurations can be specified using a table similar to LTE, this table is index by the *PRACH Config Index*
- Frequency multiplexed PRACH transmission occasions use the same *PRACH Config Index*
- NR strives to minimize the number of bits needed for the RACH configuration
  - Use 8-bits as the starting point
  - FFS: If SCS and formats are part of the table

Agreements:
- The slot duration for PRACH resource mapping for short preamble formats (i.e., L=139) is based on the RACH Msg1 numerology, i.e. SCS.
- The slot duration for PRACH resource mapping for long preamble formats (i.e., L=839) is based on 15kHz SCS

Agreements:
- The pattern given by the *PRACH Config Index* repeats every RACH Configuration Period
  - The density and duration within each configuration period are FFS
    - Including the possibility of in every slot
- RACH Configuration Period:
  - (working assumption) 10/20/40ms
  - FFS 80ms/160ms
  - FFS if the same values will be used for above and below 6GHz
- FFS the details in terms of how the pattern and configuration period are specified (e.g., via a table, via a formula, etc.)

Proposals:
- For TDD, NR supports the actual transmitted SS blocks (based on RMSI) for RACH resource configurations,
  - Use available symbols in a slot that contains SS blocks based on PRACH formats
  - Only the second half of a slot that contains SS blocks can be configured for RACH
  - FFS: Consider switching between DL/UL
  - FFS: If additional symbols in a slot that contain an SS blocks are not used for uplink transmissions.

Proposals:
- Down-select among the following three alternatives within this week:
  - Alt1: Support consecutive mapping of RACH resources within a slot
  - Alt2: Support non-consecutive mapping of RACH resources within a slot
  - Alt3: Support both consecutive and non-consecutive mapping of RACH resources within a slot

Thursday
R1-1719114 Summary of AI 7.1.4.1, Remaining details on PRACH formats ZTE, Sanechips

Agreements:
- One PRACH format is configured for a cell
  - FFS the impact BWP/SUL

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- For PRACH formats based on short sequence length
  - Format A and format B is considered as a package for the PRACH configuration, configures either format A/B or format C
  - If format A/B is configured, the last PRACH resource within a RACH slot uses the format B and other PRACH resources within the RACH slot uses format A
  - At least support only format B4 within a RACH slot, in the case of a single PRACH occasion within a RACH slot
  - FFS Support a PRACH format taken from A0/A1/A2/A3 within a RACH slot

Agreements:

- NR at least supports RACH configuration that have the same starting symbol in all RACH slots
  - Values of starting symbol: 0, 2
    - FFS other values

Agreements:

- For TDD, RACH configurations maps RACH resources onto slots irrespective of the time locations of actually transmitted SS/PBCH block
  - In the case that an actually transmitted SS/PBCH block overlap with a RACH resource within a RACH configuration period, define rules for which RACH resources that are still valid
  - FFS: the rules (no RRC signalling involved in defining the rules)
    - Also consider the DL/UL switching points
    - Also consider potential impact due to semi-static DL/UL configuration and/or dynamic SFI
  - Note: RAN1 strives to minimize the impact of the time location of the SS/PBCH block to the RACH configuration table design

Friday

R1-1719175 Summary of AI 7.1.4.1, Remaining details on PRACH formats ZTE, Sanechips

Agreements:

- RACH PRB allocation is the PRBs allocated to RACH within a RACH slot
- NR supports the following numbers of subcarriers as guard band:
  - Note: Generation of any additional guard band is up to gNB implementation

PRACH sequence length (L)	PRACH SCS (kHz)	UL SCS (kHz)	RACH PRB allocation size	Number of subcarriers as guard band
839	1.25	15	6	25
839	1.25	30	3	25
839	1.25	60	2	313
839	5	{15,30,60}	24,12,6	25
139	15	{15,30}	12, 6	5
139	15	60	3	5
139	30	{15,30,60}	24,12,6	5
139	60	{60,120}	12,6	5
139	120	{60, 120}	24,12	5

Email discussion/approval on UL initial BWP – Byoung-Hoon (LGE)

R1-1717035 PRACH formats and Resource Configuration ZTE, Sanechips
R1-1717053 Capacity shortfall solution for agreed NR PRACH formats Huawei, HiSilicon
R1-1717357 Remaining details of PRACH formats Intel Corporation
R1-1717581 Remaining details on PRACH formats Samsung
R1-1717802 Further details on NR RACH format CATT
R1-1717878 Discussion on RACH configuration CMCC
R1-1717930 Discussion on PRACH preamble format details LG Electronics
R1-1718183 Discussion on remaining details on PRACH formats NTT DOCOMO, INC.
R1-1718302 Remaining details on PRACH formats Nokia, Nokia Shanghai Bell
R1-1718476 On PRACH Formats for Capacity Enhancement and Beam Management InterDigital, Inc.
R1-1718531 Remaining details on PRACH formats Qualcomm Incorporated
R1-1718715 Remaining details on PRACH formats Ericsson

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7.1.4.2 Remaining details on RACH procedure

R1-1718923 **Summary of Remaining Details on RACH Procedure** **Qualcomm Inc.**
R1-1718937 **Summary of Remaining Details on RACH Procedure** **Qualcomm Inc.**

Proposals:
- At least support one-to-one and many-to-one mapping between SS blocks and RACH transmission occasion
  - SS Block to RACH preamble index mapping in scenarios where many-to-one mapping between SS blocks and RACH transmission occasion is NOT supported
- FFS: One-to-many mapping between SS block and RACH transmission occasions

Proposal:
- RACH burst set period is a time duration containing time instances for RACH transmission occasions after which the pattern of RACH transmission occasion associated to one SS block gets repeated.

Proposal:
- NR supports non-slot and slot based PDSCH/PUSCH transmission but only slot based PDCCH transmission during RACH procedure in Rel-15

Wednesday
R1-1719025 **Summary of Remaining Details on RACH Procedure** **Qualcomm Inc.**

Agreements:
- Let X be the number of PRACH transmission occasions in the RACH configuration period which are associated (by the SSB to RACH resource association rule) with the actually transmitted SS blocks in the SS burst set period.
  - X can be greater than, equal to or smaller than the number of actually transmitted SS blocks in the SS burst set

Agreements:
- For contention-based random procedure, after the UE selects one PRACH transmission occasion for Msg1 transmission, the UE is not allowed to select another one before the expiration of RAR window for the same Msg 1 transmission in Rel-15

Agreements:
- NR supports both slot based PDCCH, PDSCH and PUSCH, and non-slot based PDSCH/PUSCH transmissions for Msg2/Msg3/Msg4 transmission
  - For the non-slot based transmission, 2, 4 and 7 OFDM-symbol durations for the PDSCH/PUSCH is supported
  - FFS the handling of PDCCH for non-slot based transmissions
  - FFS Time gap during RACH procedure applied to non-slot based transmissions
  - Note: Whether to support simultaneous uplink transmission of slot and non-slot based transmission from UE's perspective will be finalized in the control channel session

Agreements:
- Bit field length of RAPID is fixed in the spec.
- (working assumption) Bit field length of RAPID is 6 bits.
  - RAN1 is discussing if 8 bits should be considered for bit field length of RAPID
  - FFS the impact of SUL
  - FFS: How RACH occasion is conveyed to UE
- LS to send to RAN2 – Nazmul (R1-1719036)

Friday
R1-1719036 **[draft] LS on response to RACH agreements** **CATT**
Decision: The document is endorsed and approved in R1-1719214.
MCC to correct sourcing to RAN1.

Agreement: Maximum size of TA command for RAR is 12 (as a working assumption) bits.

Disucss further offline how to rely the LS regarding TA granularity – Nazmul (QC)

Thursday
R1-1719160 **Summary of Remaining Details on RACH Procedure** **Qualcomm Inc.**

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Agreements:
- Assuming N preamble indices are available in one RACH transmission occasion:
  - If only one SSB is mapped to only one RACH transmission occasion, each RACH transmission occasion has preamble index 0 to N-1
  - FFS other cases

Agreements:
- If many SSBs are mapped to one RACH transmission occasion, NR supports at least a mapping from different SSBs to non-overlapping subsets of RACH preamble indices within one RACH transmission occasion.
  - FFS: Mapping to overlapping subsets

Agreements:
- UE may assume that the DMRS of PDCCH and the DMRS of PDSCH conveying Msg2 are QCL'ed with the SS block that the UE selected for RACH association and transmission
- UE may assume that the DMRS of PDCCH conveying Msg3 retransmission grant is QCLed with the SS block that the UE selected for RACH association and transmission

Agreements:
- If there is no beam reporting in RACH message 3, UE may assume that the DMRS of PDCCH and the DMRS of PDSCH conveying Msg4 are QCL'ed with the SS block that the UE selected for RACH association and transmission
  - FFS: Whether to support beam reporting in Msg3
  - FFS: If and how beam reporting in RACH message 3 impacts message 4 Tx QCL assumption

Agreement: NR supports asynchronous adaptive HARQ retransmissions for RACH message 3.

Agreements:
- HARQ process ID for Msg3 PUSCH retransmission is fixed in the spec.
  - HARQ process ID for Msg3 PUSCH retransmission is fixed as 0 index.

Proposal: For the timing advance in RAR, its granularity of depends on tone spacing of Msg3.

Agreement: SCS of Msg1 of PDCCH triggered CFRA is same as the SCS of Msg1 of contention based random access

Proposals:
- Subcarrier spacing of Msg2 of PDCCH triggered CFRA is the same as the SCS of the PDCCH order.
- Samsung proposal: SCS of Msg2 of PDCCH ordered CFRA follows the SCS of the UE's active bandwidth part.

Friday
R1-1719197 Summary of Remaining Details on RACH Procedure Qualcomm Inc.

Agreements:
- NR supports gNB configuring the number of preambles for actually transmitted SS blocks.
  - FFS: Same value for all SS blocks or different value for different SS blocks
  - FFS: The range of the number of preambles – email discussion/approval till 11/27 – Nazmul (Qualcomm)

Agreements:
- For ZC type RACH preamble sequence, if only one SSB is mapped to only one RACH transmission occasion,
  - RACH preamble indices are in order of:
    - Increasing cyclic shifts of a root index and then
    - Increasing logical root index

Proposals:
- NR down-selects from following options:
  - Alt 1: Preamble indices for CBRA and CFRA for one SSB are mapped consecutively in one RACH transmission occasion.
  - Alt 2: Preamble indices for CBRA and CFRA for one SSB are not mapped consecutively in one RACH transmission occasion
- Email discussion/approval (at least target potential RRC impact related approval) till 10/27 – Nazmul (Qualcomm)

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Agreements:

- NR supports RACH configuration in RMSI containing 1 bit to convey SCS of Msg3
  - In sub-6 GHz, subcarrier spacing of Msg3 can be either 15 or 30 kHz
  - In over-6 GHz, subcarrier spacing of Msg3 can be either 60 or 120 kHz

Working assumption:

- For the timing advance in RAR, its granularity depends on:
  - Subcarrier spacing of the first uplink transmission after RAR
    - Supported by: Ericsson, CATT, Mediatek, ZTE, Sanechips, Huawei, Hisilicon, Qualcomm, LGE, NTT DOCOMO

Table 3. Granularity of [12] bits TA command

Subcarrier Spacing (kHz) of the first uplink transmission after RAR	*Unit*
15	*16*64 Ts*
30	*8*64 Ts*
60	*4*64 Ts*
120	*2*64 Ts*

Note: $T_s = 1/(64 * 30.72 * 10^6)$ *seconds.*

R1-1719215 [Draft] LS reply to RAN4 on UE timing advance adjustment step size Huawei
Decision: For email approval till 10/20.

R1-1717036 Remaining details of RACH procedure ZTE, Sanechips
R1-1717051 Remaining Issues in RACH Procedure Huawei, HiSilicon
R1-1717358 NR RACH procedures Intel Corporation
R1-1717582 Remaining details on PRACH procedure Samsung
R1-1717715 Discussion on RA procedure Fujitsu
R1-1717803 Further details on NR 4-step RA Procedure CATT
R1-1717931 RACH Procedure LG Electronics
R1-1718004 Remaining details on RACH procedure ETRI
R1-1718052 Discussion on NR 4-Step Random Access Procedure Guangdong OPPO Mobile Telecom
R1-1718184 Discussion on remaining details on RACH procedure NTT DOCOMO, INC.
R1-1718303 Remaining details on PRACH procedure Nokia, Nokia Shanghai Bell
R1-1718764 Numerology for Msg2 and Msg4 for RRC_CONNECTED UEs PANASONIC (Revision of R1-1718314)
R1-1718340 Remaining details on RACH procedure MediaTek Inc.
R1-1718359 RACH configuration of Multiple Msg1 transmissions before the end of a monitored RAR window InterDigital, Inc.
R1-1718381 Remaining details of RACH Procedure and RACH Configuration AT&T
R1-1718532 PRACH procedure considerations Qualcomm Incorporated
R1-1718665 Considerations on RACH Procedure Sony
R1-1718696 Remaining details on random access procedure Motorola Mobility, Lenovo
R1-1718716 Remaining details on RACH procedure Ericsson

7.1.5 Mobility procedure

7.1.5.1 Remaining details on measurement for mobility management

Including both SS block and CSI-RS related aspects

R1-1718877 Monday Offline Summary and Remaining Issues for 7.1.5.1 Samsung

Agreement: Keep the terminologies as in TS38.215 for the following measurement quantities:

- SS-RSRP
- SS-RSRQ

Agreements:

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- CSI reference signal received quality (CSI-RSRQ) is defined as the ratio (N×CSI-RSRP)/ CSI-RSSI, where N is the number of resource blocks in the CSI-RSSI measurement bandwidth. The measurements in the numerator and denominator are made over the same set of resource blocks.
    - FFS: Additional support of the following. The measurements in the numerator and denominator can be made over potentially different sets of resource blocks. In other words, the CSI-RSSI measurement BW can be differently configured from the CSI-RS measurement BW.

Agreements:
- Secondary synchronization signal reference signal received quality (SS-RSRQ) is defined as the ratio N×(SS block RSRP)/(NR carrier RSSI), where N is the number of RB's of the NR carrier RSSI measurement bandwidth. The measurements in the numerator and denominator are made over the same set of resource blocks.
    - FFS The measurements in the numerator and denominator can be made over potentially different sets of resource blocks. In other words, the SS-RSSI measurement BW can be differently configured from the SS measurement BW.

Agreements:
- SS received signal strength indicator (SS-RSSI), comprises the linear average of the total received power (in [W]) observed in OFDM symbols of measurement time resource(s), in the measurement bandwidth, over N number of resource blocks from all sources, including co-channel serving and non-serving cells, adjacent channel interference, thermal noise etc.
    - Measurement time resource(s) are confined within SMTC window duration(s).

Agreement: The SMTC configuration provided for IDLE mode per frequency carrier corresponds to one of the two SMTC configurations for the CONNECTED mode for the same carrier frequency.

Agreements:
- At least single-port CSI-RS resources, following the same design already agreed for BM, can be configured to be used for L3 mobility
- CSI-RS for L3 mobility is separately configured from that for BM

Agreement: No concensus to support additional periodicity values for CSI-RS for L3 mobility

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Wednesday
R1-1719017 **Monday Offline Summary and Remaining Issues for 7.1.5.1** **Samsung**

Agreements:
- Default RSSI time-domain measurement resource is supported, where a pre-determined (i.e., fixed in the spec) set of OFDM symbols are used taking into account OFDM symbols associated with detected SSBs
    - FFS details
- A set of slots for RSSI time-domain measurement resource can be explicitly configured per frequency carrier by OSI for IDLE, by RRC for CONNECTED. A set of OFDM symbols in the configured slot are used taking into account OFDM symbols associated with detected SSBs.
    - This is supported at least for intra-frequency measurement for both IDLE and CONNECTED; and inter-frequency measurement for CONNECTED
        - FFS the applicability for IDLE mode inter-frequency measurement
    - FFS details

R1-1719019 **[Draft] LS Reply on RSRP Measurements for Mobility in NR** **Huawei, Ericsson**
Decision: The document is endorsed and final LS is approved in R1-1719040 with the following updates:
- various UE measurements ~~capabilities~~
- Appending the following sentence in the 2nd paragraph "However, RAN1 has not concluded whether or not the Antenna Connnector should be used as measurement reference points. In addition, RAN1 believes that the measurement reference points should be decided by RAN4. "
- Update action to "RAN1 would respectfully ask RAN4 to provide guidance with respect to the measurement reference points."

Thursday
R1-1719163 **Thursday Offline Summary and Remaining Issues for 7.1.5.1** **Samsung**

Agreements:
- L3 mobility CSI-RS is based on the CSI-RS configuration framework for the BM

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- FFS the details, e.g., tailoring some or all the BM parameters (e.g., resource settings, resource sets, and resources; and corresponding parameters) for L3 mobility needs

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Friday

R1-1719208 Friday Offline Summary and Remaining Issues for 7.1.5.1 Samsung

Agreements:

- CSI received Signal Strength Indicator (CSI-RSSI), comprises the linear average of the total received power (in [W]) observed only in OFDM symbols of measurement time resource(s), in the measurement bandwidth, over N number of resource blocks from all sources, including co-channel serving and non-serving cells, adjacent channel interference, thermal noise etc.
  - Measurement time resource(s) for CSI-RSSI corresponds to OFDM symbols containing L3 mobility CSI-RS.

Agreement: IMR for SSS based RS-SINR shall be down-selected from the following alternatives:

- Alt 1: PBCH DMRS
- Alt 2: The RS used for RSRP measurement (i.e., SSS + potentially PBCH DMRS)
- No RRC impact is expected

Agreement: IMR for CSI-RS based RS-SINR for RRM shall be down-selected (if any) from the following alternatives:

- Alt 1: CSI-RS REs used for the RSRP measurement
- Alt 2: interference is measured on the same OFDM symbol for which corresponding CSI-RS is mapped
- No RRC impact is expected

R1-1717037 Remaining details of RRM measurements ZTE, Sanechips
R1-1717054 Remaining details on NR RRM measurement based on SS block and CSI-RS for L3 mobility Huawei, HiSilicon
R1-1717359 RRM Measurements for NR Intel Corporation
R1-1717583 Remaining issues on the NR mobility Samsung
R1-1717741 Discussion on the association between the SMTC and the measurement object Spreadtrum Communications
R1-1717804 Mobility Management based on SS block and CSI-RS measurements CATT
R1-1717879 Discussion on RSSI measurement for RSRQ and interference measurement for RS-SINR CMCC
R1-1717932 Remaining Details on L3 measurement and mobility management LG Electronics
R1-1718060 Remaining details on NR RRM measurement Guangdong OPPO Mobile Telecom
R1-1718185 Discussion on remaining details on measurement for mobility management NTT DOCOMO, INC.
R1-1718320 Discussion on Measurement for Mobility Management MediaTek Inc.
R1-1718382 Measurements for L3 mobility based on SS block and CSI-RS AT&T
R1-1718533 Remaining details on measurement for mobility management Qualcomm Incorporated
R1-1718616 Measurements for mobility management Nokia, Nokia Shanghai Bell
R1-1718671 On RRM Measurements in wideband CC Sony
R1-1718697 SS/PBCH block based measurement in wideband carrier Motorola Mobility, Lenovo
R1-1718717 Remaining details on measurement for mobility management Ericsson
R1-1718858 Summary of Key Issues and Proposals for 7.1.5.1 Samsung

7.1.5.2 Radio link monitoring for mobility management

R1-1718794 Summary of Discussion for NR Radio Link Monitoring Intel Corp.

Agreements:

- The IS/OOS threshold pair index to be used by a UE is explicitly indicated by RRC
  - IS/OOS threshold pair index corresponds to a specific IS/OOS threshold pair (to be defined by RAN4)
  - FFS on default IS/OOS threshold pair index

Agreements:

- At least single-port CSI-RS resources, following the same design already agreed for BM, can be used for RLM
  - FFS configuration details, especially w.r.t. interaction with those configured for BM

Proposals:

- For RLM purpose, 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 parameter set

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Proposals:
- At least two transmission/measurement bandwidths are defined for CSI-RS for RLM
  - one equal to the minimum bandwidth of the carrier, and
  - one additional larger bandwidth

Agreements:
- Discuss further offline on the maximum # of indicated CSI-RS resources & SS blocks to be used for RLM
- In case of SS/PBCH block based RLM, the RLM-RS resources are UE-specifically RRC configured, where among L SS Blocks for a given frequency band, each SS block to be used for RLM can be individually indicated
  - FFS signalling details (e.g., via bitmap, via SS block index)
    - Note: this depends on the max # of SS blocks for RLM

Wednesday
R1-1718977 **Summary of Discussion for NR Radio Link Monitoring** **Intel Corp.**

Agreements:
- RLM-RS based on CSI-RS can be separately configured from CSI-RS for BM.
  - Framework for signaling CSI-RS for RLM would use the same signaling framework for signaling CSI-RS for BM.
  - FFS: additional updates of CSI-RS for RLM based on updates of CSI-RS in BM
  - Note: Network can choose to re-use of some or all of CSI-RS resources for BM for CSI-RS for RLM.

Agreements:
- NR supports configuration of at most X number of RLM-RS (CSI-RS and/or SSB) resources for a UE
  - final value of X to be determined in the next meeting and (X <= [8])
  - Note: in the deployment scenario where BM is needed, the BM processing and reporting are a pre-requisite for the network to select up to X RLM-RSs.
  - FFS: whether to have different number for sub 6 and above 6 GHz

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Thursday
R1-1719048 **Summary of Discussion for NR Radio Link Monitoring** **Intel Corp.**

Proposals:
- Further discussion offline on how to interpret "Each RLM-RS resource should correspond to a single type of RLM-RS"
  - Alt 1) UE is only configured with a single type (between SSB or CSI-RS) of RLM-RS for all RLM-RSs
    - Supported by: Qualcomm, Samsung, Mediatek, ZTE, Vivo, OPPO, Intel
  - Alt 2) UE can be configured with any types of RLM-RS for each RLM-RSs
    - Periodicity of the RLM-RSs belong to two different RS types can have different values.
    - Maximum number of RLM-RSs regardless of RS type that can be configured for a UE is X (refer to agreement regarding maximum number of configurable RLM-RS).
    - Note: that only 1 IS/OOS report per RLM reporting period even if two types of RLM-RS is configured.
    - Supported by: Nokia, Ericsson, Huawei, HiSilicon, Panasonic, LGE

Friday
R1-1719169 **Summary of Discussion for NR Radio Link Monitoring** **Intel Corp.**

Agreements:
- Rel-15 NR will not provide additional signaling (other than the configuration of RLM-RS(s) resource(s)) for the purpose of interference and noise (IN) measurement for RLM.
- Rel-15 NR will not provide configuration of additional resource(s) for the purpose of IN measurement for RLM.
- RAN1 continues discussions on which (existing) resource(s) can be and/or cannot be used for IN measurement for RLM.
  - Note that this does not necessarily mean the NR specification will specify UE behavior on use of resources for IN measurement for RLM.

Agreements:
- For guidance for RAN4 testing & requirement purposes:

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- UE may assume that configured RLM-RS and the "hypothetical" DMRS of the "hypothetical" PDCCH for RLM has QCL relationship with respect to spatial, average gain, delay and Doppler parameters.

- Draft LS in R1-1719216.

R1-1719216 **[DRAFT] LS on QCL assumption for RLM Reference Signal** **Intel**
Decision: The document is endorsed and approved in R1-1719218.

Email discussion/approval on potential RRC impact till 10/27 – Daewon (Intel)

R1-1717038 RLM in NR ZTE, Sanechips
R1-1717055 Remaining details on Radio link monitoring in NR Huawei, HiSilicon
R1-1717360 Radio Link Monitoring for NR Intel Corporation
R1-1717464 IMR configuration for Radio link monitoring in NR vivo
R1-1717584 Radio link monitoring Samsung
R1-1717742 Discussions on the IS and OOS counting procedure Spreadtrum Communications
R1-1717805 NR Radio Link Monitoring CATT
R1-1717933 Discussion on Radio Link Monitoring in NR LG Electronics
R1-1718061 Remaining details on NR radio link monitoring Guangdong OPPO Mobile Telecom
R1-1718186 Discussion on remaining details on radio link monitoring for mobility management NTT DOCOMO, INC.
R1-1718321 Discussion on Radio Link Monitoring MediaTek Inc.
R1-1718383 Radio link monitoring procedure and thresholds AT&T
R1-1718534 Radio link monitoring consideration Qualcomm Incorporated
R1-1718718 Radio link monitoring for mobility management Ericsson
R1-1718803 Radio Link Monitoring in NR Nokia, Nokia Shanghai Bell

7.1.6 Other

R1-1717056 On numerology determination during initial access Huawei, HiSilicon
R1-1717057 On initial active bandwidth part Huawei, HiSilicon
R1-1717465 SSB collision issues vivo
R1-1717585 RAR contents Samsung
R1-1717586 Discussion on RACH capacity enhancement Samsung
R1-1717587 Discussion on MSG. 3 tx timing determination Samsung
R1-1717588 Discussion on RACH configuration Samsung
R1-1717589 Assisted information for MSG. 3 tx beam determination Samsung
R1-1717590 RAR detection for contention-free random access Samsung
R1-1718768 Discussion on additional RACH resource for contention free RACH Samsung (Revision of R1-1717591)
R1-1717592 RRM for wider bandwidth operations Samsung
R1-1717593 Remaining details on power control during RACH procedure Samsung
R1-1717761 Additional synchronization provision Ericsson
R1-1717901 Remaining issues on PRACH for SUL Huawei, HiSilicon
R1-1717934 Discussion on PRACH preamble for capacity enhancement LG Electronics
R1-1718618 On different deployments and SS SCS combinations Nokia, Nokia Shanghai Bell
R1-1718719 Multiple Preamble transmissions Ericsson
R1-1718720 Remaining details on NR-RACH capacity Ericsson
R1-1718721 On intra-frequency measurement gaps Ericsson

7.2 MIMO

R1-1719118 **Chairman's notes of AI 7.2 NR MIMO** **Ad-Hoc chair (Samsung)**
The document was presented by Younsun Kim of Samsung.
Decision: The document is endorsed, and content incorporated below.

7.2.1 Multi-antenna scheme

Physical control channel related issues are to be discussed in the agenda item for scheduling/HARQ aspects.

R1-1718681 Open issues on RRC parameters for Multi-antenna scheme Ericsson

R1-1719042 **NR UL MIMO Offline Session Notes** **Ericsson**

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7.2.1.1 Remaining details on codeword mapping

R1-1718798 Summary of Open Issues on Layer Mapping Samsung

Agreement: No additional CW-layer correspondence is supported, at least in Rel-15, for >4 layers

Conclusion:
There is no consensus on supporting 2-CW layer mapping in addition to agreed 1-CW mapping, for 2, 3, and 4 layers for completion by December, 2017

R1-1718991 WF on RE mapping for DFT-SOFDM with intra-slot FH Samsung, Nokia, NSB, Ericsson, Intel Corporation, MediaTek, Interdigital, CATT, ITRI, ETRI, KT Corporation, Acorn Technologies, Panasonic, Bouygues Telecom
Further revised in R1-1719137.

Working Assumption

- For DFT-SOFDM for single codeblock with intra-slot frequency hopping, only Option 1 is supported:
- The RE mapping is performed with the following order:
  - Frequency-first mapping followed by time and sub-slot: the modulated symbols are first mapped across sub-carriers, then across DFT-SOFDM symbols within a sub-slot, then across sub-slots (occupying different sets of PRBs)
- FFS: DFT-SOFDM for multiple codeblock with intra-slot frequency hopping

R1-1719022 WF on RE mapping for DFT-s-OFDM with frequency hopping NTT DOCOMO, AT&T, ZTE, Sanechips, vivo, Sharp, Sony, NEC, Motorola, Lenovo, Softbank, Mitsubishi, Deutsche Telekom, China Telecom, Fujitsu, CHTTL

Possible Agreement:
For each of the following channels, c_init used for data scrambling will at least depend on UE specifically configured scrambling ID (scrambling ID is C-RNTI by default)

- PDSCH
- PUSCH

More offline discussion

Email discussion on the parameters for detemination of c_init for data scrambling until Oct 27 – Mattias (Ericsson)

R1-1717295 Remaining details of codeword mapping in NR Huawei, HiSilicon
R1-1717361 Remaining details on CW to MIMO layer mapping Intel Corporation
R1-1717416 Remaining details of codeword mapping ZTE, Sanechips
R1-1717466 On remaining details of codeword mapping vivo
R1-1717594 Finalizing Layer Mapping Samsung
R1-1717806 On codeword mapping CATT
R1-1717865 Remaining details of codeword mapping for DFT-s-OFDM Lenovo, Motorola Mobility
R1-1717935 Discussion on codeword mapping LG Electronics
R1-1718187 Remaining details on CW mapping NTT DOCOMO, INC.
R1-1718335 Remaining details on codeword mapping MediaTek Inc.
R1-1718384 Codeword to layer Mapping for DFTsOFDM with Frequency Hopping AT&T
R1-1718424 Further details on CW mapping Ericsson
R1-1718535 Remaining issues on CW to layer mapping Qualcomm Incorporated
R1-1718666 Discussions on additional CW-to-Layer correspondences Sony
R1-1719137 WF on RE mapping for DFT-SOFDM with intra-slot FH Samsung, Nokia, NSB, Ericsson, Intel Corporation, MediaTek, Interdigital, CATT, ITRI, ETRI, KT Corporation, Acorn Technologies, Panasonic, Bouygues Telecom, ITL, KRRI, CHTTL

7.2.1.2 Codebook based transmission for UL

R1-1718856 Summary of Issues and WFs on Codebook based transmission for UL Intel

R1-1718897 WF on 4Tx UL codebook for DFTs-OFDM LG Electronics, CATT, Intel, Nokia, NSB

Agreement:

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- At least for the case where single SRS resource is configured and for DFT-S-OFDM, support additional 4Tx rank 1 codebook below

Codebook index	Number of layers $\upsilon=1$							
16 – 23	$\frac{1}{2}\begin{bmatrix}1\\0\\1\\0\end{bmatrix}$	$\frac{1}{2}\begin{bmatrix}1\\0\\-1\\0\end{bmatrix}$	$\frac{1}{2}\begin{bmatrix}1\\0\\j\\0\end{bmatrix}$	$\frac{1}{2}\begin{bmatrix}1\\0\\-j\\0\end{bmatrix}$	$\frac{1}{2}\begin{bmatrix}0\\1\\0\\1\end{bmatrix}$	$\frac{1}{2}\begin{bmatrix}0\\1\\0\\-1\end{bmatrix}$	$\frac{1}{2}\begin{bmatrix}0\\1\\0\\j\end{bmatrix}$	$\frac{1}{2}\begin{bmatrix}0\\1\\0\\-j\end{bmatrix}$
24 –27	$\frac{1}{2}\begin{bmatrix}1\\0\\0\\0\end{bmatrix}$	$\frac{1}{2}\begin{bmatrix}0\\1\\0\\0\end{bmatrix}$	$\frac{1}{2}\begin{bmatrix}0\\0\\1\\0\end{bmatrix}$	$\frac{1}{2}\begin{bmatrix}0\\0\\0\\1\end{bmatrix}$	-	-	-	-

- Send an LS to RAN4 to inform that RAN1 has agreed to support the above UL codebook (codebook indices 16~27) for 4TX UEs and request feedback from RAN4 (ex: MPR) on feasibility – Peter (will comeback on Thursday)

Thursday

R1-1718994 Draft LS on NR UL codebook for 4Tx Qualcomm

Decision: The document is endorsed and final LS is approved in R1-1719044.

Agreements:

- For 4 Tx with wideband TPMI, use at least single stage DCI
  - FFS for 2 stage DCI
- For wideband TPMI, for NR 4 Tx codebook for CP-OFDM, downselect one of:
  - Alt 1: Rel-10 UL, possibly with additional entries:
  - Alt 2: Rel-15 DL, possibly with additional entries:
  - Alt 3: Rel-8 DL, possibly with additional entries
- Evaluate performance of candidate codebooks & decide by RAN1#91

Agreements:

- NR supports 3 levels of UE capability for UL MIMO transmission
  - Full coherence
    - All ports can be transmitted coherently
  - Partial coherence
    - Port pairs can be transmitted coherently
  - Non-coherence
    - No port pairs can be transmitted coherently
- TPMI codewords from the codebook are used by gNB accordingly

Proposal

For TPMI size,

- By RAN1#91, downselect to one alternative among:
  - Alt 1: Restrict codewords from 2 or 4 Tx codebooks, reducing TPMI bitwidth:
    - Alt 1.1 From RRC configuration, UE can be configured with a table that maps codepoints to codewords in a table
    - Alt 1.2 Restriction is determined according to UE coherence capability
  - Alt 2: Use same TPMI size for coherent, non-coherent, and partially coherent operation
    - Note: Alt 2 has no RRC impact
  - The alternative selected in RAN1#91 should not have RRC impact

More offline discussion

R1-1719152 WF on uplink Codebook Subset Restriction MediaTek, Intel, ZTE, Sanechips, AT&T, III, CHTTL, Lenovo, Motorola Mobility, OPPO, Huawei, HiSilicon, Samsung

Email discussion on TPMI size until Oct 27, Weidong (MediaTek)

Agreement:

- For 1 SRS resource
  - Full coherence

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        - All ports corresponding to ports in an SRS resource can be transmitted coherently
    - Non-coherence
        - All ports corresponding to ports in an SRS resource are not transmitted coherently
    - Partial coherence
        - Ports pairs corresponding to ports in an SRS resource can be transmitted coherently

Agreement:
- In RAN1#91, decision will be made whether, in addition to codebook based transmission using one SRS resource, codebook based transmission using multiple SRS resource including non-coherent inter-SRS resource transmission is supported
    - Non-coherent inter-SRS resource transmission:
        - FFS: use of two DCI, with one TPMI per DCI
        - One TPMI/TRI per SRS resource is signaled
        - Note: Indication of selection of multiple SRS resources was agreed

R1-1718477 TPMI Indication for Frequency Selective UL Precoding InterDigital, Inc.
R1-1717807 Further discussion on codebook based transmission for UL CATT
R1-1718024 Remaining issues on UL codebook design Guangdong OPPO Mobile Telecom

R1-1717362 Remaining issues on codebook based UL transmission Intel Corporation
R1-1717417 Codebook based UL transmission ZTE, Sanechips
R1-1717467 Discussion on codebook based UL transmission vivo
R1-1717595 Codebook-Based UL Transmission Samsung
R1-1717864 Discussion on Codebook based UL transmission Lenovo, Motorola Mobility
R1-1717936 Discussion on codebook based transmission for UL LG Electronics
R1-1718188 Codebook design for uplink NTT DOCOMO, INC.
R1-1718237 Codebook based transmission for UL MIMO Huawei, HiSilicon
R1-1718385 On UL MIMO with Codebbok AT&T
R1-1718425 Codebook Based UL MIMO Ericsson
R1-1718507 UL Codebook Based Transmission and Codebook Design Nokia, Nokia Shanghai Bell
R1-1718536 Codebook based UL transmission Qualcomm Incorporated
R1-1718780 Codebook based transmission for UL MediaTek Inc.
R1-1718962 WF on antenna group signaling MediaTek, Nokia, NSB, Intel
R1-1718963 WF on SRS resource/port permutation MediaTek Inc.

7.2.1.3 Non-codebook based transmission for UL

R1-1718871 Summary of issues on UL non-codebook based transmission Nokia, Nokia Shanghai Bell

Agreement:
- Only wideband SRI is supported in Rel-15 for non-codebook based UL transmission
    - The above does not preclude frequency selective precoding on SRS

R1-1718917 WF on DL measurement RS indication for non-codebook based transmission for UL MIMO Huawei, HiSilicon, Intel, Nokia, Nokia Shanghai Bell, Ericsson, NTT DOCOMO

R1-1719166 WF on DL measurement RS indication for non-codebook based transmission for UL MIMO Huawei, HiSilicon, Intel, Nokia, Nokia Shanghai Bell, Ericsson, NTT DOCOMO, MediaTek, CATT, LG Electronics, Spreadtrum, China Telecom, OPPO, Sharp, KT Corporation, Lenovo, Motorola Mobility, Samsung, Deutsche Telekom

Agreements:
- Support indicating DL measurement RS for UE to calculate UL candidate precoders for precoded AP-SRS resource via DCI
    - The DL measurement RS is a CSI-RS for CSI acquisition
    - Specify the following mechanism for DCI signalling:
        - Using the same field for AP-SRS resource triggering
            - Association between triggering state, triggered SRS resource(s) and the CSI-RS resource ID is higher layer configured
- Support indicating DL measurement RS for UE to calculate UL candidate precoders for precoded P/SP-SRS resource via higher layer signalling
    - The DL measurement RS is a CSI-RS for CSI acquisition

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- AP-SRS(s) association with P(>1)-port AP-CSI-RS:
  - AP-CSI-RS can be transmitted in the same slot as the DCI containing AP-SRS trigger.
  - The AP-SRS(s) is transmitted X symbols after AP-CSI-RS.
    - FFS: The scope of X and whether the AP-SRS and AP-CSI-RS can be in the same slot
- AP/SP/P-SRS(s) association with P(>1)-port P/SP-CSI-RS
  - Timing of UL precoder calculation based on the associated CSI-RS is up to UE implementation

R1-1719185 WF on Multiple SRI & SRS Resource Transmission Ericsson, ZTE, Sanechips, Huawei, HiSilicon, Intel, MediaTek, Samsung, CATT, Nokia, NSB
Email discussion on SRS grouping until Oct 27, Mark (Ericsson)

R1-1717296 Non-codebook based transmission for UL MIMO Huawei, HiSilicon
R1-1717753 PUSCH precoder determination for non-codebook-based UL MIMO transmission Spreadtrum Communications
R1-1717596 Discussion on Non-Codebook-Based UL Transmission Samsung

R1-1717363 Remaining issues on non-codebook based UL transmission Intel Corporation
R1-1717418 Non-Codebook based UL transmission ZTE, Sanechips
R1-1717468 Discussion on non-codebook based UL transmission vivo
R1-1717808 Further discussion on non-codebook based transmission for UL CATT
R1-1717937 Discussion on non-codebook based transmission for UL LG Electronics
R1-1718025 Further discussion on uplink non-codebook transmission Guangdong OPPO Mobile Telecom
R1-1718189 Non-codebook based transmission for uplinkNTT DOCOMO, INC.
R1-1718386 On Non Codebook based UL MIMO AT&T
R1-1718426 Non-Codebook Based UL MIMO Ericsson
R1-1718478 On Non-Codebook UL Transmission InterDigital, Inc.
R1-1718508 Non-codebook based UL-MIMO transmission Nokia, Nokia Shanghai Bell
R1-1718537 Non-codebook based UL transmission Qualcomm Incorporated

7.2.1.4 PRB bundling for DL

R1-1718958 Summary of Issues on DL PRB Bundling vivo

Agreement: UE is configured with PRB bundling size(s) per BWP

Agreement: For broadcast PDSCH, multi-cast PDSCH, and unicast PDSCH before RRC configuration, PRB bundling size is 2

R1-1719072 Summary of Offline Discussions on DL PRB Bundling vivo

Agreement: 1-bit DCI field for indication of PRB bundling size can be configured to be present by RRC

R1-1719147 WF on usage of 1 bit DCI InterDigital, LGE, Samsung, Vivo, CATT, NTT Docomo, Qualcomm, ZTE, Sanechips, Ericsson, IITH, IITM, CEWiT, Tejas Networks, Convida Wireless, Sharp, Mitsubishi, ITL, KRRI, Huawei, HiSilicon, Panasonic, KT

Agreements:
- When 1-bit DCI field is present, the following configuration is supported
  - Candidate values: {2, 4, scheduled BW}
    - FFS: support 1 as an additional candidate value
  - The DCI bit field indicated "1" : select one value from one or two RRC configured candidate values
    - When two candidate values are configured, one value is implicitly determined
      - FFS details of implicit determination (e.g., scheduled BW, RBG-based, subband size, PDCCH REG bundling size, BWP, DMRS pattern, etc.)
  - The DCI bit field indicated "0": select one RRC configured candidate value
  - When a UE is configured with RBG=2, the UE is not expected to be configured with PRG=4

R1-1717364 On PRB bundling for DL Intel Corporation
R1-1718427 PRB bundling for DL Ericsson
R1-1718509 On remaining issues on PRB bundling Nokia, Nokia Shanghai Bell

R1-1717297 PRB bundling size for DL data precoding Huawei, HiSilicon

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R1-1717419 On PRB Bundling ZTE, Sanechips
R1-1717469 Discussion on PRB bundling for DL vivo
R1-1717597 PRB bundling for NR DMRS Samsung
R1-1717809 PRB bundling for DL transmission CATT
R1-1717938 Discussion on PRB bundling LG Electronics
R1-1718479 Discussion on Dynamic PRG Size Indication InterDigital, Inc.
R1-1718538 Discussion on PRB bundling for DL Qualcomm Incorporated

7.2.1.5 Other

R1-1718755 Summary of offline discussion on UL MIMO Open Issues Ericsson

Agreement:
- For non-codebook based UL transmission, a total of up to 4 SRS ports can be indicated by SRI(s) using one DCI field

Agreement:
- Confirm the following working assumption:
  - For non-codebook based precoding, each SRS resource contains one port

Agreement:
- For single SRS resource case with CP-OFDM with 2 ports
  - Use Alt 1 from RAN1#90: include TPMIs 4 & 5 for rank 1 and TPMI 2 for rank 2, except the scale factor is FFS

R1-1717298 Rate matching for data channels Huawei, HiSilicon
R1-1717365 On antenna calibration signal Intel Corporation
R1-1717420 Discussion on rate matching ZTE, Sanechips
R1-1717421 On Transmission Setting ZTE, Sanechips
R1-1717598 Discussion on DL/UL multi-TRP/-panel supports Samsung
R1-1717599 Continuous precoding for NR DMRS in time domain Samsung
R1-1717600 CSI Feedback Overhead Reduction for NCJT Samsung
R1-1717601 Discussion on transmission parameter sets Samsung
R1-1717602 Discussion on transition between NR network coordination schemes Samsung
R1-1718026 Discussion on UL transmission mode design Guangdong OPPO Mobile Telecom
R1-1718423 Differential Rank Indication for Multi-subband UL MIMO Huawei, HiSilicon
R1-1718428 Scrambling for data channels Ericsson
R1-1718429 Single Antenna and Antenna Selection UL Transmission Ericsson
R1-1718430 Uplink Transmission on Non-homogeneous Arrays Ericsson
R1-1718480 On PDSCH rate matching for NR InterDigital, Inc.
R1-1718734 UL MIMO Signaling Details Ericsson

7.2.2 CSI acquisition and beam management

R1-1718682 Open issues on RRC parameters for CSI acquistion and beam management Ericsson

7.2.2.1 CSI measurement

R1-1718910 Summary of CSI measurement ZTE, Sanechips

Agreement:
For ZP CSI-RS based IMR, following combinations of P/SP/AP CMR and IMR are supported
- For semi-persistent CSI reporting,

	PR CMR	SP CMR	AP CMR
PR IMR	YES	NO	NO
SP IMR	NO	YES	NO
AP IMR	NO	NO	NO

- For aperiodic CSI reporting,

	PR CMR	SP CMR	AP CMR
PR IMR	YES	NO	NO

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SP IMR	NO	YES	NO
AP IMR	NO	NO	YES

Agreement:
- At least the following patterns are supported for ZP CSI-RS for IMR:
  - One pattern from (2,1), (2,2), (4,1)

R1-1719005 **Offline Summary of CSI measurement ZTE, Sanechips**

Agreement: Configuration of resources for rate matching is separate from configuration of resources for interference measurement.

Working Assumption:
- For ZP CSI-RS based IMR, support (2,2) and (4,1) which are configurable by RRC signalling
  - Note: Study until next meeting whether support of both (2,2) and (4,1) are both necessary. If not, RRC configurability will be removed.

R1-1719186 **WF on aperiodic CSI-RS triggering ZTE, Sanechips, Samsung, LG Electronics, NTT DOCOMO, Qualcomm, Intel, ASTRI, Verizon, KDDI, IITH, CEWiT, IITM, Tejas Networks, CHTTL, Sharp, NEC, MediaTek, KT Corporation, Nokia, NSB**

Working Assumption:
- Aperiodic CSI-RS is triggered by RRC+DCI or RRC+MAC-CE+DCI
  - If number of RRC configured resource sets across all CCs is less than 2^N, RRC+DCI is used. Otherwise, RRC+MAC-CE+DCI is used.
    - FFS on the value of N
  - The triggering is done per CSI-RS resource set

Email discussion on the value of N for aperiodic CSI-RS is triggering until 27th of Oct – Ruyue (ZTE)

Agreement: For non-PMI feedback, support the following port index indication method:
- Port index indication is signaled to UE for RI/CQI calculation in non-PMI feedback
  - Port index indication per CSI-RS resource is configured by RRC to select the CSI-RS port(s) used for RI/CQI calculation per rank
    - Identity matrix is assumed by UE on the selected CSI-RS ports for RI/CQI calculation
    - N ports are selected for rank N
    - The CSI-RS resource can be dynamically selected for CSI reporting in CSI framework

R1-1719178 **WF on NZP CSI-RS based interference measurement Huawei, HiSilicon, Qualcomm, Ericsson, IITH, Intel, Spreadtrum, OPPO, China Unicom, vivo, Interdigital, IITM, Deutsche Telekom, CeWiT, KDDI, NEC, Vodafone, CMCC, Sharp, Tejas Networks, ASUSTeK, Softbank, Sony, CATR, China Telecom, III, Mitsubishi, ZTE, Sanechips, CATT, Samsung**

Agreement:
- A set of NZP CSI-RS resource(s) is configured to a UE for channel and interference measurements, where
  - A subset of the set of NZP CSI-RS resource(s) are for channel measurement and another subset of the set of NZP CSI-RS resource(s) are for interference measurement
    - Network indicates via DCI the subset of NZP CSI-RS resource(s) for channel measurement and the subset of CSI-RS resource(s) for interference measurement
    - FFS: Whether the DCI indication is the dynamic triggering of one or multiple CSI reporting setting(s) or not
    - FFS: some CSI-RS resource(s) from two NZP CSI-RS resource subsets can be overlapped or not
  - UE assumes each port of channel measurement NZP CSI-RS resource(s) corresponds to a desired layer if no PMI and RI feedback

R1-1718539 Details of CSI measurement Qualcomm Incorporated

Petitioners' Exhibit 1007, p. 688
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R1-1717939 Discussion on CSI measurement LG Electronics
R1-1717422 Remaining details on CSI measurement ZTE, Sanechips

R1-1717299 Channel and interference measurement for CSI acquisition Huawei, HiSilicon
R1-1717366 Remaining issues on interference measurement for CSI Intel Corporation
R1-1717470 Discussion on CSI measurement vivo
R1-1717603 Discussions on CSI measurements Samsung
R1-1717754 NZP CSI-RS for interference measurement Spreadtrum Communications
R1-1717810 Remaining issues on reciprocity based operation CATT
R1-1718053 Discussion on CSI Measurement Guangdong OPPO Mobile Telecom
R1-1718190 Views on CSI measurement for NR NTT DOCOMO, INC.
R1-1718387 Remaining details on CSI measurements for NR AT&T
R1-1718431 On CSI measurement Ericsson
R1-1718660 Considerations on interference measurement Sony
R1-1718706 On the channel reciprocity support for CSI acquisition Nokia, Nokia Shanghai Bell
R1-1718953 WF on CSI timing LG Electronics, Samsung, KT corp

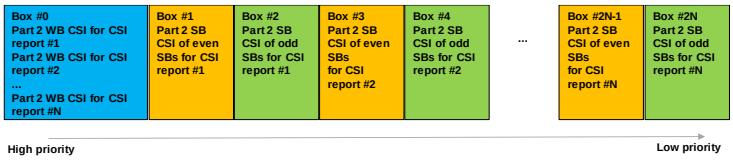
7.2.2.2 CSI reporting

R1-1718956 Summary of views on CSI reporting (agenda item 7.2.2.2) Ericsson

R1-1718886 WF on omission rules for partial Part 2 reporting ZTE, Sanechips, Ericsson, MediaTek, Samsung, NTT DOCOMO, ASTRI, CATT
Also supported by Nokia, NSB

Agreement:
For NR CSI reporting on PUSCH, Part 2 information bits of partial subbands can be omitted.

- Support the following priority rule to omit partial Part 2, where the priority level goes from high to low from Box #0 to Box #2N, and the omission granularity is one box in the following picture
  - N is the number of CSI reports in one slot
  - The CSI report numbers correspond to the order in the CSI report configuration



- Down-select one of the following Alts for CQI calculation in RAN1#91
  - Alt 1: Subband CQI for each omitted subband is calculated assuming PMI in the nearest subband(s) with Part 2 reporting
  - Alt 2: Subband CQI for each omitted subband is calculated assuming PMI in this subband

R1-1718955 WF for Subband Size for CSI Samsung, Ericsson, ZTE, Sanechips

Agreement:

- For a given bandwidth of the active bandwidth part, a UE can be configured with one out of two subband sizes via higher layer signaling
- The two possible values are described as follows

Carrier bandwidth part (PRBs)	Subband Size (PRBs)
24 – 60	[6], [12]
61 – 100	8, [16]
101 – 150	[10], [20]
151 – 200	12, [24]
201 – 275	16, [32]

R1-1718869 WF on remaining details on Codebook Subset Restriction for Type I Single-Panel codebook Ericsson, Intel Corporation, Samsung, CATT, LG Electronics

Agreement:

- For Type I SP, rank 3-4 codebooks for 16, 24, and 32 ports

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- Use single bitfield to determine restricted $\tilde{v}_{l_2,m}$ depending on restricted $v_{l_1,m}$
  - $\tilde{v}_{l,m}$ is restricted if at least one of $v_{2l+1,m}$, $v_{2l-1,m}$, $v_{2l,m}$ is restricted
    - FFS: Introduction of inter-group co-phasing restriction

Agreement:
- The RI payload depends on the rank restriction signalling.
  - LTE approach for rank restriction using a bitmap of size-8, where bit $i \in 0, \ldots, 7$ indicates if rank $r = i + 1$ is allowed to be reported

R1-1718870 **WF for remaining details on aperiodic CSI on PUCCH** **Ericsson**
Also supported by Nokia, NSB

Agreement:
- At most RI=2 is allowed to be reported for a CSI report setting configured with Type II codebook

Possible Agreement:
One Resource Setting used for P/SP/AP CSI can only contain one resource set
- Above applies only for CSI acquisition

More offline discussions
Emails discussion on resource setting for P/SP/AP CSI until Oct 27 – Sebastian (Ericsson)

Agreement: Support the following encoding for first part of Type II report
- Separate fields: Each field is encoded separately

Conclusion:
Continue discussion in RAN1#91 on the following:
- BWP for which CSI is reported is determined by the active BWP in the time location of the CSI reference resource

R1-1719142 **Offline session notes CSI reporting (AI 7.2.2.2)** **Ericsson**

Agreement:
- For A-CSI on short PUCCH with single CSI report, downselect from the following:
  - Alt 1:
    - The CSI report is triggered with CSI request field in DL-related DCI
      - UE-specific or UE-group-specific DCI is to be discussed in control channel session
    - PUCCH resource indicator field in DL-related DCI indicates the PUCCH resource for the triggered CSI report from a set of higher-layer configured PUCCH resources
  - Alt 2:
    - Use UE-specific UL-related DCI, CSI request field triggers a CSI report. It is indicated in the CSI Report Setting if PUCCH or PUSCH is used
  - Alt 3:
    - Use UE-specific UL-related DCI, indication on if PUCCH or PUSCH is used is determined by bit in DCI

Email discussion to down-select among the 3 alternatives for A-CSI on short PUCCH with single CSI report
- Until Oct 27 – Sebastian (Ericsson)

Agreement:
NR at least supports the following periodicities for P/SP CSI reporting
- {5, 10, 20, 40, 80, 160, 320} slots
- Details on restriction on periodicity as a function of subcarrier spacing is to be concluded in RAN1#91 (including whether or not to support)

Agreement:
- At least for when Type I CSI collides with Type I CSI and Type II CSI collides with Type II CSI
  - The following priority order for CSI periodicity types applies
    - Aperiodic CSI > P-CSI
    - Aperiodic CSI > SP-CSI
    - Note: Study further on the priority between SP-CSI and P-CSI
    - CSI on PUSCH has priority over CSI on PUCCH

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- Only one CSI periodicity type is piggybacked on PUSCH
  - Lower priority CSI is dropped when there is a collision
- Aperiodic CSI on PUCCH is dropped if there is a collision with PUSCH

- TBD in RAN1#91 If the above applies for Type I CSI collides with Type II CSI as well

Agreement:

- Adopt the following refined subband sizes:

Carrier bandwidth part (PRBs)	Subband Size (PRBs): 1st value, 2nd value
24 – 60	4, [8]
61 – 100	8, [16]
101 – 200	[12], [24]
201 – 275	16, [32]

- The 2nd subband size values in brackets are to be confirmed or refined in RAN1#91

Email discussion on semi-persistent CSI on PUSCH

- Until Oct 27 – Sebastian (Ericsson)

R1-1717300	Details of CSI reporting on PUCCH/PUSCH	Huawei, HiSilicon
R1-1717367	Remaining issues on CSI reporting	Intel Corporation
R1-1717423	Remaining details on CSI reporting	ZTE, Sanechips
R1-1717471	Discussion on CSI reporting	vivo
R1-1717811	Remaining issues on CSI reporting	CATT
R1-1717940	Discussions on CSI reporting	LG Electronics
R1-1718191	Remaining Issues on Feedback Design for CSI Type I and Type II	NTT DOCOMO, INC.
R1-1718337	Remaining details for CSI reporting	MediaTek Inc.
R1-1718432	On remaining details of CSI reporting	Ericsson
R1-1718481	Remaining issues on CSI reporting	InterDigital, Inc.
R1-1718510	Remaining details on CSI reporting for Type II and Type I codebook	Nokia, Nokia Shanghai Bell
R1-1718540	On Type I and Type II CSI reporting	Qualcomm Incorporated
R1-1718816	CSI Reporting and UCI Multiplexing	Samsung
R1-1718992	WF on subband size for CSI	Samsung
R1-1719029	Remaining issues with RRC impact in CSI reporting (AI 7.2.2.2)	Ericsson

7.2.2.3 Beam measurement and reporting

Including Beam Indication, UL beam management

R1-1718920 Beam management offline discussion summary Qualcomm

Agreement: Support at least the explicit approach for the update of spatial QCL reference in a TCI state.

- FFS: Additional support for implicit update.
- Note: In the explicit approach, the TCI state is updated using either RRC or RRC + MAC-CE based approach
- Note: In the implicit approach, when a set of aperiodic CSI-RS resources are triggered, the triggering DCI includes a TCI state index which provides spatial QCL reference for the triggered set of CSI-RS resources. Following the measurement, the spatial QCL reference in the RS set corresponding to the indicated TCI state is updated based on the preferred CSI-RS determined by the UE. Other operations of implicit approaches are not precluded.

Agreement:

- NR adopts the SRS Tx beam indication, i.e., by a SRS resource or by a DL RS
  - The DL RS supported at least include CSI-RS and SSB.
- NR supports the indication of at least the spatial relations between the DL RS and the UL SRS Tx beam via at least the following mechanisms.

Spatial parameter	Reference RS	Target RS	Signalling mode
Spatial	SSB/CSI-RS (at least P-CSIRS and SP - CSI-RS), P-SRS FFS: AP-CSI-RS, SP-SRS	P SRS	RRC
Spatial	SSB/CSI-RS(at least P-CSIRS and SP - CSI-RS), P-SRS/ SP-SRS	SP-SRS	RRC + MAC-CE

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	FFS:AP-SRS, AP-CSI-RS		
Spatial	SSB/CSI-RS (at least P-CSIRS and SP - CSI-RS), P-SRS, SP-SRS, AP-SRS Working assumption: AP-CSI-RS	AP SRS	RRC or RRC+MAC CE for configuration, indication with DCI

FFS: The use of spatial relation across CCs and/or BWPs.

R1-1719009 Way forward on beam reporting based on CSI-RS for BM with repetition ZTE, Sanechips, ASTRI, Ericsson, NTT DOCOMO

Agreement:
Working assumption from RAN1#90 is confirmed:

- 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

Furthermore, the following details are agreed

- CSI-RS resources in the resource set are TDMed if repetition is ON
  - If repetition is ON, The UE does not expect different values for the following parameters across different CSI-RS resources within a resource set
    - Transmission periodicity
    - Number of antenna port subject to RAN4 decision
    - FFS for other parameters

Agreement:
NR supports the following configurations for beam management where a resource set is formed from multiple beam management CSI-RS resources and is contained within a resource setting:

- Single resource set with repetition = "OFF"
  - UE reports CSI-RS resource indicator(s) within this resource set for CRI feedback
- Single resource set with repetition = "ON"
  - UE does not report CRI
- FFS: Further support additional configuration by down selection from the following two alternatives:
  - (a) Multiple resource sets, all with repetition = "ON"
    - UE reports CSI-RS resource set indicator(s) for CRI feedback
      - FFS: Whether set ID(s) are local within a resource setting or global across all resource settings
  - (b) Multiple equal-size resource sets, all with repetition = "OFF"
    - UE reports distinct local CSI-RS resource indicator(s) within one or more resource sets. The UE can assume that the gNB applies the same Tx beams in the same order for each of the sets
- Note: Not all configurations are applicable for P1/P2/P3
- FFS: Dimensioning of the bit width of the UCI field which can carry either CRI(s) or CSI-RS resource set indicator(s)

R1-1719059 WF on Beam Management Samsung, CATT, Huawei, HiSilicon, NTT Docomo, MediaTek, Intel, OPPO, SpreadTrum, AT&T, InterDigital, CHTTL, KDDI, LG Electronics, Sony, China Unicom, Ericsson, VIVO, China Telecom, Qualcomm, National Instruments, Vodafone
Also supported by Verizon

Agreement:
The contents of R1-1719059 are approved with the following clarifications and modification

- Slide 2: (Modification) Add N=3
- Slide 3: (Clarification) For uplink BM, multiple SRS resource sets can be configured
- For all slides: (Clarification) RRC parameter list refers to SRS resource set and previous agreements refer to SRS groups. Both are the same thing.

R1-1719064 WF on beam reporting Qualcomm, NTT DoCoMo, Ericsson, ZTE, Huawei, AT&T, Samsung, LGE, Intel, Nokia, NSB, Sharp

Agreement:

- For L1-RSRP and/or beam resource indicators (e.g. CRI or SSB index) reporting for beam management, support the following UL channels:

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- Short/long PUCCH
- PUSCH

- Support the following reporting types for beam mgmt. on the above channels
  - For Periodic, support long PUCCH and short PUCCH
  - Semi-persistent – support all channels
  - Aperiodic – support PUSCH and short PUCCH

R1-1719010 WF on DL beam indication ZTE, Sanechips, LGE, CATT, ASTRI
Also supported by Intel, Spreadtrum, OPPO, vivo, AT&T

R1-1719190 WF on DCI Field Size for TCI Ericsson, Samsung, Intel, OPPO, CATT, ZTE, Sanechips, LGE

Agreement:

- Down-select to one of the following 2 options for the DCI field size for TCI in RAN1#91
  - Alt-1: Fixed number of bits [2 or 3] bits
  - Alt-2: A higher layer signaling parameter indicates the number of bits (2 or 3)

R1-1719170 WF on beam management parameters Qualcomm, Ericsson, Intel, LGE, Samsung, Huawei, HiSilicon, Nokia, NSB
Emails discussion to finalize the parameter list for BM

- Until Oct 27 – Sundar (Qualcomm)

R1-1717301 Beam measurement and reporting Huawei, HiSilicon
R1-1717313 Beam indication with low-overhead TCL
R1-1717368 Discussioin on Beam Management Intel Corporation
R1-1717424 Discussion on beam management ZTE, Sanechips
R1-1717472 Discussion on beam measurement, beam reporting and beam indication vivo
R1-1717605 On Beam Management, Measurement and Reporting Samsung
R1-1717716 Discussion on beam indication Fujitsu
R1-1717743 Beam measurement, report, and indication Spreadtrum Communications
R1-1717812 Consideration on DL beam management CATT
R1-1717813 Consideration on DL beam failure recovery CATT
R1-1717866 Discussion of beam measurement and reporting Lenovo, Motorola Mobility
R1-1717880 Considerations on beam reporting and beam indication CMCC
R1-1717897 Discussion on UL Beam Management ASUSTEK COMPUTER (SHANGHAI)
R1-1717941 Discussion on DL/UL beam management LG Electronics
R1-1718009 Considerations on L1-RSRP reporting NEC
R1-1718054 Discussion on Remaining Issues of Beam Management Guangdong OPPO Mobile Telecom
R1-1718075 Discussion on beam indication ITRI
R1-1718192 Further Views on NR Beam Management NTT DOCOMO, INC.
R1-1718333 DL and UL Beam management MediaTek Inc.
R1-1718388 Beam Measurement and Reporting AT&T
R1-1718433 On beam indication, measurement, and reporting Ericsson
R1-1718482 Remaining issues on beam management InterDigital, Inc.
R1-1718511 Beam Indication, Measurements and Reporting Nokia, Nokia Shanghai Bell
R1-1718541 Beam management for NR Qualcomm Incorporated
R1-1718662 Considerations on UL beam management Sony
R1-1718865 WF on remaining details on SRS Tx beam association LG Electronics, Intel Corporation, InterDigital, KT Corporation, ZTE, Sanechips
R1-1719191 RRC parameters for R1-1719059 (WF on Beam Management) Samsung

7.2.2.4 Mechanism to recover from beam failure

R1-1718878 Summary for Remaing issues on Beam Failure Recovery MediaTek
R1-1718933 Offline discussion summary on Beam Failure Recovery MediaTek

Agreement:

- gNB response is transmitted via a PDCCH addressed to C-RNTI
  - FFS: DCI format for gNB response
- Dedicated CORESET(s) is applied for monitoring gNB response for BFRQ. The CORESET is down-selected from the following two alternatives:

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- Alt 1: the same CORESET (s) as before beam failure
- Alt 2: dedicatedly configured CORESET for beam failure recovery.

R1-1718982 **Way Forward on Candidate Beam Identification for Beam Failure Recovery** **Huawei, HiSilicon, LGE, Intel, Interdigital AT&T, vivo, Spreadtrum, Lenovo, Motorola Mobility Sharp, KT Corporation, OPPO, ZTE, SaneChips, Nokia, Nokia Shanghai Bell, China Telecom**
Also supported by Convida Wireless, WILUS Inc, Fujitsu

Agreement:
Specification supports the CSI-RS + SS block case for the purpose of new candidate beam identification

- The above case is configured by gNB
- Note: a dedicated PRACH resource is configured to either an SSB or a CSI-RS resource
- Following two scenarios are supported when a UE is configured with CSI-RS + SSB
  - Scenario 1: PRACHs are associated to SSBs only
    - In this scenario, CSI-RS resources for new beam identification can be found from the QCL association to SSB(s).
  - Scenario 2: Each of the multiple PRACHs is associated to either an SSB or a CSI-RS resource
- FFS: multiple SSB can be associated with the same uplink resource.

CATT has concerns on the above agreement that it may not be an essential feature for beam failure recovery

Working Assumption:

- Beam failure detection is determined based on the following quality measure:
  - Hypothetical PDCCH BLER

R1-1719174 **WF on Beam Failure Recovery** **MediaTek, Intel, Huawei, HiSilicon, ZTE, Sanechips, CHTTL**

Agreement:

- A beam recovery request can be transmitted if the number of consecutive detected beam failure instance exceeds a configured maximum number
  - (Working assumption) If hypothetical PDCCH BLER is above a threshold, it is counted as beam failure instance
    - Note: Beam failure is determined when all serving beams fail
  - The candidate beam can be identified when metric X of candidate beam is higher than a threshold
    - FFS: metric X
    - 1 or 2 threshold values are introduced
      - If 2 thresholds are introduced, one is for SSB and the other is for CSI-RS
    - One of the following alternatives will be down-selected in RAN1#91
      - Alt-1: Fixed value
      - Alt-2: Configurable value by RRC signaling
    - RAN2 should specify the RRC signaling to configuration of the threshold
  - Note: for beam failure detection, the UE should aware the transmission power offset between CSI-RS and DMRS of PDCCH
  - FFS other details.

Agreement:

- For gNB to uniquely identify UE identity from a beam failure recovery request transmission
  - A PRACH sequence is configured to UE

Working Assumption:

- At least the following parameters should be configured for dedicated PRACH resources for beam failure recovery
  - Per UE parameters
    - Preamble sequence related parameters
      - E.g., root sequence, cyclic shift, and preamble index
    - Maximum number of transmissions
    - Maximum number of power rampings
    - Target received power
    - Retransmission Tx power ramping step size
    - Beam failure recovery timer
  - Per dedicated PRACH resource parameters
    - Frequency location information
    - Time location, if it is only a subset of all RACH symbols (e.g., PRACH mask)
    - Associated SSB or CSI-RS information

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- Note: as a starting point, use initial access preamble transmission mechanism and parameters. If any issue is identified, new mechanism can be introduced.
  - No further RRC signalling for above UE parameters is required if reusing the same parameter as initial access

Email discussion to discuss the remaining beam failure recovery issues in slides 8, 9, 10 of R1-1719174
- Until Oct 27, Chia-Hao (MediaTek)

R1-1718334	Design details on beam failure recovery	MediaTek Inc.
R1-1718193	Views on Beam Recovery	NTT DOCOMO, INC.
R1-1718434	Basic beam recovery	Ericsson
R1-1717942	Discussion on beam failure recovery	LG Electronics
R1-1717302	Beam failure recovery design details	Huawei, HiSilicon
R1-1717369	Remaining issues on beam failure recovery	Intel Corporation
R1-1717425	Discussion on beam recovery	ZTE, Sanechips
R1-1717473	Discussion on beam failure recovery	vivo
R1-1717606	Beam failure recovery	Samsung
R1-1717867	Discussion of beam failure recovery	Lenovo, Motorola Mobility
R1-1718010	Discussions on Beam Failure Recovery	NEC
R1-1718055	Discussion on Beam Recovery Mechanism	Guangdong OPPO Mobile Telecom
R1-1718389	Beam Recovery for Full and Partial control channel failure	AT&T
R1-1718414	Discussion on mechanisms for beam failure recovery	Sharp
R1-1718457	Views on Beam Recovery Mechanism	National Instruments Corp.
R1-1718469	Views on remaining issues of beam failure recovery	CHTTL
R1-1718483	Remaining issues on beam failure recovery	InterDigital, Inc.
R1-1718512	Beam Recovery in NR	Nokia, Nokia Shanghai Bell
R1-1718542	Beam recovery procedures	Qualcomm Incorporated
R1-1718658	Considerations on beam recovery	Sony
R1-1719176	WF on new beam identification	Samsung, LGE

7.2.2.5 CQI and MCS

R1-1718849 **Summary for CQI and MCS** **AT&T**

Agreement:
Two separate CQI tables are supported for eMBB
- One for maximum modulation order is 256-QAM
- One for maximum modulation order is 64-QAM
- The target BLER for CQI tables is 10%
- Note: RRC signalling is used by gNB to select one of the above two tables

Agreement:
- N separate CQI table(s) are supported for URLLC
  - Downselect the value of N between 1 or 2
- Two target BLER are supported for URLLC
  - Note: RRC signalling is used by gNB to select one of the two target BLER
  - Note: The configuration of target BLER or CQI table is part of CSI report setting

Agreement:
- For CQI table of maximum modulation order of 64QAM, the CQI table from LTE Rel-8 is reused
- For CQI table of maximum modulation order of 256QAM, a CQI field size of 4 bits is supported
  - FFS on the details of the CQI table

Agreement:
- Two independent CQI fields are supported for WB CQI when two CWs is applied
  - Note: Differential WB CQI is not used for the two CWs

Agreement
For NR PDSCH MCS table, support two separate 5 bit tables for 64QAM and 256QAM and RAN1 will strive to reuse as many entries as possible

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- The 64QAM MCS table should be default unless the UE is configured to use 256QAM MCS table
- RRC signalling is used to choose between the two MCS tables

Agreement
For NR PUSCH MCS table (in case of CP-OFDM), support two separate 5 bit tables for 64QAM and 256QAM and RAN1 will strive to reuse as many entries as possible
- The 64QAM MCS table should be default unless the UE is configured to use 256QAM MCS table
- RRC signalling is used to choose between the two MCS tables

Agreement
For NR PUSCH MCS table (in case of DFT-s-OFDM), support two separate 5 bit tables for 64QAM and 256QAM and RAN1 will strive to reuse as many entries as possible
- The MCS table will include entries for PI/2 BPSK
- The 64QAM MCS table should be default unless the UE is configured to use 256QAM MCS table
- RRC signalling is used to choose between the two MCS tables
- Note: In the case a UE supports only up to 16QAM, the default table should be used

Agreement
The following fields are used in defining the MCS table:
- MCS index and a corresponding modulation order and target code rate x [1024]

R1-1718194 Views on MCS and MCS tables NTT DOCOMO, INC.
R1-1718543 Consideration for MCS table Qualcomm Incorporated
R1-1717607 CQI Definition Samsung

R1-1717303 CQI and MCS design Huawei, HiSilicon
R1-1717370 CQI/MCS for NRIntel Corporation
R1-1717426 On CQI and MCS ZTE, Sanechips
R1-1717474 Discussion on CQI and MCS vivo
R1-1717943 Discussion on CQI and MCS tables LG Electronics
R1-1718163 CQI and MCS Tables for pi/2 BPSK PUSCH IITH
R1-1718390 On Adaptive CQI and MCS Table configuration for NR AT&T
R1-1718435 Further Discussion on CQI and MCS Ericsson
R1-1718513 Consideration on new MCS and CQI table for NR Nokia, Nokia Shanghai Bell

7.2.2.6 Other

R1-1717427 Enhancements on CSI framework ZTE, Sanechips
R1-1717428 Details and evaluation results on beam reporting ZTE, Sanechips
R1-1717429 Details and evaluation results on beam indication ZTE, Sanechips
R1-1717430 Details of UL beam management ZTE, Sanechips
R1-1717608 CSI Acquisition and Beam Management Framework Samsung
R1-1717609 CSI Reporting for Reciprocity Operation Samsung
R1-1717610 Discusssion on Tx beam grouping configuration for multi-panel TRP and multi-TRP Samsung
R1-1717611 Discussion on CSI-RS Resource Allocation Samsung
R1-1717612 Discussion on beam indication for PDSCH Samsung
R1-1717613 Port selection codebook for beamformed CSI-RS Samsung
R1-1717614 Extension of Type I multi-panel codebook Samsung
R1-1717615 Differential reporting of Type II CSI Samsung
R1-1717616 On higher rank Type II CSI Samsung
R1-1717617 On codebook subset restriction Samsung
R1-1717618 L1 RSRP reporting for beam management Samsung
Late submission
R1-1717619 Discussions on service specific CSI for NR Samsung
R1-1717620 Discussion on beam indication for UL transmission Samsung
R1-1717621 Discussion on cross-carrier beam management Samsung
R1-1717622 DL beam management configuration Samsung
R1-1717623 Discussion on joint CLI measurement and beam management Samsung
R1-1717624 QCL associations for beam management RS Samsung
R1-1717625 L1-RSRP measurement duration Samsung
R1-1717626 Parameters for beam management Samsung

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R1-1717627 On beam indication Samsung
R1-1717814 General CSI framework for CSI acquisition and beam management CATT
R1-1717815 Details on interference measurement CATT
R1-1718008 Discussion on beam measurement and reporting ETRI
R1-1718195 Investigation on beam pattern design for beam management NTT DOCOMO, INC.
R1-1718196 Performance investigiation on beam reporting NTT DOCOMO, INC.
R1-1718238 Beam indication for control and data channels Huawei, HiSilicon
R1-1718239 Seamless beam failure recovery in a holistic mechanism Huawei, HiSilicon
R1-1718240 Network-side beam failure detection and new candidate beam identification Huawei, HiSilicon
R1-1718241 Beam indication for network-based beam failure recovery Huawei, HiSilicon
R1-1718242 Full reciprocity based CSI acquisition mechanism Huawei, HiSilicon
R1-1718243 CSI acquisition details for hybrid CSI Huawei, HiSilicon
R1-1718244 Encoding of Type I and Type II CSI parameters Huawei, HiSilicon
R1-1718245 Remaining issues for codebook subset restriction Huawei, HiSilicon
R1-1718415 CSI framework for NR Sharp
R1-1718436 Details of CSI framework Ericsson
R1-1718437 Signaling Overhead Analysis for CSI framework Ericsson
R1-1718438 On Dynamic Triggering for CSI Reports and CSI-RS Ericsson
R1-1718439 A comparison of CSI-RS activation schemes based on MAC CE and DCI Ericsson
R1-1718440 Further details of measurement restriction Ericsson
R1-1718441 Performance impact of inactive antenna ports Ericsson
R1-1718442 On semi-persistent CSI reporting on PUSCHEricsson
R1-1718443 On aperiodic and semi-persistent CSI reporting on PUCCH Ericsson
R1-1718444 NR CSI Computation Capability Ericsson
R1-1718445 Frequency parameterization for Type II CSI codebook Ericsson
R1-1718456 Further Details of Beam Failure Handling National Instruments Corp.
R1-1718544 Details of CSI framework Qualcomm Incorporated
R1-1718667 Considerations on CSI framework Sony
R1-1718698 Discussion on higher rank Type II codebook and feedback overhead reduction Motorola Mobility, Lenovo
R1-1718735 Details of CSI feedback for Transparent PDSCH TxDEricsson
R1-1718736 On codebook subset restriction Ericsson
R1-1718737 CSI feedback for multi-TRP Ericsson
R1-1718738 On multi-panel codebook extensionEricsson
R1-1718740 Multi-cell beam recovery Ericsson
R1-1718741 Beam management in C-DRX Ericsson
R1-1718742 Performance of beam management without beam indication Ericsson
R1-1718743 Analysis of beam indication signalling options Ericsson
R1-1718744 Details of SS beam reporting framework Ericsson
R1-1718745 Interactions between beam recovery and beam management Ericsson
R1-1718746 On common beam for PDSCH and PDCCH Ericsson
R1-1718747 On UL beam indication Ericsson
R1-1718748 CQI reporting for URLLC Ericsson
R1-1718757 Simulation results on system performance vs. CSI subband size Ericsson
R1-1718759 Performance evaluation for beam coordination considering dynamic TDD China Unicom

7.2.3 Reference signals and QCL

Highest priority in NR MIMO agenda items

R1-1717924 RS design for pi/2 BPSK PUSCH IITH

R1-1717986 PT-RS usage for Phase/frequency and Doppler/channel correction IITH
R1-1718683 Open issues on RRC parameters for Reference signals and QCL Ericsson

R1-1719073 WF on pre-DFT RS IITH, Mitsubishi, Deutsche Telekom, AT&T, IITM, CEWiT, Tejas Networks, Reliance Jio
Also supported by Qualcomm, IDC, National Instruments, KDDI, Softbank

Conclusion
Companies are encouraged to study if chunk based pre-DFT RS K>4 can be supported for enhanced channel estimation of DFT-S-OFDM PUSCH in future NR MIMO related study/work items

- FFS: values of K and other details (K is the number of samples in a chunk)

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7.2.3.1 Multiplexing of different types of RSs

R1-1718851 Summary for remaining issues of RS multiplexing Huawei, HiSilicon

Agreement:
When SS block and PDSCH are scheduled in the same symbols, DMRS and SS block can be in a same symbol.
- Above applies at least for the case where DMRS and SS block are not overlapping in the frequency domain
- Above applies at least for the case where SS block and DMRS are spatially QCL-ed
- Above applies at least for the case where the same subcarrier spacing is used for SS block and DMRS

Agreement:
Multiplexing schemes for TRS with DMRS/PDSCH/PDCCH/SS block follow the multiplexing schemes for CSI-RS with DMRS/PDSCH/PDCCH/SS block.

R1-1718987 Summary of offline for RS multiplexing Huawei, HiSilicon

Agreement:
A CSI-RS resource can be configured on RBs outside CORESET in CORESET symbols from UE perspective.
- Above applies at least for the case where PDCCH and CSI-RS are spatially QCL-ed, and FFS for multi-panel UEs
- FFS: Use case when the above is applicable (ex: CSI reporting for wideband and partial band)
- Note: CSI-RS BW discussion should be taken into account
- Above at least applies for non-slot based cases

Above feature is supported for slot-based transmissions as well

Agreement:
A CSI-RS resource can be configured on RBs outside PBCH RBs in the symbols containing SS block from UE perspective.
- Above applies at least for the case where SS block and CSI-RS are spatially QCL-ed, FFS for multi-panel UEs.
  - FFS: If non-QCLed, study UE's behavior
- Note: CSI-RS BW discussion should be taken into account. If beam management is agreed, the requirement on minimum BW for CSI acquisition and beam management may be different.
- Above applies at least for the case where the same subcarrier spacing is used for SS block and CSI-RS
- Down select following alternatives:
  - Alt.1 Above applies for the cases: CSI-RS used for beam management and CSI acquisition
  - Alt.2 Above applies for the cases: CSI-RS only used for CSI acquisition
  - Alt.3 Above applies for the cases: CSI-RS only used for beam management

R1-1717475	On multiplexing of different types of RSs	vivo
R1-1717371	On multiplexing of different RS types	Intel Corporation
R1-1717304	Multiplexing different types of RSs for DL and UL	Huawei, HiSilicon
R1-1717431	Discussion on multiplexing of different RSs	ZTE, Sanechips
R1-1717628	Discussion on DL/UL RS multiplexing	Samsung
R1-1717744	Consideration on DL RS multiplexing	Spreadtrum Communications
R1-1717816	Consideration on RS multiplexing	CATT
R1-1717881	Discussion on multiplexing of different types of RSs	CMCC
R1-1717944	On multiplexing of different types of RSs	LG Electronics
R1-1718027	Discussion on RS multiplexing	Guangdong OPPO Mobile Telecom
R1-1718350	On RS multiplexing	MediaTek Inc.
R1-1718391	Multiplexing different type of RSs	AT&T
R1-1718446	On multiplexing of RS types	Ericsson
R1-1718514	On multiplexing of different RS types	Nokia, Nokia Shanghai Bell
R1-1718545	On multiplexing of different types of RSs	Qualcomm Incorporated
R1-1718972	WF on FDM of CSI-RS and SSB	Samsung, NTT DOCOMO, LGE

7.2.3.2 Remaining details on CSI-RS

R1-1718841 Summary of remaining issues on CSI-RS Huawei, HiSilicon

Agreement:
The starting subcarrier of a CSI-RS component RE pattern
- For 1 port CSI-RS, there is no restriction
- For Y=2, is constrained to be one among even subcarriers, in the given PRB (indexed from 0)

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- For Y=4, is constrained to be one among subcarriers 0, 4, 8, in the given PRB (indexed from 0)

Agreement:
At least {8, 9, 10, 11}-th OFDM symbol in a slot structure can be configured for CSI-RS transmission, in addition to the {6, 7, 13, 14}-th OFDM symbol. Note: the symbol locations assume that symbol indexing starts at 1.
- FFS: Other OFDM symbols

R1-1718947 Summary of offline discussions on CSI-RS Huawei, HiSilicon

Agreement:
Support configuring CSI-RS resource on BWP with a transmission BW equal to or smaller than the BWP. When the CSI-RS BW is smaller than the BWP, support at least the case that CSI-RS spans contiguous RBs in the granularity of N RBs, where the value of N is FFS.
- When CSI-RS BW is smaller than the corresponding BWP, it should be larger than X RBs (FFS: value of X)
- FFS: Whether the value of X is same or different for beam management and CSI acquisition
- FFS: The value of X may or may not be numerology-dependent

Agreement:
NR supports the following CSI-RS transmission periodicities
- {5, 10, 20, 40, 80, 160, 320, 640} slots
- FFS: Restriction on periodicity as a function of subcarrier spacing

Agreement:
Support assigning CSI-RS port index within a CDM group first, then across CDM groups (analogous to LTE). FFS: order of CDM groups, e.g., frequency first or time first.

Conclusion:
Companies are encouraged to review the list of open issues in R1-1718947 and other CSI-RS open issues especially those with impact to RAN2
- Email discussion until 27th of Oct on CSI-RS open issues with RAN2 impact to be coordinated by Xi (Huawei)

Agreement:
For each of the following RSs, c_init used for sequence generation will at least depend on UE specifically configured scrambling ID by RRC configuration
- DL: DMRS, CSI-RS resource
  - FFS: Support of multiple IDs for DMRS
- UL: DMRS(for CP-OFDM), PTRS(for DFT-s-OFDM)

R1-1718882 WF on Remaining details on CSI-RS design LG Electronics, Samsung, CATT, MediaTek Inc
Also supported by IDC

R1-1717629	**Remaining details on CSI-RS**	**Samsung**
R1-1718546	Discussion on CSI-RS design	Qualcomm Incorporated
R1-1718447	Details on CSI-RS design	Ericsson
R1-1717305	CSI-RS design in NR	Huawei, HiSilicon
R1-1717372	Remaining details on CSI-RS	Intel Corporation
R1-1717432	On CSI-RS for CSI acquisition and beam management	ZTE, Sanechips
R1-1717476	Discussion on CSI-RS	vivo
R1-1717817	Remaining issues on CSI-RS	CATT
R1-1717945	On CSI-RS design	LG Electronics
R1-1718028	Disussion on CSI-RS design	Guangdong OPPO Mobile Telecom
R1-1718197	Remaining details on CSI-RS	NTT DOCOMO, INC.
R1-1718392	On the details of CSI-RS design	AT&T
R1-1718515	Remaining issues on CSI-RS design	Nokia, Nokia Shanghai Bell
R1-1718971	WF on CSI-RS periodicity and offset	Samsung, CATT, MediaTek, LGE, CHTTL

7.2.3.3 Remaining details on DMRS

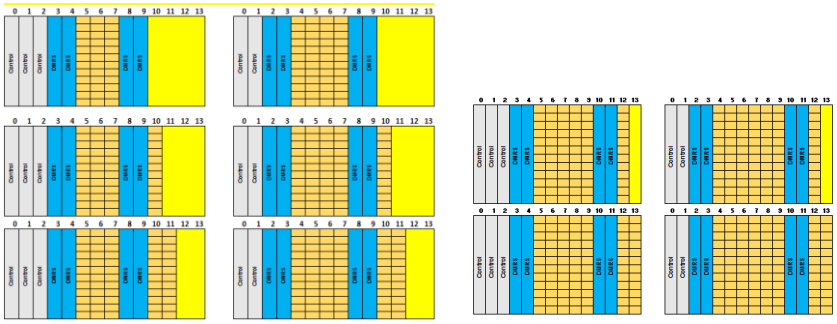
Including remaining details of pi/2-BPSK for PUSCH

Petitioners' Exhibit 1007, p. 699
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R1-1718810 **Remaining issues on NR DM-RS Qualcomm**

Agreement:

- For slot-based scheduling, for PDSCH, for the 2-symbol front-load DMRS, the 2-symbol additional DMRS symbol is configured in
  - the {9th-10th} symbol
    - for PDSCH spanning to the 10th or 11th or 12th symbol of the slot
  - the {11th-12th} symbol
    - for PDSCH spanning to the 13th or 14th symbol of the slot



Agreement:

- For the 2-symbol non-slot based scheduling, no additional DMRS can be configured
- For the 4-symbol non-slot based scheduling, no additional DMRS can be configured
- For the 7-symbol non-slot based scheduling, one additional DMRS can be configured
- FFS: Location of the front-loaded DMRS

R1-1719182 **Remaining issues on NR DM-RS Qualcomm**

Emails discussion on the DMRS of 2/4/7-symbol for non-slot based scheduling

- Until Oct 27 – Alex (Qualcomm)

Agreement:

- For the location of the first position of front-load DMRS for PUSCH without frequency hopping, support at least the following:
  - The first OFDM symbol with respect to the scheduled data contains the first symbol of front-load UL DMRS
    - Study further when this is applied; E.g., in case of a mixed DL/UL slot from network perspective, or for PUSCH starting from the Xth symbol with X>1, etc.
  - The 3rd or 4th symbol of the slot contains the first symbol of front-load DMRS
    - At least same location for UL and DL is supported
      - Study further whether the first position of front-load DMRS for PUSCH can be different than the first position of front-load DMRS for PDSCH.
    - Study further when this is applied. E.g., in case of a UL only slot from network perspective, or for PUSCH starting the 1st symbol, etc.
- FFS: Further restrictions (if any) of FDMing DMRS and PUSCH due to UE processing timeline

R1-1718969 **Remaining issues on NR DM-RS Qualcomm**

Agreement:

For the PUSCH without a hop when the first symbol of the front-load DMRS is located in the 3rd or 4th symbol of the slot

- reuse DL DMRS locations for UL DMRS with respect to the additional DMRS symbols and reuse the scenarios they are applied with respect to the last PUSCH symbol.
- Note: This applies to both NCP and ECP whenever applicable.

For RAN1#91: Study further until next meeting whether NR should support in addition to a comb-2 DMRS structure, a DMRS structure with RPF=1 for DFT-s-OFDM.

Agreement:

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Any configured DMRS port indication table supports SU-MIMO scheduling.
The maximum number of ports per UE in SU-MIMO

- DMRS configuration type 1 with 1-symbol DMRS
  - 4 for DL, 4 for UL
- DMRS configuration type 1 with 2-symbol DMRS
  - 8 for DL, 4 for UL
- DMRS configuration type 2 with 1-symbol DMRS
  - 6 for DL, 4 for UL
- DMRS configuration type 2 with 2-symbol DMRS
  - 8 for DL, 4 for UL

Agreement:
The maximum number of orthogonal ports per UE in MU-MIMO for

- DMRS configuration type 1 with 1-symbol DMRS
  - 2 for DL
- DMRS configuration type 1 with 2-symbol DMRS
  - 4 for DL
- DMRS configuration type 2 with 1-symbol DMRS
  - 4 for DL
- DMRS configuration type 2 with 2-symbol DMRS
  - 4 for DL

Proposal:
For pi/2 BPSK PUSCH, RS design should be such that PAPR of RS is similar to data

- The design should also consider cross correlation properties with NR/LTE DMRS, BLER, and effect of spectrum shaping

Email discussion on RS design based on pi/2 BPSK for DFT-s-OFDM

- Until Oct 27 – Kiran (Indian Institute of Tech (H))

Agreement:
For the PN sequence for CP-OFDM, QPSK modulated DMRS is derived from the

- Alt. 1: length-31 Gold sequence (as in LTE)
- Alt. 2: length-63 Gold sequence

Agreement:
A UE is configured for the number of front-load DMRS symbols for PUSCH and PDSCH DMRS with the following signaling method:

- The maximum number is configured with higher-layer signaling and the actual number with DCI using DMRS-table-based indication

Agreement:
At least the following information is included in DCI as part of downlink DMRS port assignment:

- Scheduled downlink DMRS ports
- Potential presence of co-scheduled downlink DMRS CDM groups for rate matching
  - FFS: Whether the presence of co-scheduled downlink DMRS port(s) within the assigned downlink DMRS CDM group is supported or not
  - There are no dedicated bits for rate matching around DMRS CDM group(s)

At least the following information is included in DCI as part of uplink DMRS port assignment for CP-OFDM:

- Scheduled uplink DMRS ports
- Uplink DMRS CDM groups for rate matching
  - There are no dedicated bits for rate matching around DMRS CDM group(s)

Agreement
A UE in MU-MIMO should be scheduled ports first within a specific CDM group, and then across CDM groups from UE perspective

- The ports within the same CDM group should be QCL-ed
- The above applies for the case of single TRP

Agreement:

- For DMRS for DFT-s-OFDM PUSCH with a hop, at least one DMRS symbol is included in each hop.

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- For DMRS for DFT-s-OFDM PUSCH with a hop, at least support the first DMRS of the 2nd hop to be located on the first symbol of the PUSCH within that hop.
  - FFS: another case for the location first DMRS of the 2nd hop in cases of collision with reserved resources on the uplink.

Agreement:
For DMRS for DFT-s-OFDM PUSCH with a hop, support first DMRS of the 1st hop to be located on the
- The first OFDM symbol with respect to the scheduled data contains the first symbol of front-load UL DMRS
  - Study further when this is applied; E.g., in case of a mixed DL/UL slot from network perspective, or for PUSCH starting from the Xth symbol with X>1, etc.
- FFS: The 3rd or 4th symbol of the slot contains the first symbol of front-load DMRS for the 1st hop
  - At least same location for UL and DL is supported
    - Study further whether the first position of front-load DMRS for PUSCH can be different than the first position of front-load DMRS for PDSCH.
  - Study further when this is applied. E.g., in case of a UL only slot from network perspective, or for PUSCH starting the 1st symbol, etc
- FFS: another case for the location first DMRS of the 1st hop in cases of collision with reserved resources on the uplink.

R1-1718965 WF on DMRS configuration for MU-MIMO LG Electronics, Qualcomm, Ericsson, Nokia, Nokia Shanghai Bell, Panasonic, Samsung, CATT, Intel, ZTE, Sanechips

R1-1719187 WF on DMRS configuration for MU-MIMO LG Electronics, Qualcomm, Ericsson, Nokia, Nokia Shanghai Bell, Panasonic, Samsung, CATT, Intel, ZTE, Sanechips, Huawei, HiSilicon, MediaTek, AT&T, NTT DOCOMO, vivo

Agreement:
- In Rel. 15, at least for PDSCH, a UE is not expected to assume co-scheduled MU-UE(s) with different DMRS configuration with respect to the followings:
  - The actual number of front-loaded DMRS symbol(s)
  - The number of additional DMRS
  - The DMRS symbol location
  - DMRS configuration type.

R1-1717310 Signaling of DMRS ports for SU/MU-MIMO Huawei, HiSilicon
R1-1717373 On the remaining details of DM-RS Intel Corporation
R1-1717433 Remaining details on DL DMRS and UL DMRS ZTE, Sanechips
R1-1717477 Remaining details on DMRS design vivo
R1-1717630 Remaining details on DMRS Samsung
R1-1717745 Remaining issues on DMRS for CP-OFDM Spreadtrum Communications
R1-1717818 Remaining issues on DMRS CATT
R1-1717853 Remaining issues on DMRS Lenovo, Motorola Mobility
R1-1717946 On DMRS design LG Electronics
R1-1718002 Discussion on DMRS design ETRI
R1-1718011 Remaining issues on DMRS configurations NEC
R1-1718198 Remaining details on DM-RS NTT DOCOMO, INC.
R1-1718271 Discussion on remaining details of DMRS design KT Corp.
R1-1718351 On remaining details of downlink DMRS MediaTek Inc.
R1-1718367 On remaining details of NR DL DMRS Panasonic
R1-1718393 Remaining details for DMRS design AT&T
R1-1718448 Details on DMRS design Ericsson
R1-1718466 Views on DL DMRS designs Mitsubishi Electric Corp
R1-1718516 On remaining issues of DM-RS for NR physical data channels Nokia, Nokia Shanghai Bell
R1-1718525 Remaining details on DL DMRS for NR ITL
R1-1718547 Remaining details on DMRS Qualcomm Incorporated
R1-1719180 WF on the DMRS power boosting principle LG Electronics, KT Corp., Nokia, Nokia Shanghai Bell

7.2.3.4 Remaining details on PT-RS

R1-1718845 Summary of PTRS open issues Ericsson

Petitioners' Exhibit 1007, p. 702
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R1-1718998 **JOINT WF on PTRS** **Huawei, HiSilicon, Intel, Samsung, ZTE, Sanechips, IITH, CEWiT, IITM, Tejas Networks, Reliance Jio, Panasonic, InterDigital, Mitsubishi, National Instruments, NEC, LG Electronics, NTT DOCOMO, KT, ATSRI, Ericsson, Nokia, NSB, OPPO, AT&T, MediaTek, CMCC, Qualcomm, CATT, Vodafone**
The contents of R1-1718998 are agreed

R1-1719018 **WF on pre-DFT PT-RS pattern for DFTsOFDM** **Mitsubishi Electric, Ericsson, Nokia, NSB, IITH, IITM, CeWit, Tejas Networks, Reliance Jio, Spreadtrum, Sony, CMCC, Interdigital, Huawei, HiSilicon, AT&T, Samsung, ZTE, Sanechips, Sharp, vivo, Lenovo, Motorola Mobility, NEC, Vodafone, CHTTL, National Instruments, CATT, Intel, LG Electronics, Qualcomm**

Agreement:

- For chunk-based pre-DFT PTRS insertion for DFTsOFDM with X chunks of size K={2,4}, support the following
  - For K=2, the samples in DFT domain are divided in X intervals, and the chunks are located in each interval in samples n to n+K-1 where the n is FFS
  - For K=4, the samples in DFT domain are divided in X intervals, where in the first interval the chunk is placed in the Head (first K samples), in the last interval the chunk is placed in the Tail (last K samples), and in the rest of intervals the chunk is placed in the middle of each of the two intervals
  - For PTRS for DFT-s-OFDM, support a RRC parameter « *UL-PTRS-frequency-density-transform-precoding* » indicating a set of thresholds **T**={N_{RBn},n=0,1,2,3,4}, per BWP that indicates the values of X and K the UE should use depending on the scheduled BW according to the table below

Scheduled BW	X x K
$N_{RB0}<N_{RB} \leq N_{RB1}$	2x2
$N_{RB1}<N_{RB} \leq N_{RB2}$	2x4
$N_{RB2}<N_{RB} \leq N_{RB3}$	4x2
$N_{RB3}<N_{RB} \leq N_{RB4}$	4x4
$N_{RB} > N_{RB4}$	Yx4

    - FFS default UE behaviour before RRC configuration, if needed
    - FFS value of Y (if different than 4)
    - FFS whether thresholds are MCS dependent
    - Note: N_{RB0} can be equal to 0; when N_{RB0} is larger than 0, no PTRS is present for allocations less than or equal to N_{RB0}
    - Note: The use of a specific pattern can be disabled by setting $N_{RBi}=N_{RBi+1}$ on the corresponding line in the previous table
  - Possible PTRS presence/absence is configured through an RRC parameter « *UL-PTRS-present-transform-precoding* »
  - Time-domain PTRS density is configured by an RRC parameter « UL-PTRS-time-density-transform-precoding » where supported time densities are L_{PT-RS}={1,2}
    - Note: Time-domain pattern depends on DM-RS positions using the same principle as agreed for CP-OFDM PTRS mapping
- FFS: Whether to introduce (K=1, X=16) and the impacts on existing design. If supported, K={1,2,4} is supported and the following applies
  - The samples in DFT domain are divided in X intervals, and the chunks (K=1) are located in the middle of each interval
  - (K=1, X=16) applies when $N_{RB4}<N_{RB} \leq N_{RB5}$, and Yx4 applies for $N_{RB} > N_{RB5}$

R1-1717306 Further details of PTRS Huawei, HiSilicon
R1-1717374 Remaining details on PT-RS Intel Corporation
R1-1717434 Remaining details on PT-RS ZTE, Sanechips
R1-1717478 Discussion on the remaining details on PT-RS vivo
R1-1717631 Discussion on PT-RS Samsung
R1-1717746 Remaining issues on PT-RS Spreadtrum Communications
R1-1717779 PT-RS design Panasonic Corporation
R1-1717819 Remaining issues on PT-RS CATT
R1-1717854 Remaining issues on PTRS Lenovo, Motorola Mobility
R1-1717882 Discussion on PT-RS design CMCC
R1-1717947 On PT-RS design LG Electronics
R1-1718012 Remaining issues on PTRS configurations NEC
R1-1718072 PT-RS support for pi/2 BPSK PUSCH IITH
R1-1718199 Remaining details on PT-RS NTT DOCOMO, INC.
R1-1718449 Details on PT-RS design Ericsson

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R1-1718517 On remaining details of PT-RS design Nokia, Nokia Shanghai Bell
R1-1718548 PTRS considerations Qualcomm Incorporated
R1-1718825 Remaining issues on PT-RS InterDigital, Inc.
R1-1718854 On chunk-based PTRS for UL DFTsOFDM waveform Mitsubishi Electric RCE
R1-1719071 RRC parameters for PTRS Ericsson

7.2.3.5 Remaining details on SRS

Including SRS carrier based switching

R1-1718774 Summary of SRS Sony

Agreement: NR supports a single SRS bandwidth table consist of multiple value of C_SRS and 4 values of B_SRS.

Agreement: The frequency domain starting position of a SRS allocation (analogous to K0_P in LTE) is UE specifically configurable such that it is aligned on a common grid with 4 PRB granularity defined on a wideband CC from network perspective

- Note: This can enable alignment of SRS resources of different UEs with partially overlapped BWPs multiplexed on the same comb

Agreement: NR support for a maximum of 12 CS for comb 4 and a maximum at least 8 CS for comb 2.

- FFS: configuration of fewer than the maximum number defined cyclic shifts

Agreement: NR supports intra-slot and inter-slot frequency hopping within a BWP.

- FFS: if the same hopping formula as in LTE can be used
- FFS: aperiodic/semi-persistent/periodic SRS for each hopping type (intra-/inter-slot)
- FFS: number of OFDM symbols per SRS resource for each hopping type (intra-/inter-slot)
- FFS: Whether independent ON/OFF configurations for intra-slot and inter-slot frequency hopping for one SRS resource

Agreement: NR supports gNB to configure SRS resource in time domain only by UE-specific parameters, e.g., by {SRS-SlotConfig, SRS-ResourceMapping}

R1-1718980 Summary of SRS Sony

Agreement:
NR supports 17 unique rows in LTE for SRS BW <=96 PRBs.
In addition to 17 unique rows in LTE, additional rows for <=96 PRBs is not prohibited.

Agreement: For group and sequence hopping, both group hopping and sequence hopping are supported as in LTE

R1-1718985 WF on prioritization between SRS and short PUCCH transmission in case of collision Mitsubishi Electric, LG, ZTE, Sanechips, Nokia, NSB, Sony, InterDigital, Ericsson
Also supported by Samsung and Intel

Agreement:

- In the case of collision of SRS and short PUCCH carrying only CSI report/beam failure recover request, support the prioritization rules in the table below:
  - The channel listed in the entries below are prioritized

	Aperiodic SRS	**Semi-persistent SRS**	**periodic SRS**
sPUCCH with aperiodic CSI report only	No rule**	sPUCCH	sPUCCH
sPUCCH with semi persistent CSI report only	SRS	sPUCCH	sPUCCH
sPUCCH with periodic CSI report only	SRS	sPUCCH	sPUCCH
sPUCCH with beam failure recover request*	sPUCCH	sPUCCH	sPUCCH

- In case SRS is dropped, dropping can be partial in time domain, i.e., only those OFDM symbols that collide with short PUCCH

*If short PUCCH is supported for beam failure recovery request and collision between short PUCCH with beam failure recovery request and aperiodic/semi persistent/periodic SRS occurs, prioritize short PUCCH
** UE can assume that this collision will not occur

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R1-1718993 **Way Forward on SRS Switching among CCs and Bandwidth Parts Huawei, HiSilicon, AT&T, CMCC, Samsung, Softbank, Vodafone**

Agreement:

- Specify NR SRS switching among CCs similar to Rel-14 LTE SRS carrier-based switching design including
  - Periodic/aperiodic/semi-persistent SRS on a CC without PUCCH/PUSCH configured
  - TA (through PRACH) on TAG without PUSCH/PUCCH configured
  - Power control separated from that of PUSCH
  - Group common DCI for aperiodic SRS triggering and TPC
  - DL/UL interruptions and collision handling due to SRS switching

R1-1718968 **WF on SRS for NR** **Ericsson, Qualcomm, Huawei, HiSilicon, ZTE, Sanechips, Mitsubishi, Sony, Nokia, NSB, NTT Docomo, AT&T, China Unicom, China Telecom, Vodafone, Intel, Samsung, Verizon**
Slides 13, 14, 15 in R1-1718968 are agreed.

Agreement:

- An X-port SRS resource spans N = 1, 2, or 4 adjacent OFDM symbols within the same slot where all X ports are mapped to each symbol of the resource
  - When frequency hopping only is configured, the X ports are mapped to potentially different sets of subcarriers in each OFDM symbol of the resource, depending on the hopping pattern
  - For N = 4, frequency hopping + repetition can be configured where the the X ports are mapped to a different set of subcarriers in the second pair OFDM symbol(s) of the resource
    - Note: Symbol pairs are adjacent
  - Note: same comb is assumed for different sets of subcarriers
  - Note: hopping pattern is within the tree structure defined by a given C_SRS, B_SRS, and b_hop
  - Note: When repetition only is configured, the mapping is covered by previous agreement in RAN1#90:
    - "Each of the X ports are mapped to the same set of subcarriers in the same set of PRBs in the N SRS symbols."
  - NCP SRS resource definition is reused for ECP
- FFS: SRS transmission repetition within a slot can be at different power levels to account for relative phase discontinuities from multiple UE Tx chains

Agreement:
The following SRS bandwidths are supported in NR:

	B_{SRS} = 0		B_{SRS} = 1		B_{SRS} = 2		B_{SRS} = 3	
C_{SRS}	$m_{SRS,0}$	N_0	$m_{SRS,1}$	N_1	$m_{SRS,2}$	N_2	$m_{SRS,3}$	N_3
0	4	1	4	1	4	1	4	1
1	8	1	4	2	4	1	4	1
2	12	1	4	3	4	1	4	1
3	16	1	4	4	4	1	4	1
4	16	1	8	2	4	2	4	1
5	20	1	4	5	4	1	4	1
6	24	1	4	6	4	1	4	1
7	24	1	12	2	4	3	4	1
8	28	1	4	7	4	1	4	1
9	32	1	16	2	8	2	4	2
10	36	1	12	3	4	3	4	1
11	40	1	20	2	4	5	4	1
12	48	1	16	3	8	2	4	2
13	48	1	24	2	12	2	4	3
14	52	1	4	13	4	1	4	1
15	56	1	28	2	4	7	4	1
16	60	1	20	3	4	5	4	1
17	64	1	32	2	16	2	4	4
18	72	1	24	3	4	6	4	1
19	72	1	36	2	12	3	4	1

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20	76	1	4	19	4	1	4	1
21	80	1	40	2	20	2	4	5
22	88	1	44	2	11	4	4	1
23	96	1	32	3	16	2	4	4
24	96	1	48	2	24	2	4	6
25	104	1	52	2	4	13	4	1
26	112	1	56	2	28	2	4	7
27	120	1	60	2	20	3	4	5
28	120	1	40	3	8	5	4	2
29	120	1	24	5	12	2	4	1
30	128	1	64	2	32	2	4	8
31	128	1	64	2	16	4	4	4
32	128	1	16	8	8	2	4	2
33	132	1	44	3	4	11	4	1
34	136	1	68	2	4	17	4	1
35	144	1	72	2	36	2	4	9
36	144	1	48	3	24	2	12	2
37	144	1	48	3	16	3	4	4
38	144	1	16	9	8	2	4	2
39	152	1	76	2	4	19	4	1
40	160	1	80	2	40	2	4	10
41	160	1	80	2	20	4	4	5
42	160	1	32	5	16	2	4	4
43	168	1	84	2	28	3	4	7
44	176	1	88	2	44	2	4	11
45	184	1	92	2	4	23	4	1
46	192	1	96	2	48	2	4	12
47	192	1	96	2	24	4	4	6
48	192	1	64	3	16	4	4	4
49	192	1	24	8	8	3	4	2
50	208	1	104	2	52	2	4	13
51	216	1	108	2	36	3	4	9
52	224	1	112	2	56	2	4	14
53	240	1	120	2	60	2	4	15
54	240	1	80	3	20	4	4	5
55	240	1	48	5	16	3	8	2
56	240	1	24	10	12	2	4	3
57	256	1	128	2	64	2	4	16
58	256	1	128	2	32	4	4	8
59	256	1	16	16	8	2	4	2
60	264	1	132	2	44	3	4	11
61	272	1	136	2	68	2	4	17
62	272	1	136	2	44	4	4	11
63	272	1	16	17	8	2	4	2

R1-1719149 **Offline discussion on SRS configuration table** **CATT**

Agreement

- LTE SRS configuration tables are starting point for NR SRS configuration table design.
- At least 2, 5, 10, 20, 40, 80, 160, 320 slots periodicity are supported for 15KHz SCS
  - FFS on additional periodicities for other numerologies

FFS: supported slot offset for each supported numerology

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R1-1717435 Discussion on SRS design for NR ZTE, Sanechips
R1-1717307 UL SRS design for beam management and CSI acquisition Huawei, HiSilicon
R1-1718467 Views on SRS designs Mitsubishi Electric Corp

R1-1717375 Discussion on SRS for NR Intel Corporation
R1-1717479 Discussion on SRS design vivo
R1-1717632 Remaining details on SRS Samsung
R1-1717820 Further discussion on remaining issues on SRS CATT
R1-1717948 On SRS design and related operations LG Electronics
R1-1718029 Further discussion on SRS design for NR Guangdong OPPO Mobile Telecom
R1-1718200 Discussions on NR SRS Design NTT DOCOMO, INC.
R1-1718338 Remaining details on SRS MediaTek Inc.
R1-1718450 Details on SRS design Ericsson
R1-1718485 Remaining issues on SRS InterDigital, Inc.
R1-1718518 Remaining details on SRS design in NR Nokia, Nokia Shanghai Bell
R1-1718549 Remaining details on SRS Qualcomm Incorporated
R1-1718659 Considerations on SRS design Sony

7.2.3.6 Remaining details on TRS

R1-1718857 Summary of TRS remaining details MediaTek Inc.

Agreement
Following TRS BWs are supported in NR
- min(BWP, ~50RBs)
- FFS: BWP

UE is not expected to receive TRS outside the BWP
TRS RB position is configured by gNB

Agreement: TRS can be configured on a carrier or on an active BWP when SS block is not present

Conclusion:
Periodic SS burst and periodic TRS burst can be arranged such that the UE can utilize one SS burst and one TRS burst for AGC adjustment and T/F tracking before DRX ON
- No further specification impact may be necessary

R1-1719148 Summary of TRS offline discussion MediaTek

Agreement
- For **N**=2+2, **X**=2, TRS symbols have the same symbol positions in the two consecutive slots
- DMRS and TRS are at least TDMed from UE perspective
- One of the following symbol positions per slot can be configured by RRC,
  - Option 1: symbol 4 and 8 (symbol index starts from 0)
  - Option 2: symbol 5 and 9
  - Option 3: symbol 6 and 10
  - Note 1: Potential down selection can be done until next meeting. It is not limited to select only one option
  - Note 2: RRC signaling to configure TRS as above can be related to the existing RRC signaling for DMRS, CSI-RS, etc.
  - Note 3: It is not precluded to have additional options

R1-1719133 WF on TRS design MediaTek

Agreement:
- TRS can be configured as one-port CSI-RS resource(s) with the agreed parameters on St, Sf, N, B, X and Y
  - FFS on one or multiple resources
  - Note: TRS is also supported in above-6GHz
    - FFS on the parameters X, N, St
    - FFS: TRS periodicity
  - For below 6GHz, TRS periodicity 10ms, 20ms, 40ms and 80ms are supported
    - For RAN4 information, 10ms is introduced for high speed train scenario
    - Note: It is up to the editor to capture the periodicity in units of slots
  - TRS BW can be equal to BW of BWP

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- UE is not expected to be simultaneously configured with TRS BW equal to BWP and TRS periodicity of 10ms if the BWP is larger than 50 RBs
- FFS on CSI-RS measurement restriction functionality can be configured between TRS bursts
- Sf=4
  - FFS: Additional Sf values
- for below 6GHz
  - FFS on X=1

R1-1718352 **On remaining details of TRS MediaTek Inc.**
R1-1718451 Details on TRS design Ericsson
R1-1717747 Remaining issues on TRS Spreadtrum Communications
R1-1718550 Remaining issues on TRS Qualcomm Incorporated

R1-1717308 Reference signal for fine time and frequency tracking Huawei, HiSilicon
R1-1717376 Remaining Details on TRS Intel Corporation
R1-1717436 Remaining details on TRS ZTE, Sanechips
R1-1717480 Discussion on TRS vivo
R1-1717633 Remaining details on TRS Samsung
R1-1717949 Discussion on fine time/frequency tracking of channel LG Electronics
R1-1718519 Remaining details of TRS design Nokia, Nokia Shanghai Bell

7.2.3.7 Remaining details on QCL

R1-1718863 **Summary of QCL Nokia, Nokia Shanghai Bell**

Agreement:
Observation 1 QCL after RRC for below 6GHz
- SSB → TRS: Doppler shift, average delay
- Support type B

Agreement: SP CSI-RS is activated with RRC + MAC CE

Agreement: The following P/SP/AP CSI-RS signaling options are supported:

QCL parameter	Reference RS	Target RS	Signalling mode	Reference RS and Target RS should belong to the same CC/BWP or not
Spatial	SSB	P CSI-RS	RRC	Can be on different CCs/BWPs
Spatial	SSB	SP CSI-RS	SP CSI-RS activation signal	Can be on different CCs/BWPs
Spatial	P CSI-RS	Another P CSI-RS	RRC	Can be on different CCs/BWPs
Spatial	SSB or P/SP CSI-RS	AP CSI-RS	RRC or RRC+MAC CE for configuration, indication with DCI	Can be on different CCs/BWPs

R1-1719069 **Summary of offline discussions on QCL Nokia, Nokia Shanghai Bell**

Working Assumption: After RRC for above 6 GHz
- SSB → [TRS - if is supported for above 6GHz] w.r.t average delay, Doppler shift, spatial RX parameters
- SSB → CSI-RS for BM w.r.t. [average delay, Doppler shift], spatial RX parameters
- SSB → CSI-RS for CSI w.r.t. [average delay, Doppler shift], spatial RX parameters
- SSB → DMRS for PDCCH (before TRS is configured) w.r.t. [average delay, Doppler shift, delay spread, Doppler spread], spatial RX parameters
- SSB → DMRS for PDSCH w.r.t. [average delay, Doppler shift, delay spread, Doppler spread], spatial RX parameters
- CSI-RS for BM → DMRS for PDCCH w.r.t. [average delay, Doppler shift, delay spread, Doppler spread], spatial RX parameters
- CSI-RS for BM → DMRS for PDSCH w.r.t. [average delay, Doppler shift, delay spread, Doppler spread], spatial RX parameters
- CSI-RS for CSI → DMRS for PDSCH w.r.t. average delay, Doppler shift, delay spread, Doppler spread, [spatial RX parameters]
- CSI-RS for BM → CSI-RS for CSI w.r.t. spatial RX parameters

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R1-1719186 WF on aperiodic CSI-RS triggering ZTE, Sanechips, Samsung, LG Electronics, NTT DOCOMO, Qualcomm, Intel, ASTRI, Verizon, KDDI, IITH, CEWiT, IITM, Tejas Networks, CHTTL, Sharp, NEC, MediaTek, KT Corporation, Nokia, NSB

R1-1718452 Details on QCL Ericsson
R1-1717377 On QCL for NR Intel Corporation
R1-1718769 Remaining details on QCL Nokia, Nokia Shanghai Bell (Revision of R1-1718520)

R1-1717309 Details of QCL assumptions and related RS design considerations Huawei, HiSilicon
R1-1717437 QCL design for UL and DL MIMO ZTE, Sanechips
R1-1717481 Discussion on QCL vivo
R1-1717634 Remaining details on QCL Samsung
R1-1717821 On QCL for NR CATT
R1-1717950 Discussion on QCL for NR LG Electronics
R1-1718057 Discussion on Remaining Issues of QCL Guangdong OPPO Mobile Telecom
R1-1718201 Remaining Issues on QCL Design for NR NTT DOCOMO, INC.
R1-1718394 on the remaining details of QCL configuration AT&T
R1-1718486 Remaining issues on QCL InterDigital, Inc.
R1-1718551 Discussion on QCL Qualcomm Incorporated

7.2.3.8 Other

R1-1717635 Discussion on DMRS port scheduling for UL MIMO reception Samsung
R1-1717636 PTRS design for 40 GHz and higher frequency bands Samsung
R1-1717637 Evaluations on pre-DFT PTRS insertion Samsung
R1-1718202 Views on DM-RS for mini-slot NTT DOCOMO, INC.
R1-1718246 SRS antenna switching Huawei, HiSilicon
R1-1718247 Evaluation results of DMRS design for DL/UL data channel Huawei, HiSilicon
R1-1718248 Common UL/DL DMRS design Huawei, HiSilicon
R1-1718249 Considerations on UE-specific RS Sequence Design Huawei, HiSilicon
R1-1718250 DMRS design for URLLC Huawei, HiSilicon
R1-1718251 SRS switching among CCs and bandwidth parts Huawei, HiSilicon
R1-1718453 Antenna port mapping tables Ericsson
R1-1718454 On the collission between DMRS and DC subcarrier Ericsson
R1-1718455 CM evaluations of DMRS for pi/2 BPSK Ericsson
R1-1718552 Discussion on Bursty Interference Measurement Resources Qualcomm Incorporated
R1-1718553 Evaluation of DMRS design Qualcomm Incorporated
R1-1718599 Control of UE beamforming in RRC_CONNECTED ASUSTEK COMPUTER (SHANGHAI)
R1-1718749 Further evaluations on DMRS Ericsson
R1-1718750 Further evaluations on PTRS for CP-OFDM Ericsson
R1-1718751 Further evaluations on PTRS for DFT-s-OFDM Ericsson
R1-1718752 On SRS bandwidth table design Ericsson
R1-1718753 Further details on CSI-RS Design Ericsson
R1-1718754 Evaluations on TRS bandwidth Ericsson
R1-1718779 Beam association relationship between data and control channels Guangdong OPPO Mobile Telecom
R1-1719074 Analysis of High speed train scenarios and the TRS requirements Ericsson

7.2.4 Other

Including MIMO calibration

R1-1717638 Beamforming Gain for Spatial Channels with Angular Spread Samsung
R1-1717639 Discussion on feasibility of mobile mmWave Samsung
R1-1717640 Evaluation results for dense urban on 30GHz frequency band Samsung
R1-1718076 Calibration results for NR MIMO system level calibration ITRI
R1-1718840 Codebook based uplink MIMO performance evaluation MediaTek Inc.

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7.3 Scheduling/HARQ aspects

7.3.1 Physical downlink control channel

R1-1718684 Open issues on RRC parameters for DL control channel Ericsson
Proposals:
- Conclude on the CORESET relationship to BWP and whether the frequency domain allocation is based on BW part or some other BW
- Conclude starting symbol signaling for CORESET(s)
- Conclude how to put limits on the distribution of the number of blind decodes
- Conclude on parameter ranges for configuration of CORESETs and the possible number of configured CORESETs
- Conclude on the maximum number of search spaces in a CORESET
- Finalize aspects related to RRC signaling including the search space configuration, the tables for the SFI information and associated signaling in the group common PDCCH
- Conclude on DCI format to be able to finalize the RRC signaling details for it

Decision: The document is noted.

7.3.1.1 PDCCH structure

Remaining details on REG, CCE, RS, interleaving, RE mapping, etc.

R1-1718833 Summary of key aspects for PDCCH structure NTT DOCOMO
Decision: The document is noted.

Agreements:
- Support for a UE, configurable ID for PDCCH DMRS at least for the initialization of DMRS sequence/scrambling.
  - FFS: whether this is used also for other purpose.
  - FFS details including the applicability of configurable ID

R1-1717039 Further details on PDCCH structure ZTE, Sanechips
Observation 1: For NR-PDCCH with interleaving CORESETs and a DMRS density of 1/4th, narrow band DMRS has similar performance as wide band DMRS.
Proposal 1: Wide band DMRS is not supported in NR.
Proposal 2: A block inter-leaver with configurable rows should be supported for NR-PDCCH for variety levels of tradeoff between transmit diversity and channel estimation gain.
- The interleaving unit is a REG bundle.
- Pre-coding granularity more than one REG bundle should be supported at least for interleaved NR-PDCCH.

Decision: The document is noted.

R1-1718979 On NR-PDCCH structure Huawei, HiSilicon (rev. of R1-1717061)
R1-1717378 Remaining details of NR PDCCH structure Intel Corporation
R1-1717483 NR PDCCH structure vivo
R1-1717641 On PDCCH Structure Samsung
R1-1717822 On PDCCH structure CATT
- Proposal: Confirm the working assumption
  - For a CORESET, precoder granularity in frequency domain is:
    - Configurable between i) equal to the REG bundle size in the frequency domain; or ii) equal to the number of contiguous RBs in the frequency domain within the CORESET
      - For ii), DMRS is mapped over all REGs within the CORESET.
- Proposal: Both rectangular interleaver and LTE PDCCH interleaver are sufficient to achieve diversity gain. From the complexity perspective, we slightly prefer rectangular interleaver for NR PDCCH.
- Proposal: Orthogonal MU-MIMO can be supported with 1/4 DMRS overhead by applying either frequency domain or time domain OCC depending on the CORESET duration.
- Proposal: For non-orthogonal MU-MIMO is generated based on the UE identity and a cell-specific or beam-specific ID.
- Observation: The two-step interleaver design seems to target overlapping CORESETs with similar configuration and its operation is somewhat equivalent to configuring several smaller CORESETs.

Decision: The document is noted.
R1-1717883 Discussion on DMRS design for NR-PDCCH CMCC
R1-1717951 Discussion on PDCCH structure LG Electronics
R1-1718042 On NR PDCCH structure design Guangdong OPPO Mobile Telecom
R1-1718077 Discussion on DMRS location for PDCCH ITRI
R1-1718203 Remaining issues of NR-PDCCH structure NTT DOCOMO, INC.

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R1-1718322 Remaining issues on PDCCH structure MediaTek Inc.
R1-1718487 Remaining issues of PDCCH structure InterDigital, Inc.
R1-1718554 Remaining issues on PDCCH structure Qualcomm Incorporated

Proposal 1: Frequency-first CCE-to-REG mapping is also supported with multi-symbol CORESET.
Proposal 2: REG bundling size = 2 and 6 are supported with frequency-first CCE-to-REG mapping for multi-symbol CORESET.
Proposal 3: Confirm the working assumption that
Proposal 4: When wideband DMRS is configured for a CORESET,

- DMRS for all the search spaces within the CORESET is based on Cell ID.

When wideband DMRS is not configured for a CORESET,

- DMRS for CSS within the CORESET is based on Cell ID.
- DMRS for UESS within the CORESET is UE-specifically configured.

Proposal 5: Do not introduce orthogonal MU-MIMO DMRS for NR DL control channel.
Observation 1: Configuring overlapping Coresets with different length can support efficient PDCCH resource reuse for PDSCH.
Proposal 6: For 1-symbol and 2-symbol time first CORESET, the aggregation level of 1, 2, 4, 8 is adopted. For a 3-symbol time first mapping CORESET, the aggregation level of 1, 3, 6, 12 is adopted. A larger aggregation level is FFS.
Proposal 7: Adopt alternative 3 (2-step interleaving) with X=12 RBs to support better overlapping coreset coexistence.

- Alt.3: Two-step interleaver
  - First interleaving is within X REG bundles where the interleaving unit is a REG bundle
  - Second interleaving is within the CORESET where the interleaving unit is [6] RBs
    - The first interleaver can take the PDCCH or EPDCCH interleaver as the starting point.
    - The second interleaver is down select between following two options:
      - Alt.3-1: Random interleaver with the PDCCH interleaver as the starting point
      - Alt.3-2: A block interleaver

Decision: The document is noted.
R1-1718601 Remaining details of PDCCH construction Nokia, Nokia Shanghai Bell
R1-1718799 On NR-PDCCH Structure Ericsson (Revision of R1-1718627)

Proposal: When interleaving is used to map CCEs to REGs, the interleaver f(·) operating on REG bundles is

$$f(i) = \left(i \bmod N_{SEG}^{CS}\right) \frac{N_{RB}^{SEG}}{\left(L / N_{SYM}^{CS}\right)} + \left\lfloor i / N_{SEG}^{CS} \right\rfloor,$$

where, L is the number of REGs in a REG bundle, $N_{\mathrm{SEG}}^{\mathrm{CS}}$ is the number of segments in the CORESET, $N_{\mathrm{SYM}}^{\mathrm{CS}}$ is the number of OFDM symbols in the CORESET and $N_{\mathrm{RB}}^{\mathrm{SEG}}$ is the number of (contiguous) PRBs in a segment.

Proposal: For a CORESET, precoder granularity in frequency domain is configurable between the following two options:

i) equal to the REG bundle size in the frequency domain
ii) equal to the number of contiguous RBs in the frequency domain within the CORESET
FFS: Whether DMRS is mapped over all REGs within the CORESET when a NR-PDCCH is transmitted with option ii

Proposal:

- A UE assumes three DM-RS REs per REG in REs 2, 6 and 10 in a PRB with REs numbered from 0 to 11 in all REGs in which DMRS is transmitted for both interleaved and non-interleaved REG-to-CCE mapping.
- DMRS sequence generation is done as in LTE based on Gold sequences.

Decision: The document is noted.
R1-1718699 On PDCCH structure Motorola Mobility, Lenovo

Thursday
R1-1719049 Proposal on PDCCH interleaver NTT DOCOMO
Decision: The document is noted.

RAN1 Chair recommendation: RAN1 needs to decide on interleaver, between the two proposed alternatives in R1-1719049.
Alt.1 supported by ZTE, Sanechips, Intel, NTT DOCOMO, Nokia, Nokia Shanghai Bell, MediaTek, LGE, Samsung, OPPO, CATT, MotM, Lenovo
Alt.2 supported by InterDigital, Qualcomm, Huawei, HiSilicon, vivo

Agreements:

- NR support the following interleaver

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- The number of rows A configured from {2, 3, and 6}, and the number of columns (P/A), where P is the number of interleaving unit for the given CORESET, and write in the row and read in the column
- No any further permutation is introduced
- Cyclic shift of the interleaving unit is applied based on the configurable ID which is independent parameter from the configurable ID for DMRS

Friday

Agreement:
- Confirm the WA: DMRS is evenly distributed within a REG
  - DMRS REs are #1, #5, #9

Agreements:
- DMRS sequence is a Gold sequence as in LTE
  - Note: in case if new Gold sequence is introduced for NR, this would be revisited
  - DMRS sequence for NR-PDCCH is obtained according to a reference point in frequency domain.
    - FFS the reference point

Agreements:
- Confirm the WA with the following clarifications (in red):
- For each CORESET, precoder granularity in frequency domain is:
  - Configurable between i) equal to the REG bundle size in the frequency domain; or ii) equal to the number of contiguous RBs in the frequency domain within the CORESET
    - For ii), DMRS is mapped over all REGs within CORESET.
    - RAN1 assumes that CORESET for PDCCH scheduling RMSI can be configured with Option i)
    - In Option ii) UE may assume DMRS is present in all REGs within the set of contiguous RBs of the CORESET where and when at least one REG of a candidate is mapped.

7.3.1.2 Search space

Including CORESET configuration, common vs. UE-specific search space design details, number of blind decodes, multi-beam operation, etc.

R1-1718834 **Summary of key aspects for search space NTT DOCOMO**
Decision: The document is noted.

Agreement:
- Confirm the WA 'Re-use NR DL RA Type 0 basis in units of 6 RBs, where no restriction on the maximum number of segments for a given CORESET' with the following clarifications:
  - This is for the case when the CORESET is configured by at least UE-specific RRC signalling.
    - FFS the RB indexing for resource allocation especially considering interaction with DL BWP
  - Details of resource allocation should take into account the interaction with DL BWP – FFS details

Agreements:
- For slot-based scheduling;
  - Confirm the following working assumption with updates:
    - The first DMRS position either on symbol #2 or symbol #3 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 symbol #2, and is 3 symbols otherwise.
  - The starting OFDM symbol of a CORESET can be symbol #0, #1, or #2, in a slot.
    - However, the ending OFDM symbol of a CORESET is not later than symbol #2 in a slot.

Agreements:
- In a given CORESET, two types of search spaces (e.g., UE-common search space and UE-specific search space) can have different periodicities for a UE to monitor
  - FFS details of the corresponding search spaces

Discussion further offline whether or not to introduce UE capability related to the max number of blind decodes interacting with time (per slot, periodicity of monitoring, etc.) and with frequency (e.g., # of carriers configured for a UE)
Friday: Above is for email discussion/approval till 10/27 - Fred (NTT DOCOMO)

Thursday

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R1-1719027 **Proposal on hash function** **NTT DOCOMO**
Decision: The document is noted.

Proposals:
- Alt.1 take the first bullet of R1-1719027
- Alt.2 take the same hash function of LTE EPDCCH as the hash function of NR-PDCCH

Agreement
- Take the same hash function of LTE EPDCCH as the hash functuion for NR-PDCCH
  - Further refinements can be further considered till next meeting if necessary

Friday

Agreements:
- One set of the following parameters determines a set of search spaces
  - A set of aggregation levels
  - The number of PDCCH candidates for each aggregation level
  - PDCCH monitoring occasion for the set of search spaces

Agreements:
- At least for cases other than initial access, to identify a set of search spaces, following parameters are configured by UE-specific RRC signaling:
  - The number of PDCCH candidates for each aggregation level of {1, 2, 4, 8, [16]}
    - One value from {0, 1, 2, 3, 4, 5, 6, 8}
  - PDCCH monitoring occasion for the set of search spaces
    - One value of from {1-slot, 2-slot, [5-slot], [10-slot], [20-slot]} (at least 5 values)
    - One or more value(s) from 1st symbol, 2nd symbol, …, 14th symbol within a monitored slot
  - Each set of search spaces associates with a CORESET configuration by RRC signaling

Email discussion/approval till 10/27 – Fred (NTT DOCOMO)
- For a given CORESET, an association among the following is given where FFS: how to achieve
  - A search space set
  - A DCI format size
  - RNTI
- FFS: Configuration of CORESET periodicity/offset

R1-1717062	CORESET configuration and search space design	Huawei, HiSilicon
R1-1717379	CORESETs and search spaces in NR	Intel Corporation
R1-1717484	Remaining issues on search space design	vivo
R1-1717511	CORESET configuration and Search space for NR-PDCCH	ZTE, Sanechips
R1-1717642	On Search Space Design	Samsung
R1-1717717	Multi-beam operation for NR-PDCCH	Fujitsu
R1-1717748	Discussion on search space design	Spreadtrum Communications
R1-1717823	NR PDCCH search space	CATT
R1-1717884	Discussion on PDCCH search space	CMCC
R1-1717952	Discussion on search space design	LG Electronics
R1-1718043	Discussion of search space design	Guangdong OPPO Mobile Telecom
R1-1718204	Search space design for NR-PDCCH	NTT DOCOMO, INC.
R1-1718283	Configuration of CORESET and search space design	Panasonic
R1-1718323	Discussions on search space and CORESET designs	MediaTek Inc.
R1-1718395	Polar code considerations for search space design	AT&T
R1-1718488	Search space design and CORESET configuration	InterDigital, Inc.
R1-1718555	Remaining issues on control resource set and search space	Qualcomm Incorporated
R1-1718602	On the CORESET configuration and search space design	Nokia, Nokia Shanghai Bell
R1-1718628	On Configuration of Control Resource Sets and Search Space	Ericsson

7.3.1.3 Remaining details on group-common PDCCH

Proposal:
- For the set of possible slot formats for SFI (single-slot & multi-slot), discuss further offline to come up with a table containing the possible entries

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Agreement:

- For GC-PDCCH monitoring, confirm the working assumption
  - UE can be configured to monitor SFI in group common PDCCH for a Scell on a different cell

Proposals:

- For cross cell GC-PDCCH monitoring, support the following – need to take into account BWP
  - The same SFI can be applicable to more than one CC
  - Different SFI fields in one GC-PDCCH can be applied to different CCs
  - Different SFI fields in different GC-PDCCH can be applied to different CCs

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Thursday

Agreements:

- For cross cell GC-PDCCH monitoring, support by RRC configuration for a UE the following:
  - The same SFI can be applicable to more than one cell
  - Different SFI fields in one GC-PDCCH can be applied to different cells
  - FFS interaction with multiple BWP configuration per cell

Agreements:

- The UE is not expected to have conflict on link (DL or UL) direction between that of dynamic SFI and that of UE specific data (UE specific DCI triggered PDSCH, PUSCH (grant-based), and PUCCH with A/N for a PDSCH) in Rel-15
  - Note: a link direction denoted as "unknown" in dynamic SFI is not deemed as in conflict with DL or UL

Agreements:

- The single slot format table supports up to two D/U switching points per slot
  - Zero switching point: 14 DL symbols, or 14 unknown symbols, or 14 UL symbols.
  - One D/U switching point of all combinations: Start with zero or more DL symbols, end with zero or more UL symbols, and with unknown symbols in between, where there is at least one unknown symbol and one DL or UL symbol.
  - Two D/U switching points within a slot: The first 7 symbols start with zero or more DL symbols, ends with at least one UL symbol at symbol #6 with zero or more unknown symbols in between. The second 7 symbols starts with one or more DL symbols and ends with zero or more UL symbols with zero or more unknown symbols in the middle.
  - Note: This single slot slot format table will be captured in RAN1 spec. In Rel.15, RAN1will specify up to X<[256] entries, but the RRC signaling need to consider future compatibility with more entries and from RAN1 perspective, a total of [256] entries in the RRC signalling is necessary (with only X entries specified in Rel-15 in RAN1)

Agreements:

- gNB configures a per serving cell GC-PDCCH (for dynamic SFI) monitoring periodicity of K slots (based on GC-PDCCH numerology), up to 8 choices
  - K = 1, 2, 5, 10, 20
    - FFS other values

Agreements:

- For the UE specific single-slot/multi-slotset SFI table configuration
  - Each entry of the table indicates a sequence of configured single-slot slot formats
    - Note if the sequence length is 1, the entry is a single-slot slot format
    - Note if the sequence length is more than one, the entry is a multi-slot slot format
    - Note that it is possible all the slots in a multi-slot slot-format can have the same slot format
    - Note The entries in the table can be of different length including a mix of single slot SFI and multi-slot SFI
      - The length of each entry in the table is FFS, e.g., multiple of configured GC-PDCCH monitoring period, a fraction of the configuration GC-PDCCH monitoring period, etc.

~~Agreements:~~

- ~~GC-PDCCH for dynamic SFI monitoring~~
  - ~~For same cell GC-PDCCH monitoring: UE is required to monitor at most one GC-PDCCH per spatial QCL per configuration period carrying dynamic SFI in the active BWP in the cell~~
    - ~~The coreset(s) is located in the first 1/2/3 symbols in a slot~~
    - ~~Configuration of GC-PDCCH for UE to monitor is FFS especially considering interaction with BWP configuration~~

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- ~~Note: This is not intended to address the case of multi-TRP which is deprioritized before Dec.~~
- ~~FFS when configure the GC-PDCCH monitoring for dynamic SFI, the gNB will configure the payload length of GC-PDCCH and an index of the location in DCI for dynamic SFI~~

Friday

Above agreements is modified as follows:

Agreements:

- GC-PDCCH for dynamic SFI monitoring
  - For same cell GC-PDCCH monitoring: UE is required to monitor at most one GC-PDCCH per spatial QCL per configuration period carrying dynamic SFI in the active BWP in the cell
    - The coreset(s) is located in the first 1/2/3 symbols in a slot
    - Configuration of GC-PDCCH for UE to monitor is FFS especially considering interaction with BWP configuration
    - Note: This is not intended to address the case of multi-TRP which is deprioritized before Dec.
  - When configuring the GC-PDCCH monitoring for dynamic SFI, the gNB will configure the payload length
  - When configuring the GC PDCCH monitoring for dynamic SFI for a serving cell, the gNB will configure the location of the bits used for the dynamic SFI in the payload

R1-1719172 **Offline discussion on GC-PDCCH carrying SFI** **Qualcomm Inc.**

Proposals:

- For the blind decoding of GC-PDCCH carrying SFI, the GC-PDCCH blind decoding is configured with one decoding candidate at a configured starting CCE with a configured aggregation level in a CSS or group-CSS in a configured coreset
- On overwriting rules across semi-static DL/UL assignment, dynamic SFI, DCI, etc
  - Need to decide the overwriting rules between
    - Semi-static DL/UL assignment (including states DL, UL, unknown)
    - Dynamic SFI (indicated in GC-PDCCH with states DL, UL, and unknown)
    - UE specific data transmission (UE specific DCI triggered PDSCH, PUSCH, and PUCCH with A/N for a PDSCH)
      - FFS: Broadcast transmission (sync, PRACH, RAR,…)
      - FFS: SPS transmission
    - Measurement: Measurement related signals semi-statically configured by RRC (eg. periodic/semi-persistent CSI-RS for CSI report, periodic CSI report, periodic/semi-persistent SRS) where a DL or UL direction will be assumed
      - FFS: CSI-RS for RRM, TRS, etc
    - FFS: Other signals, measurements, and monitoring (including configured coreset monitoring)
  - Consider the following directions of potential overwriting in Rel. 15:
    - States from semi-static DL/UL assignment overwritten by measurement, dynamic SFI, or UE specific data
    - State from measurement overwritten by dynamic SFI or UE specific data
    - Dynamic SFI overwritten by UE specific data
  - For the states from semi-static DL/UL assignment
    - "Unknown" in semi-static DL/UL assignment can be overwritten by measurement, dynamic SFI, and UE specific data
    - DL/UL in semi-static DL/UL assignment cannot be overwritten to the other direction (DL to UL or UL to DL) by measurement, dynamic SFI and UE specific data
    - DL/UL in semi-static DL/UL assignment cannot be overwritten by "unknown" by dynamic SFI
  - For the states from measurement in symbols not under DL/UL from semi-static DL/UL assignment:
    - DL/UL direction implied by measurement can be overwritten by unknown in dynamic SFI
      - UE behavior will be the cancellation of the measurement or measurement related transmission
    - DL/UL direction implied by measurement can be overwritten by UL/DL from dynamic SFI
      - UE behavior will be the cancellation of the measurement or measurement related transmission
    - DL/UL direction implied by measurement can be overwritten by UE's own UE-specific data if the UE specific data imples the other direction
      - UE behavior will be the cancellation of the measurement or measurement related transmission
      - UE will follow the DCI for UE-specific data transmission and reception
  - For the states in dynamic SFI in symbols not under DL/UL from semi-static DL/UL assignment (Already agreed in other agreements and only include for completeness)
    - UL/DL in dynamic SFI cannot be overwritten by UE specific data
      - UE will treat it as an error case when UE specific data and dynamic SFI imply different transmit directions
    - Unknown in dynamic SFI can be overwritten by UE specific data (change to DL or UL)

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- UE will follow the DCI for UE-specific data transmission and reception
- When a configured GC-PDCCH carrying dynamic SFI is not detected (detection erasure event)
  - UE assumes "unknown" dynamic SFI is received for all symbols in the current monitoring period

Email discussion/approval till 10/27 – Jing (Qualcomm)

Agreements:

- For the cell-specific higher layer signalling on semi-static DL/UL assignment, the transmission indication is in pattern of DL-unknown-UL. The signaling include:
  - For DL resources indication, the signaling include:
    - Number of full DL slot(s) (x1) at the beginning of the period. Values for x1 include {0,1,…, (Number of slots in a UL-DL switching periodicity)}
    - Number of DL symbol(s) follow the full DL slots (x2). Values for x2 include {0,1,…, 13}
  - For UL resource indication, the signaling include:
    - Number of full UL slot(s) (y1) at the end of the period. Values for y1 include {0,1,…, (Number of slots in a UL-DL switching periodicity)}
    - Number of UL symbol(s) (y2) preceeds full UL slots. Values for y2 include {0,1,…, 13}
  - The resource(s) in a period between DL and UL segments are unknown resources.
  - FFS The UE does not receive and not transmit on 'Unknown' resources in cell-specific higher layer signalling if not otherwise indicated.

Agreements:

- For the UE-specific higher layer signalling on semi-static DL/UL assignment,
  - The signaling includes the indication as per slot basis, the signalling includes:
    - Number of DL symbol(s) (y3) in the beginning of slot No.x3
      - Values for x3 include {1,…, (Number of slots in a UL-DL switching periodicity)}
      - Values for y3 include {0,1,…,13,14}
    - Number of UL symbol(s) (y4) in end of slot No.x4
      - Values for x4 include {1,…, (Number of slots in a UL-DL switching periodicity)}
      - Values for y4 include {0,1,…,13,14}
    - The resource(s) in a slot without DL/UL indication are unknown resource(s).
  - FFS the UE does not receive and not transmit on 'Unknown' resources in UE-specific higher layer signalling if not otherwise indicated.
  - FFS At most single DL/UL switching point exists in a UL-DL switching periodicity.

Agreement: GC-PDCCH for SFI is associated with a SFI RNTI by configuration

R1-1717063	Remaining details of group-common PDCCH	Huawei, HiSilicon
R1-1717380	On group-common PDCCH	Intel Corporation
R1-1717485	Design of group-common PDCCH	vivo
R1-1717512	Remaining details on group-common PDCCH	ZTE, Sanechips
R1-1717643	On UE-Group Common PDCCH	Samsung
R1-1717782	Slot format indicator in Group-common PDCCH	Apple Inc.
R1-1717824	Remaining design aspects of slot format indication	CATT
R1-1717885	Discussion on Signalling and UE behavior for DL and UL transmission assignment	CMCC
R1-1717953	Discussion on group common PDCCH	LG Electronics
R1-1718044	Discussion of Group Common PDCCH	Guangdong OPPO Mobile Telecom
R1-1718078	UE behavior in unknown resource	ITRI
R1-1718205	Remaining details on group-common PDCCH	NTT DOCOMO, INC.
R1-1718276	Remaining issues on group-common PDCCH for NR	WILUS Inc.
R1-1718284	Remaining details on group-common PDCCH	Panasonic
R1-1718324	Design of GC PDCCH	MediaTek Inc.
R1-1718396	Remaining details on group common PDCCH	AT&T
R1-1718461	Discussion on the remaining issues of group common PDCCH	Xiaomi Technology
R1-1718489	On Group-Common PDCCH Structure and Contents	InterDigital, Inc.
R1-1718556	Remaining issues on slot format indication	Qualcomm Incorporated
R1-1718600	Discussion on GC PDCCH	ASUSTEK COMPUTER (SHANGHAI)
R1-1718603	On the remaining aspects of group-common PDCCH in NR	Nokia, Nokia Shanghai Bell
R1-1718629	On Group-Common PDCCH	Ericsson
R1-1718668	On remaining details on group-common PDCCH	Sony
R1-1718700	On group-common PDCCH	Motorola Mobility, Lenovo

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7.3.1.4 DCI contents and formats

R1-1718630 Summary of e-mail Discussion on DCI Contents Ericsson
Decision: The document is endorsed as starting point for further discussion.

R1-1718785 Summary of 7.3.1.4 (DCI contents and formats) Ericsson
Decision: The document is noted.

Agreements:

- For multiple DCI formats with the same DCI size of a same RNTI, an explicit identifier is included in the respective DCI format to distinguish them
  - Note: the same DCI size may come from a few (but not a large number of) zero-padding bits at least in UE-specific search space

Proposals:

- The "fallback DCI" for DL and the "fallback DCI" for UL have the same size
- FFS The "fallback DCI" has the same size at that of the DCI used for common messages (e.g. paging, RMSI scheduling)

Proposal: For RNTI used for NR PDCCH, the number of bits is 16

Friday
Email discussion/approval on DCI contents/formats till next meeting – Stefan (Ericsson)

R1-1717064 DCI contents and formats in NR Huawei, HiSilicon
R1-1717486 DCI format size and blind decoding vivo
R1-1717644 DCI Contents and Formats Samsung
R1-1717825 Discussion on NR DCI formats CATT
R1-1717886 Discussion on NR DCI format design CMCC
R1-1717954 Further discussion on DCI formats LG Electronics
R1-1718045 Considerations on DCI formats and DCI contents Guangdong OPPO Mobile Telecom
R1-1718285 Discussion on DCI formats Panasonic
R1-1718325 Discussions on DCI formats in NR MediaTek Inc.
R1-1718557 Discussion on DCI related issues Qualcomm Incorporated
R1-1718604 On DCI formats, DCI content and the configurability of DCI fields in NR Nokia, Nokia Shanghai Bell
R1-1718722 DL HARQ feedback for UL grant free transmission Sequans Communications
R1-1718874 On slot-based and non-slot-based scheduling Huawei, HiSilicon

7.3.1.5 Other

R1-1717065 Dynamic and semi-static DL/UL resource partition Huawei, HiSilicon
R1-1717084 UE procedure of PDCCH monitoring for URLLC Huawei, HiSilicon
R1-1717086 PDCCH reliability for URLLC Huawei, HiSilicon
R1-1717088 DCI design for URLLC Huawei, HiSilicon
R1-1717381 Ultra-reliability for NR PDCCH Intel Corporation
R1-1717487 DCI contents and design vivo
R1-1717488 Discussion on ultra-reliable design for PDCCH vivo
R1-1717513 Supporting Multi-beam in NR-PDCCH ZTE, Sanechips
R1-1717645 On UE Power Savings Samsung
R1-1717646 PDCCH Design for URLLC Samsung
R1-1717647 Remaining Aspects for PDCCH Samsung
R1-1717751 On the resource sharing between NR-PDCCH and NR-PDSCH Spreadtrum Communications
R1-1717781 Control information for UE power saving Apple Inc.
R1-1717887 Discussion on coverage enhancement transmission of PDCCH CMCC
R1-1717902 Resource multiplexing between PDCCH and PDSCH Huawei, HiSilicon
R1-1717903 Design considerations for UE power saving Huawei, HiSilicon
R1-1717955 Discussion on DL control with ultra-reliability requirement LG Electronics
R1-1718046 PDCCH for URLLC Guangdong OPPO Mobile Telecom
R1-1718206 DL control channel design for URLLC NTT DOCOMO, INC.
R1-1718360 Considerations for ultra-reliable DCI transmission InterDigital, Inc.
R1-1718422 Consideration on physical downlink control channel for URLLC CATR
R1-1718558 Advanced Grant Indication for UE Power Saving Qualcomm Incorporated
R1-1718605 On the URLLC specific aspects for DL control channel Nokia, Nokia Shanghai Bell
R1-1718606 On the usage of PDCCH DMRS as a complementary synchronization signal in DL Nokia, Nokia Shanghai Bell

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R1-1718631 On PDCCH for Ultra-Reliable Transmission Ericsson

7.3.2 Physical uplink control channel

R1-1718685 Open issues on RRC parameters for UL control channel Ericsson

7.3.2.1 PUCCH structure in short-duration

R1-1718862 Summary of PUCCH structure in short-duration (7.3.2.1) Ericsson (Revision of R1-1718812)
Decision: The document is noted.

7.3.2.1.1 Short-PUCCH for UCI of up to 2 bits

Focus on short-PUCCH on a OFDM symbol.

R1-1718844 Summary of the evaluated sequence designs for PUCCH InterDigital

Conclusion:
- Summarize the performance of the new length-12 sequences (also considering at least DM-RS for long PUCCH and DM-RS for DFT-s-OFDM based PUSCH for mod order >BPSK) and compare with LTE sequences (R1-1718844). Aim to decide on the set of sequences within this week

Agreement:
- In Rel-15, only length 12 sequences are supported for short PUCCH for up to 2 bits (PUCCH format 0) and long PUCCH for up to 2 bits

Agreements:
- For HARQ-ACK transmission using short PUCCH for up to 2 bits
  - In case of 1-bit HARQ-ACK only:
    - The distance between the two cyclic shifts within a PRB is 6
  - In case of 2-bit HARQ-ACK only
    - The distance between any two adjacent cyclic shifts within a PRB is 3
  - In case of 1-bit HARQ-ACK & SR (positive or negative)
    - FFS
  - In case of 2-bit HARQ-ACK & SR (positive or negative)
    - FFS

Agreements:
- In case of SR due at the same time with other UCI, 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

Proposal:
- In addition to the already agreed short PUCCH resources in the last and second last symbols, additional short PUCCH resources can be configured in other symbols of a slot.

Thursday Agreement:
- In addition to the already agreed short PUCCH resources in the last and second last symbols, additional short PUCCH resources can be configured in other symbols of a slot
  - FFS whether or not such a configuration is conditioned on non-slot based operation

CATT: concern with the FFS – don't understand the condition
RAN1 chair – let's put it offline

R1-1717514 On short PUCCH for up to 2 bits UCI ZTE, Sanechips
- Observation 1: If the cyclic shifts of one UE can be assigned into multiple RBs, benefits can be achieved on link level performance, forward compatibility, multiplexing capacity and high reliability of {NACK to ACK} for URLLC.
- Proposal 1: For sequence based short PUCCH, the cyclic shifts of one UE for HARQ-ACK transmission can be assigned into multiple RBs.
- Proposal 2: For sequence based short PUCCH, the cyclic shifts and RBs can be RRC configured for ACK/NACK states and dynamically selected by DCI.
- Proposal 3: Support the multiplexing of UEs in one RB for HARQ-ACK transmission in sequence-based short PUCCH.
- Proposal 4: The multiplexing of the sequence based PUCCH with other UL signal(s) should be adopted.
- Proposal 5: When positive SR and 2-bit HARQ-ACK are to be transmitted in sequence based short PUCCH, HARQ-ACK bundling is applied. 2 Channel resources (RB + sequence) are configured for SR.

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- Proposal 6: L1 signaling to dynamically release or enable the SR resources should be considered for SR configuration in NR.
- Proposal 7: Each root sequence of CGSs for short PUCCH should be with low CM. The cross-correlations among root sequences should be kept low.

Decision: The document is noted. Further revised in R1-1719003.

Wednesday:

R1-1718949 WF on new NR CG sequences for PUCCH Intel Corporation, Qualcomm Inc., Huawei, HiSilicon, CATT, KT Corporation, WILUS Inc., Acorn Technologies, Samsung

~~Agreements:~~

- ~~The sequences on slide 4 in R1-1718949 are adopted as the set of length-12 base sequences for short PUCCH for up to 2 bits and DM-RS for long PUCCH for UCI of up to 2 bits, except the entries 2/3/10/11 which are supported as baseline~~
  - ~~Refinement of entries of 2/3/10/11 can be done till this Friday~~
    - ~~Companies are encouraged to further check 2/3/10/11 and possibly new sequences as proposed in R1-1719002 for entries 2/10/11 combined with entry 3 in R1-1719003~~
  - ~~If no additional consensus can be reached by Friday regarding possibly having new sequences for entries 2/3/10/11, the sequences in R1-1718949 for entries 2/3/10/11 will be agreed.~~

Thursday

Agreements:

- For short PUCCH for up to 2 UCI bits, the base sequence can be hopped for transmission of PUCCH in different slots
  - The base sequence hopping can be enabled or disabled by cell-specific RRC parameters via RMSI.
  - Hopping pattern is at least based on a configurable ID
    - FFS on details of the hopping pattern
    - The ID has a bitwidth of [10] bits
  - FFS on cyclic shift hopping
    - No RRC signaling impact

Friday

Wednesday agreements on CG sequences are modified as follows:

Agreement: The sequences on slide 4 in R1-1718949 are adopted as the set of length-12 base sequences for short PUCCH for up to 2 bits and DM-RS for long PUCCH for UCI of up to 2 bits

R1-1717066	Short PUCCH for UCI of up to 2 bits	Huawei, HiSilicon
R1-1717382	Short PUCCH for UCI of up to 2 bits	Intel Corporation
R1-1717489	Design of short-PUCCH for UCI up to 2 bits	vivo
R1-1717648	Short PUCCH for UCI of 1 or 2 Bits	Samsung
R1-1717826	On short PUCCH design for up to two UCI bits	CATT
R1-1717920	Sequence design for short PUCCH up to 2 bits	IITH
R1-1717956	Design of short PUCCH for UCI of up to 2 bits for NR	LG Electronics
R1-1718032	Short-PUCCH for up to 2 UCI bits	Guangdong OPPO Mobile Telecom
R1-1718207	Short-PUCCH for UCI of up to 2 bits	NTT DOCOMO, INC.
R1-1718253	Discussion on 1-symbol short-PUCCH for UCI of up to 2 bits	Panasonic Corporation
R1-1718277	Discussion on multiplexing of HARQ-ACK and SR on Short PUCCH	WILUS Inc.
R1-1718304	Remaining details of short PUCCH for UCI up to 2 bits	Nokia, Nokia Shanghai Bell
R1-1718559	Channelization of 1-symbol short PUCCH with 1 or 2 bits payload	Qualcomm Incorporated
R1-1718632	On the Design of 1-Symbol PUCCH for up to 2 bits	Ericsson
R1-1718848	Evaluation of CGS candidates for PUCCH	InterDigital, Inc.
R1-1719157	Evaluation of PUCCH base sequence set proposals	Intel Corporation
R1-1719183	Modifications to proposed NR CG sequences for PUCCH	InterDigital

7.3.2.1.2 Short-PUCCH for UCI of more than 2 bits

Focus on short-PUCCH on a OFDM symbol.

Agreements:

- For short-PUCCH for UCI of more than 2 bits
  - Only contiguous PRB allocation within a symbol is supported in release-15
  - In addition to RRC configuration, the number of PRBs can be additionally determined based on the following:

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        - As a function of UCI payload size
        - Dynamic indication via DCI
        - FFS the detailed determination method
    - FFS the set of supported PRBs

Agreements:
- For short-PUCCH for UCI of more than 2 bits, the LTE PN sequence generator is used for scrambling of the encoded bits and generation of DM-RS for the PUCCH
    - Note:can be revisited if new Gold sequences are introduced

Proposals:
- Simultaneous transmission of HARQ-ACK bits and CSI feedback with/without SR with PUCCH format 2 is supported
    - Support both
        - Case 1: separately encode the CSI feedback and the HARQ-ACK bits with and without SR
            - FFS resources for CSI and HARQ-ACK (w/ & w/o SR)
        - Case 2: jointly encode the CSI feedback and the HARQ-ACK bits with and without SR
    - FFS the applicable scenarios for case 1 and case of the above
- Also need to consider other PUCCH formats and the case of UCI on PUSCH
- Check offline also whether different CSI types for P-CSI are allowed to be transmitted in the same PUCCH or not

Thursday agreements:
- Simultaneous transmission of HARQ-ACK bits and CSI feedback with/without SR with PUCCH format 2 is supported by RRC configuration
    - FFS details
    - There is no additional RRC signaling involved in regarding how encoding is done for CSI/HARQ-ACK/SR
        - Note that whether some UCI is dropped or not is not considered as part of the encoding in the above bullet

R1-1717067	Short PUCCH for UCI of more than 2 bits	Huawei, HiSilicon
R1-1717383	Short PUCCH for UCI of more than 2 bits	Intel Corporation
R1-1717490	Design of short-PUCCH for UCI of more than 2 bits	vivo
R1-1717649	Short PUCCH for UCI of more than 2 Bits	Samsung
R1-1717827	On short PUCCH design for more than two UCI bits	CATT
R1-1717957	Design of short PUCCH for UCI of more than 2 bits for NR	LG Electronics
R1-1718208	Short-PUCCH for UCI of more than 2 bits	NTT DOCOMO, INC.
R1-1718305	On remaining details of short PUCCH for UCI of more than 2 bits	Nokia, Nokia Shanghai Bell
R1-1718560	Channelization of 1-symbol short PUCCH with more than 2 bits payload	Qualcomm Incorporated
R1-1718633	On the Design of 1-Symnol PUCCH for more than 2 bits	Ericsson

7.3.2.1.3 Support of short-PUCCH over 2 OFDM symbols

Further discussion offline especially w.r.t. whether or not there is RRC impact

R1-1717068	Short PUCCH over 2 OFDM symbols	Huawei, HiSilicon
R1-1717384	2-symbol NR PUCCH	Intel Corporation
R1-1717491	Support of short-PUCCH over 2 OFDM symbols	vivo
R1-1717650	Short PUCCH over 2 OFDM Symbols	Samsung
R1-1717958	Support of short PUCCH over 2 OFDM symbols for NR	LG Electronics
R1-1718209	Support of short-PUCCH over 2 OFDM symbols	NTT DOCOMO, INC.
R1-1718306	On remaining aspects of 2-symbol short PUCCH design	Nokia, Nokia Shanghai Bell
R1-1718491	On HARQ-ACK and SR multiplexing on Short-PUCCH	InterDigital, Inc.
R1-1718561	Channelization of 2-symbol short PUCCH	Qualcomm Incorporated
R1-1718634	On the Design of 2-Symbols PUCCH	Ericsson

7.3.2.2 PUCCH structure in long-duration

R1-1718821 **Summary of issues in AI 7.3.2.2. PUCCH structure in long duration** **Huawei, HiSilicon**
Decision: The document is noted.

For FH for long-PUCCH for UCI of up to 2 bits & more than 2 bits, to have more detailed analysis (performance, complexity, multiplexing, etc.) – to revisit later this week

Wednesday:

Petitioners' Exhibit 1007, p. 720
AT&T et al v. Asustek Computer
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Agreement: For long PUCCH for UCI of up to 2 bits and long PUCCH for UCI of more than 2 bits: for duration of 4-14 symbols, frequency-hopping is enabled/disabled by RRC UE-specifically.

7.3.2.2.1 Long-PUCCH for UCI of up to 2 bits

Focus on long-PUCCH within a slot.

R1-1717069 Long PUCCH for UCI of up to 2 bits Huawei, HiSilicon

Proposal 1: For structures of NR long PUCCH with up to 2 bits, frequency hopping should locate at the middle of N-symbol long PUCCH:
- When N is even, the end of first frequency-hop is at symbol (N/2-1);
- When N is odd, the end of first frequency-hop is at symbol ((N+1)/2-1) or ((N-1)/2-1);
  Note: the start of symbol index of long PUCCH is from 0.

Proposal 2: For structures of NR long PUCCH with up to 2 bits, different length of time domain OCC is applied depending on the number of symbols for the long PUCCH:
- If frequency hopping is enabled,
  - OCC multiplexing capacity is 1 for 7-symbol;
  - OCC multiplexing capacity is 2 for 11-symbol;
- If frequency hopping is disabled,
  - OCC multiplexing capacity can be configured by gNB.

Decision: The document is noted.

R1-1717515 On long-PUCCH for up to 2 bits ZTE, Sanechips
- Observation 1: All Alt1~4 have close performance in almost all the number of symbols (4 ~ 14), except that the number of symbols is 6.
- Observation 2: When the number of symbols is 6 for long PUCCH, Alt3 and Alt4 are significantly better than Alt1 and Alt2 in very high speed scenarios.
- Proposal 1: The duration of long PUCCH can be smaller than the available UL symbols in a slot.
- Proposal 2: The frequency hopping should be configurable.
- Proposal 3: If long PUCCH with 1~2bits UCI is enabled for frequency hopping, DM-RS is located in all the even symbols in each hop, where the symbol is indexed from the start of the hop of value 0.
- Proposal 4: For 1~2 bits PUCCH format with different lengths, various types of multiplexing should be encouraged to study in order to enhance PUCCH multiplexing capability and make full use of resources.
- Proposal 5: Floor(Ceiling (N/2)/2) × 2(Alt4) should be selected as the frequency hopping point determination function for long PUCCH with 1 to 2 bits UCI.

Decision: The document is noted.

R1-1718562 Long PUCCH design with 1 or 2 bits UCI payload Qualcomm Incorporated

Proposal 1: NR should use the same set of sequences in short PUCCH and long PUCCH for transmission of up to 2 UCI bits on one PRB.

Proposal 2: Consider the sequences in table 1 as CGS sequences for 1 RB in short and long PUCCH transmission of up to 2 bits of UCI.

Proposal 3: For a long PUCCH with N symbols to carry 1 or 2 bits UCI, if hopping is enabled, the hopping boundary is determined as follows
- N/2-1 where mod(N,4)=2; floor(N/2) otherwise

Decision: The document is noted.

Proposals:
- For long PUCCH with duration of 4-14 symbols, frequency-hopping is enabled/disabled by RRC
  - If frequency hopping is enabled, the OCC multiplexing capacity for 7-symbol long PUCCH is 1, and for 11-symbol long PUCCH is 2.
  - If frequency hopping is disabled, at least OCC multiplexing capacity of 2 and 3 are supported.

Wednesday:

Working assumption:
- For long-PUCCH for UCI of up to 2 bits, if frequency hopping is enabled, the OCC multiplexing capacity for 7-symbol long PUCCH is 1, and for 11-symbol long PUCCH is 2.

Agreements:
- For long-PUCCH for UCI of up to 2 bits, if frequency hopping is disabled, OCC multiplexing capacity of 2,3,4,5,6,7 are supported.
  - For each duration of long PUCCH for UCI of up to 2 bits, there is only one OCC multiplexing capacity

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Agreement:

- OCC multiplexing capacity for each long PUCCH duration for long-PUCCH for UCI of up to 2 bits is given as follows:

Long-PUCCH duration N	OCC Multiplexing capacity M	
	with hopping	without hopping
4	1	2
5	1	2
6	1	3
7	[1]	3
8	2	4
9	2	4
10	2	5
11	[2]	5
12	3	6
13	3	6
14	3	7

Thursday

Agreements:

- For long PUCCH for up to 2 UCI bits, the base sequence can be hopped for transmission of PUCCH in different slots
  - The base sequence hopping can be enabled or disabled by cell-specific RRC parameters via RMSI
    - Note this parameter for hopping is the same as the one used for short PUCCH for up to 2 UCI bits
  - Hopping pattern is at least based on a configurable ID
    - FFS on details of the hopping pattern
    - The ID has a bitwidth of [10] bits
  - FFS on cyclic shift hopping
    - No RRC signaling impact

Agreements:

- If frequency hopping is enabled for long PUCCH for UCI of up to 2 bits and more than 2 bits, hopping boundary is determined by long PUCCH duration/start symbol of long PUCCH
  - No RRC configuration is involved in determining the hopping boundary

Agreements:

- For long PUCCH, reuse LTE OCC code for OCC length =2,3,4,5
  - FFS OCC code for OCC length =6,7
- Note: For long PUCCH for UCI of up to 2 bits,
  - If FH is enabled, support OCC length on DMRS = number of DMRS symbol in each hop, support OCC length on UCI = number of UCI symbol in each hop
  - If FH is disabled, support OCC length on DMRS = number of DMRS symbol in the long PUCCH, support OCC length on UCI = number of UCI symbol in the long PUCCH

R1-1717385 Long PUCCH for up to 2 UCI bits Intel Corporation
R1-1717492 Design of long-PUCCH for UCI of up to 2 bits vivo
R1-1717651 Long PUCCH for UCI of 1 or 2 Bits Samsung
R1-1717828 Remaining details of long PUCCH for up to 2 UCI bits CATT
R1-1717860 Long PUCCH design for UCI of up to 2 bits Lenovo, Motorola Mobility
R1-1717921 Sequence design for long PUCCH up to 2 bits IITH
R1-1717959 Design of long PUCCH for UCI of up to 2 bits for NR LG Electronics
R1-1718005 RE mapping for PUCCH of 1 or 2 bits ETRI
R1-1718210 Long-PUCCH for UCI of up to 2 bits NTT DOCOMO, INC.
R1-1718254 Channel structure and frequency-hopping details of long-PUCCH for UCI of up to 2 bits Panasonic Corporation
R1-1718307 Remaining details of Long PUCCH with small UCI payload Nokia, Nokia Shanghai Bell
R1-1718397 On long PUCCH for UCI up to 2 bits AT&T
R1-1718635 On the Design of Long PUCCH for up to 2 bits Ericsson

7.3.2.2.2 Long-PUCCH for UCI of more than 2 bits

Focus on long-PUCCH within a slot.

Petitioners' Exhibit 1007, p. 722
AT&T et al v. Asustek Computer
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Agreement:
- For long PUCCH for UCI of more than 2 bits
  - Reuse DMRS sequences of DFT-S-OFDM PUSCH if it occupies more than one PRB

Agreements:
- For the case of length-12 sequences, the same set of sequences are used for at least for the following:
  - DM-RS for long PUCCH for UCI of up to 2 bits,
  - DM-RS for long PUCCH for UCI of more than 2 bits,
  - DM-RS for long-PUCCH over multiple slots,
  - DM-RS for DFT-S-OFDM PUSCH with modulation order higher than BPSK
  - FFS other cases (e.g., short PUCCH for UCI of up to 2 bits, data symbols for long PUCCH, etc.)

Proposal:
- Reuse LTE design of bit-level scrambling for long PUCCH for UCI of more than 2 bits

Proposals:
- Support Pre-DFT-OCC as the UCI structure for long PUCCH with moderate payload
- Support at least multiplexing capacity of 2 users for long PUCCH with moderate payload using one PRB in Rel-15

Thursday Proposals:
- Support Pre-DFT-OCC as the UCI structure for long PUCCH for UCI of more than 2 bits with moderate payload
  - FFS: DMRS structure between CDM and IFDM
    - Considering the impact on channel estimation and power imbalance among UEs
- Support multiplexing capacity of 2 and 4 users for long PUCCH for UCI of more than 2 bits with moderate payload using one PRB in Rel-15
  - FFS design of OCC
    - No RRC signalling is necessary

Friday

Agreement:
- For long-PUCCH for UCI of more than 2 bits, the LTE PN sequence generator is used for scrambling of the encoded bits
  - Note: can be revisited if new Gold sequences are introduced

Agreements:
- Support Pre-DFT-OCC as the UCI structure for long PUCCH for UCI of more than 2 bits with moderate payload
  - FFS: DMRS structure between CDM and IFDM
    - Considering the impact on channel estimation and power imbalance among UEs
  - It will be denoted as a new format
- Support multiplexing capacity of 2 and 4 users for long PUCCH for UCI of more than 2 bits with moderate payload using one PRB in Rel-15
  - FFS design of OCC
    - No RRC signalling is necessary

Agreements:
- For long PUCCH for UCI of more than 2 bits
  - If frequency hopping is enabled, the number of DMRS symbols (between 1-2 symbol) per hop for long PUCCH duration per hop > X is configurable by RRC UE-specifically
    - RRC Bit-width is 1 bit
    - X is fixed in the spec w/o RRC impact
    - FFS the value X
  - The location of DMRS is pre-defined within long PUCCH in each hop based on number of DMRS per hop and duration of the hop.

Email approval on the disabled frequency hopping case related to the above agreements till 10/27 – Hua (Huawei)

WF on pi/2 BPSK based long PUCCH carrying more than 2 UCI bits

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For long duration PUCCH carrying more than 2 bits:
- Use pi/2 BPSK modulation, spectrum shaping can be used similar to pi/2 BPSK PUSCH

Email discussion/approval of the above till 10/27 – Hua (Huawei)

R1-1717070	Long-PUCCH for UCI of more than 2 bits	Huawei, HiSilicon
R1-1717386	Long PUCCH for more than 2 UCI bits	Intel Corporation
R1-1717493	Design of long-PUCCH for UCI of more than 2 bits	vivo
R1-1717516	On long-PUCCH for more than 2 bits	ZTE, Sanechips
R1-1717652	Long PUCCH for UCI of more than 2 Bits	Samsung
R1-1717759	On pre-DFT additional RS insertion for long PUCCH	Mitsubishi Electric RCE
R1-1717829	Design of long PUCCH formats with different multiplexing capacities	CATT
R1-1717861	Long PUCCH design for UCI of more than 2 bits	Lenovo, Motorola Mobility
R1-1717923	On use of pi/2 BPSK modulation for long PUCCH with more than 2 bits UCI	IITH
R1-1717960	Design of long PUCCH for UCI of more than 2 bits for NR	LG Electronics
R1-1718211	Long-PUCCH for UCI of more than 2 bits	NTT DOCOMO, INC.
R1-1718257	Design of long-PUCCH for UCI of more than 2 bits	Panasonic Corporation
R1-1718308	On the remaining details of long PUCCH for UCI more than 2 bits	Nokia, Nokia Shanghai Bell
R1-1718398	On long PUCCH for more than 2 bits	AT&T
R1-1718416	DMRS and multiplexing methods for NR long PUCCH with more than 2 bits	Sharp
R1-1718421	Considerations on long PUCCH for UCI of more than 2 bits	CATR
R1-1718800	On the Design of Long PUCCH for more than 2 bits	Ericsson
R1-1718805	Long PUCCH design with more than 2 bits UCI payload	Qualcomm Incorporated

7.3.2.2.3 Support of long-PUCCH over multiple slots

Agreements:
- For long PUCCH over multiple slots, at least support the case that the duration of long PUCCH in each slot is the same
  - FFS the case of different durations in different slots

Proposals:
- Each slot in the multiple slots for long-PUCCH over multiple slots is always contained with a slot
- For long PUCCH with more than 2 bits over multiple slots, all UCI bits are intended to be conveyed in each slot

Thursday Agreements:
- Each slot in the multiple slots for long-PUCCH over multiple slots is always contained with a slot
- For long PUCCH with more than 2 bits over multiple slots, all UCI bits are encoded and transmitted in each slot

Agreements:
- For long PUCCH over multiple slots, inter-slot hopping is supported by configuration
  - FFS details
- For long PUCCH over multiple slots, the intra-slot hopping and inter-slot hopping are not enabled at the same time for a UE

Proposals:
- For long PUCCH over multiple slots configured with inter-slot hopping
  - Alt 1:
    - Only one hop is supported for a long PUCCH
    - The frequency hopping boundary is at the middle of the slots and is given by ceiling (N/2), where N is the number of slots for the long PUCCH over multiple slots
  - Alt 2:
    - Hopping is performed every slot
  - FFS the definition of slots (slots under the spanning of the PUCCH, or the actually transmitted slots)

Friday

Agreements:
- For long PUCCH over multi-slots, for the case duration of long PUCCH in each slot is the same, the number of slots with long PUCCH transmission is configurable in a UE-specific manner
  - Up to 4 possible RRC configured numbers, detailed values FFS

R1-1717071	Support of long-PUCCH over multiple slots	Huawei, HiSilicon

Petitioners' Exhibit 1007, p. 724
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R1-1717387 Long PUCCH over multiple slots Intel Corporation
R1-1717494 Design of long-PUCCH over multiple slots vivo
R1-1717517 Support of long-PUCCH over multiple slots ZTE, Sanechips
R1-1717653 Multi-Slot Long PUCCH Transmission Samsung
R1-1717830 Design of multi-slot PUCCH transmission CATT
R1-1717961 Support of long PUCCH over multiple slots for NR LG Electronics
R1-1718006 Long-PUCCH over multiple slots ETRI
R1-1718212 Support of long-PUCCH over multiple slots NTT DOCOMO, INC.
R1-1718258 Discussion on support of long-PUCCH over multiple slots Panasonic Corporation
R1-1718309 Long PUCCH over multiple slots Nokia, Nokia Shanghai Bell
R1-1718341 Discussion on support of long-PUCCH over multiple slots MediaTek Inc.
R1-1718399 On long PUCCH over multiple slots AT&T
R1-1718417 Structure of NR long PUCCH over multiple slots Sharp
R1-1718564 Long PUCCH over multiple slots Qualcomm Incorporated
R1-1718637 On Support of Long PUCCH Over Multiple Slots Ericsson

7.3.2.3 UCI multiplexing

For both PUSCH with CP-OFDM waveform and PUSCH with DFT-s-OFDM waveform, PUCCH-PUSCH multiplexing, etc.

R1-1718807 Summary of remaining issues for UCI multiplexing on PUSCH Qualcomm Incorporated
Further revised in R1-1718931 Summary of remaining issues for UCI multiplexing on PUSCH Qualcomm

Agreements:
- For grant based UL transmission, use DAI based mechanism similar to LTE to indicate UE the number of ACK bits for ACK piggyback on PUSCH.
  - FFS details of DAI mechanism
  - FFS: how to enhance DAI mechanism to support CBG based transmission

Agreements:
- Regarding handling the possibility of DL assignments later than UL grant, to down-select between:
  - Alt 1: Limit to up to X ACK bits for later DL assignments. ACK bits for later DL assignments puncture PUSCH
    - X=2 for slot-based scheduling
    - FFS X for non-slot based scheduling
  - Alt 2: Uplink grant indicates number of ACK/NACK bits including past and estimated future DL assignments. UE computes ACK/NACK resources based on indicated number of ACK/NACK bits
    - FFS other details
- If no consensus can be achieved by the end of this week, the following will be agreed:
  - In Rel-15, do not support the case when DL assignments are later than UL grant mapped to the same time instance for HARQ-ACK transmission on PUSCH

Post meeting agreement: Since no additional consensus was reached by Friday regarding down-selection of Alt 1 and Alt 2, the following is confirmed:
- In Rel-15, do not support the case when DL assignments are later than UL grant mapped to the same time instance for HARQ-ACK transmission on PUSCH

Conclusion:
- Discuss further offline to support a single or two mapping mechanisms when ACK is piggybacked on PUSCH, including the possibility of configurability of two mechanisms are supported
  - E.g., map ACK to REs across as many symbols (excluding DMRS symbol) as possible, map ACK to localized REs in time-domain around DMRS, frequency-first-time-second vs. time-first-frequency-second, impact of PUSCH hopping (if any), etc.

Agreement:
- For ACK piggybacked on PUSCH, map ACK to distributed REs across PUSCH allocated RBs
  - Details FFS

Conclusion:
- Discuss further offline to support a single or two mapping mechanisms when CSI is piggybacked on PUSCH, including the possibility of configurability of two mechanisms are supported

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- E.g., map CSI to REs across as many symbols (excluding DMRS symbol) as possible, map CSI to localized REs in time-domain around DMRS, frequency-first-time-second vs. time-first-frequency-second, impact of PUSCH hopping (if any), etc.

Agreement:
- For CSI piggybacked on PUSCH, map CSI to distributed REs across PUSCH allocated RBs
  - Details FFS

Agreements:
- For CSI piggybacked on PUSCH, support splitting CSI mapping (at least for some CSI) into two parts, where the two parts are mapped differently
  - FFS details (e.g., grouping of different CSI types and map them into different REs, which types of CSI, etc.)
  - FFS impact of frequency hopping (if any)

Agreements:
- For dynamically scheduled PUSCH transmission, a plurality sets of beta_offset values can be configured by RRC signalling, and PDCCH can dynamically indicate an index to a set.
  - Each set contains a plurality of entries, each corresponding a respective UCI type (including two-part CSI when applicable)
  - FFS the case when the index is not present in DCI
- The beta-offset is used to compute the amount of REs for each respective UCI on PUSCH similar to LTE
- The set of beta-offset values for each respective UCI use the respective set of values as in LTE as a baseline
  - The values are subject to refinement especially taking into account different UL waveforms, differen UCI multiplexing mechanisms (puncturing vs. rate matching), etc.
- FFS impact of UL MIMO
- The number of sets of beta-offset values is to be down-selected between 2 or 4
  - Implying 1 or 2 bits in DCI respectively

Friday

Proposal: Down-select from the following 2 alternatives
- Alternative 1: different RE mapping rule between ACK puncture and rate-match PUSCH
  - When HARQ-ACK puncture PUSCH, map HARQ-ACK to REs across as many symbols (excluding DMRS symbol) in both freq hops if applicable. HARQ-ACK puncture should avoid puncture PT-RS.
    - When HARQ-ACK rate-matching PUSCH, map HARQ-ACK to localized REs around DMRS in time domain in both freq hops if applicable. HARQ-ACK should rate-match around PT-RS
      - When there is additional DMRS other than front loaded DMRS, map HARQ-ACK around all DMRS symbols.
- Alternative 2: The same mapping rule is applied regardless of HARQ-ACK puncture or rate match PUSCH
  - Map HARQ-ACK to REs across as many symbols (excluding DMRS symbol)

Email discussion/approval till 10/27 – Yi (Qualcomm)

Agreements:
- If freq hop is disabled for PUSCH, CSI piggybacked on PUSCH follows freq first mapping rule
  - FFS details
- FFS the case when hopping is enabled

Email approval on how to configure beta_offset till 10/27 – Yi (Qualcomm)

R1-1717072	On UCI multiplexing	Huawei, HiSilicon
R1-1717388	UCI embedding and PUSCH/PUCCH multiplexing	Intel Corporation
R1-1717495	On UCI multiplexing	vivo, Potevio
R1-1717518	UCI multiplexing on PUSCH	ZTE, Sanechips
R1-1717654	On UCI Multiplexing in PUSCH	Samsung
R1-1717831	Multiplexing of UCI and UL data on PUSCH	CATT
R1-1717962	Considerations on UCI and UL channel multiplexing for NR	LG Electronics
R1-1718033	Multiplexing of short-PUCCH	Guangdong OPPO Mobile Telecom
R1-1718213	UCI multiplexing	NTT DOCOMO, INC.
R1-1718259	Discussion on UCI multiplexing	Panasonic Corporation

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R1-1718278 Remaining issues on UCI multiplexing for NR WILUS Inc.
R1-1718310 On multiplexing of UCI Nokia, Nokia Shanghai Bell
R1-1718342 Discussion on UCI multiplexing MediaTek Inc.
R1-1718418 Simultaneous PUCCH and PUSCH transmission and collision handling Sharp
R1-1718492 On UCI resource mapping on PUSCH InterDigital, Inc.
R1-1718565 Multiplexing of PUCCH and PUSCH Qualcomm Incorporated
R1-1718638 On UCI on PUSCH Ericsson

7.3.2.4 Resource allocation for PUCCH

R1-1718922 Summary of offline discussions for PUCCH resource allocation until 10th Oct. morning OPPO
(Revision of R1-1718787)

Agreements:
- For both slot-based and non-slot based DL transmissions, and for indentifying PUCCH resource for HARQ-ACK with more than 2-bit UCI, at least following parameters can be jointly configured in one or multiple set(s) (if supported) of PUCCH resource(s) and indicated by the PUCCH resource indicator in DCI:
  - Starting symbol in the slot;
  - Number of symbols;
    - FFS: If only a single configurable value for long PUCCH in the set of PUCCH resource(s).
    - FFS: It is configured for one for multiple PUCCH formats.
  - Starting PRB;
    - FFS granularity: PRB, RBG, or subband.
  - FFS: Number of PRBs.
  - FFS: Code resources.
  - Only a limited number of values is configurable for each parameter in the set of PUCCH resource(s).
    - FFS: Configurable values.
  - FFS: Some of above parameters can be partly implicitly derived.
  - FFS: Possible joint encoding for some of above parameters.

Proposals:
- Discuss further offline whether or not to support multiple sets of PUCCH resource(s), and if supported, how to indicate
- Discuss further offline within each set of PUCCH resource(s), whether or not both short PUCCH and long PUCCH resources can be included in the same set of PUCCH resources

Agreements:
- The PUCCH resource for SR only transmission is semi-statically configured.
- The PUCCH resource for P-CSI only transmission is semi-statically configured
- FFS PUCCH resource allocation for semi-persistent CSI

Thursday
Proposals:
- For PUCCH resource, a UE can be configured with:
  - Alt 1: One PUCCH resource set for up to 2 bits. Another PUCCH resource set for UCI of more than 2 bits
    - Supported by: NTT DOCOMO, CATT, ZTE, Samsung, Panasonic. MediaTek
  - Alt 2: One or more PUCCH resource set for each format
    - Supported by: Nokia, ZTE, OPPO, Qualcomm, Samsung, LGE

Proposals:
- Different sets of PUCCH resources can be configured to convey HARQ-ACK for slot-based and HARQ-ACK for non-slot-based PDSCH respectively.

Friday

R1-1719168 Summary of offline discussions for PUCCH resource allocation until 13th Oct. morning OPPO

Email discussion/approval on how UE selects one PUCCH resource set from multiple configured PUCCH resource sets till 10/27 – Jia (OPPO)

Email discussion/approval of the following table 10/27 – Jia (OPPO)

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		PUCCH Format 0	PUCCH Format 1	PUCCH Format 2	PUCCH Format 3	PUCCH Format 4	Comments
Number of slots	Configurability	N.A.	Configured	N.A.	Configured		
	Value range	N.A.	1, 2, 4, 8	N.A.	1, 2, 4, 8		
Starting symbol	Configurability	Configured in resource set		Configured in resource set			
	Value range	0 – 13 (FFS: another value indicating implicit derivation)		0 – 13 (FFS: another value indicating implicit derivation)			
Number of symbols in the slot	Configurability	Configured in resource set		Configured in resource set			
	Value range	1, 2, 4 – 14 (FFS: another value indicating implicit derivation)		1, 2, 4 – 14 (FFS: another value indicating implicit derivation)			
Index for identifying starting PRB	Configurability	Configured in resource set		Configured in resource set			
	Value range	0 - [274]		0 - [274]			
Number of PRBs	Configurability	N.A.	N.A.	Configured in resource set			
	Value range	N.A. (Default is 1)	N.A. (Default is 1)	1 – [16]			
FFS: Frequency resource of 2nd hop if frequency Hopping is enabled							RAN1 needs to further study the necessity.
Index of initial cyclic shift	Configurability	Configured in resource set		N.A.	N.A.	N.A.	
	Value range	0 – 11		N.A.	N.A.	N.A.	
Index of time-domain OCC	Configurability	N.A.	Configured in resource set	N.A.	N.A.	N.A.	
	Value range	N.A.	0 - 6	N.A.	N.A.	N.A.	
[Length of Pre-DFT OCC]	Configurability	N.A.	N.A.	N.A.	N.A.	Configured in resource set	
	Value range	N.A.	N.A.	N.A.	N.A.	1, [2], [4]	
[Index of Pre-DFT OCC]	Configurability	N.A.	N.A.	N.A.	N.A.	Configured in resource set	

R1-1717073 Resource allocation for PUCCH Huawei, HiSilicon
R1-1717389 Resource allocation for PUCCH Intel Corporation
R1-1717496 Resource allocation for NR PUCCH vivo
R1-1717519 NR PUCCH resource allocation ZTE, Sanechips
R1-1717655 Resource Allocation for PUCCH Transmissions Samsung
R1-1717749 Considerations on PUCCH resource allocation for NR Spreadtrum Communications
R1-1717832 On PUCCH resource allocation CATT
R1-1717888 Subband-based resource allocation for NR PUCCH CMCC
R1-1717963 Considerations on PUCCH resource allocation for NR LG Electronics
R1-1718007 Resource allocation for PUCCH ETRI
R1-1718047 Resource allocation for PUCCH Guangdong OPPO Mobile Telecom
R1-1718214 Resource allocation for PUCCH NTT DOCOMO, INC.
R1-1718260 Discussion on resource allocation for uplink control channel Panasonic Corporation
R1-1718311 PUCCH Resource Allocation Nokia, Nokia Shanghai Bell
R1-1718400 Waveform Selection mechanisms for DFTsOFDM AT&T
R1-1718493 On resource allocation for PUCCH InterDigital, Inc.
R1-1718702 PUCCH resource allocation Motorola Mobility, Lenovo
R1-1718723 Resource allocation for PUCCH to support URLLC Sequans Communications
R1-1718806 Resource allocation for PUCCH Qualcomm Incorporated
R1-1718811 On PUCCH Resource Allocation Ericsson

7.3.2.5 Other

R1-1717094 Discussion on UCI feedback for URLLC Huawei, HiSilicon
R1-1717390 Configurations of various long PUCCH lengths Intel Corporation
R1-1717391 Transmit diversity for PUCCH Intel Corporation
R1-1717392 On UL control channel design aspects for URLLC Intel Corporation
R1-1717520 Analysis of URLLC reliability for uplink control channel ZTE, Sanechips
R1-1717656 PUCCH Design for URLLC Samsung
R1-1717657 Performance Results for Long PUCCH Samsung

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R1-1717658	Performance Results for UCI and Data Multiplexing	Samsung
R1-1717659	BSI Reporting on PUCCH	Samsung
R1-1717660	Multiplexing PUSCH with Short PUCCH or SRS	Samsung
R1-1717661	PUCCH resource configuration for bandwidth restricted UE	Samsung
R1-1717964	Discussion on UL control with ultra-reliability	LG Electronics
R1-1718215	UL control channel design for URLLC	NTT DOCOMO, INC.
R1-1718312	Discussion on UCI transmission for URLLC	Nokia, Nokia Shanghai Bell
R1-1718361	Considerations for ultra-reliable UCI transmission	InterDigital, Inc.
R1-1718567	SR design for GF/GB UL URLLC transmission	Qualcomm Incorporated
R1-1718626	Considerations for UCI for URLLC	III
R1-1718640	On Transmit Diversity for PUCCH	Ericsson
R1-1718641	On PUCCH Multiplexing from the Same or Different UEs	Ericsson
R1-1718642	On Simultaneous Transmission of PUCCH and PUSCH	Ericsson
R1-1718643	On PUCCH for Ultra-Reliable Transmission	Ericsson
R1-1718730	Considerations on frequency hopping for PUCCH	KT Corp.

7.3.3 DL/UL data scheduling and HARQ procedure

R1-1718686	Open issues on RRC parameters for DL/UL data scheduling and HARQ procedure	Ericsson

7.3.3.1 DL/UL resource allocation

Including TBS aspects

R1-1718906 **Outcome of offline discussion of 7.3.3.1 (time-domain allocation)** **Ericsson** (Revision of R1-1718786)

Agreements:

- For both slot and mini-slot, the scheduling DCI can provide an index into a UE-specific table giving the OFDM symbols used for the PDSCH (or PUSCH) transmission
  - starting OFDM symbol and length in OFDM symbols of the allocation
  - FFS: one or more tables
  - FFS: including the slots used in case of multi-slot/multi-mini-slot scheduling or slot index for cross-slot scheduling
  - FFS: May need to revisit if SFI support non-contiguous allocations
- At least for RMSI scheduling
  - At least one table entry needs to be fixed in the spec

Wednesday:

R1-1718983 **Summary of offline on AI 7.3.3.1(DL/UL resource allocation)** **Ericsson**

Agreement: For every TB-level (re-)transmission, the UE is able to determine the TB size from the DCI information in that transmission only

Agreements:

- The TBS is determined based on the actual # of available REs compared with a plurality of reference # of REs
  - FFS the details, including the # of reference REs and other factors for TBS determination

Proposal: For resource allocation type 0 for DL and UL, the RBG size is determined based on the size of the corresponding BWP

Thursday

Proposals – to be concluded Friday

- For resource allocation type 0 for DL and UL, the RBG size is given by UE-specific RRC configuration per BWP from the agreed set of possible RBG values
  - For a given BWP size, only two possible values which is illustrated in the table below:
    - For the two possible values configured for a given BWP size, the two possible values are irrespective of slot vs. non-slot based scheduling – to conclude Alt 1 vs. Alt 2 on Friday
      - Alt 1: the value can be separately configured for slot-based vs. non-slot based scheduling
      - Alt 2: the value is configured to be the same for slot vs. non-slot based scheduling
    - The value for DL RBG vs. UL RBG is the same if the DL BWP size is the same as the UL BWP size
  - FFS the default value before RRC configuration (to be chosen from the two values for a BWP size)
  - FFS whether or not there is an issue before RRC configuration vs. after RRC configuration when the RBG size changes, along with the potential impact on DCI size change

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X_0 – X_1 RBs	RBG size 1	RBG size 2
X_1+1 – X_2 RBs	RBG size 3	RBG size 4

Agreements:
- For the fallback DCI, only resource allocation type 1 is supported
  - At least with PRB-level granularity
  - FFS other granularty(ies)

Discuss further offline on how to perform frequency hopping based resource allocation, and whether or not to support frequency-distributed resource allocation (e.g. using VRB, etc.) especially w.r.t. whether or not RRC signalling is involved or not
Friday: Email discussion/approval till 10/27 – Stefan (Ericsson)

Thursday
R1-1719144 Summary of 7.3.3.1 (DL/UL resource allocation) Ericsson

Agreements:
- Calculate an "intermediate" number of information bits $N_{RE}^{\square} \cdot \upsilon \cdot Q_m \cdot R$ where
  - υ is the number of layers,
  - Q_m is the modulation order, obtained from the MCS index
  - R is the code rate, obtained from the MCS index
  - $N_{RE}^{\square}$ is number of resource elements
  - $N_{RE}^{\square}$ = Y * #PRBs_scheduled
- When determining $N_{RE}^{\square}$ (number of REs) within a slot
  - Determine X = 12* #OFDM_symbols_scheduled – Xd – Xoh
    - Xd = #REs_for_DMRS_per_PRB in the scheduled duration
    - Xoh = accounts for overhead from CSI-RS, CORESET, etc. One value for UL, one for DL.
      - Xoh is semi-statically determined
  - Quantize X into one of a predefined set of values, resulting in Y
    - [8] values
      - Should allow for reasonable accuracy for all transmission durations
      - May depend on the number of scheduled symbols
    - FFS: floor, ceiling or some other quantization
    - Note: quantization may not be needed
    - FFS: Quantization step should ensure the same TB size can be obtained between transmission and retransmission, irrespective of the number of layers used for the retransmission. otherwise Xd has to be independent of the number of layers
- Obtain the actual TB size from the intermediate number of information bits according to the channel coding decisions

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Friday
R1-1719167 Summary of 7.3.3.1 (DL/UL resource allocation) Ericsson

Agreements:

	Config 1	Config 2
X_0 – X_1 RBs	RBG size 1	RBG size 2
X_1+1 – X_2 RBs	RBG size 3	RBG size 4
…	…	…

- RRC selects config 1 or config 2
- One config (config 1) is the default until RRC configures otherwise
- The numbers 'RBG size' in the table are fixed in the spec
- The number of rows should be no more than [4-6]
- Same table for DL and UL
  - The configuration for DL & UL is separate
- Same RBG size irrespective of the duration (slot vs. non-slot)

R1-1717040 Considerations on resource allocation issues ZTE, Sanechips
R1-1717078 DL/UL resource allocation and TB size determination Huawei, HiSilicon

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R1-1717152	DL/UL Resource Allocation schemes for NR	NEC
R1-1717393	On resource allocation and TBS determination in NR	Intel Corporation
R1-1717497	On DL/UL resource allocation	vivo
R1-1717662	DL/UL Resource Allocation	Samsung
R1-1717718	Discussion on frequency domain resource allocation	Fujitsu
R1-1717833	PDSCH and PUSCH resource allocation	CATT
R1-1717965	Discussion on resource allocation and TBS determination	LG Electronics
R1-1718048	Resource allocation for PDSCH/PUSCH	Guangdong OPPO Mobile Telecom
R1-1718216	DL/UL resource allocation	NTT DOCOMO, INC.
R1-1718286	DL/UL resource allocation	Panasonic
R1-1718353	TB size determination and channel coding considerations	MediaTek Inc.
R1-1718494	On remaining details of data resource allocation	InterDigital, Inc.
R1-1718568	DL/UL resource allocation	Qualcomm Incorporated
R1-1718620	On resource allocation for PDSCH and PUSCH in NR	Nokia, Nokia Shanghai Bell
R1-1718644	On DL/UL Resource Allocation	Ericsson
R1-1718703	On resource allocation RBG size	Motorola Mobility, Lenovo
R1-1719115	Examples of incompatible TB sizes	Ericsson

7.3.3.2 DL/UL scheduling and HARQ management

Including scheduling and HARQ timing taking into account gNB/UE processing time, # HARQ processes, HARQ payload considerations, HARQ multiplexing/bundling, etc.

R1-1718826 **Summary of DL/UL scheduling and HARQ management** **Qualcomm Inc.**
Further revised in **R1-1718853** Summary of DL/UL scheduling and HARQ management Qualcomm

Agreements:
- The timing between DL data transmission and acknowledgement is determined based on 0 or [2] bits in DCI
  - For both slot and non-slot scheduling, the timing provides the indication to determine the slot and the symbol(s) for the HARQ-ACK transmission
  - In case of [2]-bits, FFS the actual set of values for slot-based scheduling and non-slot based scheduling, respectively
  - In case of 0-bit, FFS how to determine the single timing (e.g., UE capability dependent, whether or not to have RRC configuration, the interactions with different cases (e.g., initial access), etc.)
  - FFS whether or not to have separate information fields or a same information field for HARQ-ACK resource determation and HARQ-timing determination

Conclusion:
- Discuss further offline how to determine HARQ-ACK payload size when two or more PDSCH transmissions are associated with a single UL transmission using PUCCH or PUSCH (e.g., semi-static determination, dynamic determination based on DAI mechanism similar to LTE, etc.)

Agreements:
- NR supports HARQ-ACK bundling in spatial domain for a NR-PDSCH transmission
  - FFS details (e.g., whether or not to have RRC configuration, whether to apply to CBG-based HARQ-ACK or not, etc.)

Agreements:
- Maximum number of TAGs is 4 for a UE
- Only non-contention based random access for sTAGs

Wednesday:
Agreement:
- For NR non-CA, both semi-static and dynamic HARQ-ACK codebook are supported by configuration
  - Note: the "by-configuration" is also applicable to the CA case

Agreements:
- Dynamic HARQ-ACK codebook (per PUCCH group) for the case without CBG configuration
  - HARQ-ACK codebook determination based on counter DAI and total DAI
    - Use LTE as starting point
    - FFS details

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Agreements:

- For HARQ-ACK spatial bundling:
  - Support higher layer configuration for spatial-domain bundling per PUCCH group
    - Bundling is per cell, and same configuration applies to all the cells
  - FFS whether or not to support HARQ spatial bundling in a dynamic manner

Thursday

Agreements:

- Finalize Table 1 as the *baseline UE processing time* capability in NR Release 15 at least for slot-based scheduling in the non-CA case with single numerology for PDCCH, PDSCH, and PUSCH.
- Finalize Table 2 as the *aggressive UE processing time* capability in NR Release 15 at least for slot-based scheduling in the non-CA case with single numerology for PDCCH, PDSCH, and PUSCH.
  - FFS: if reduced processing time is achieved with a semi-statically reduced bandwidth and throughput capability relative to the peak rate supportable by the UE.
- Further determine (N1,N2) processing times for two UE capabilities in carrier aggregation, mixed numerology, higher order modulation cases, and for mini-slot scheduling.
- For a given configuration and numerology, a UE indicates only one capability for N1 (or N2) based on the corresponding entry for N1 (or N2) from either Table 1 or Table 2.
  - FFS: if multiple capabilities can be reported with different throughput constraints for N1 (or N2).

Table 1. UE Processing Time and HARQ Timing (Capability #1)

Configuration	HARQ Timing Parameter	Units	15 KHz SCS	30 KHz SCS	60 KHz SCS	120 KHz SCS
Front-loaded DMRS only	N1	Symbols	[8]	**[10]**	[14]	[14-21]
Front-loaded + additional DMRS	N1	Symbols	**[13]**	**[13]**	**[17]**	[21]
Frequency-first RE-mapping	N2	Symbols	[9]	[11]	[17]	[31]

Table 2. UE Processing Time and HARQ Timing (Capability #2)

Configuration	HARQ Timing Parameter	Units	15 KHz SCS	30 KHz SCS
Front-loaded DMRS only	N1	Symbols	**[2.5-4]**	**[2.5-6]**
Front-loaded + additional DMRS	N1	Symbols	**[12]**	**[12]**
Frequency-first RE-mapping	N2	Symbols	**[2.5-6]**	**[2.5-6]**

R1-1717041	HARQ-Ack multiplexing and bundling	ZTE, Sanechips
R1-1717075	HARQ timing, multiplexing, bundling, processing time and number of processes	Huawei, HiSilicon
R1-1717394	Remaining details of scheduling and HARQ in NR	Intel Corporation
R1-1717498	UE processing time and HARQ timing	vivo
R1-1717663	HARQ Management and Feedback	Samsung
R1-1717719	Discussion on HARQ-ACK codebook	Fujitsu
R1-1717834	Discussion on HARQ management and HARQ-ACK feedback	CATT
R1-1717855	On HARQ-ACK multiplexing and bundling	Lenovo, Motorola Mobility
R1-1717889	Discussion on timing design with semi-static DL/UL assignment	CMCC
R1-1717966	Considerations on HARQ process and feedback for NR	LG Electronics
R1-1718034	Discussion on HARQ-ACK transmission	Guangdong OPPO Mobile Telecom
R1-1718217	DL/UL scheduling and HARQ management	NTT DOCOMO, INC.
R1-1718279	Discussion on HARQ-ACK multiplexing for NR	WILUS Inc.
R1-1718287	HARQ-ACK codebook for CBG-based transmission	Panasonic
R1-1718326	HARQ-ACK and UL scheduling timing relationship	MediaTek Inc.
R1-1718362	HARQ timing and management	InterDigital, Inc.
R1-1718401	HARQ management for mini-slots	AT&T
R1-1718468	Number of HARQ processes for co-existence with TD-LTE	NEC

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R1-1718470 HARQ ACK multiplexing for NR HTC Corporation
R1-1718569 UE processing time and HARQ management Qualcomm Incorporated
R1-1718621 Remaining aspects of HARQ management Nokia, Nokia Shanghai Bell
R1-1718645 On HARQ Management Ericsson
R1-1718707 UE-based HARQ-ACK bundling for NR Sequans Communications

7.3.3.3 CBG-based (re)transmission

R1-1718861 Summary of proposals on CBG based retransmission LGE
Discuss further offline on HARQ-ACK codebook size jointly consider HARQ timing/CA/non-CA cases

Friday
R1-1719171 Summary of proposals on CBG based retransmission LGE

Agreements:
- In single CW configuration, the maximum configurable number of CBGs per TB is 8
- The possible max number of CBGs per TB is 2, 4, 6, 8
- In multiple CW configuration, the maximum configurable number of CBGs per TB is 4
- In multiple CW configuration, the configured maximum number of CBGs per TB is the same between TBs

Agreements:
- For the case when the semi-static HARQ-ACK codebook with HARQ-ACK multiplexing which includes HARQ-ACK corresponding to all the CBGs (including the non-scheduled CBG(s)) is used,
  - NACK is reported for all the CBGs if TB CRC check is not passed while CB CRC check is passed for all the CBs
  - NACK is mapped for the empty CBG index if the number of CBs for a TB is smaller than the configured maximum number of CBGs

Agreements:
- When UE is configured with CBG based retransmission, for the PDSCH scheduled by PDCCH using fallback DCI, TB level HARQ-ACK feedback is used at least for the case without HARQ-ACK multiplexing
  - FFS whether this operation is applied even for the case with HARQ-ACK multiplexing
  - Note: this means that fallback DCI does not support CBG level HARQ-ACK feedback

Conclusion:
- Discuss further DCI composition for supporting CBG based retransmission in terms of CBGTI, CBGFI, and NDI
  - No RRC impact is expected

Email discuss/approval of the above issue until 11/3 – Sukchel (LGE)

R1-1717042 On the support of TB-based HARQ A/N fallback for CBGs ZTE, Sanechips
R1-1717074 On CBG-based (re)transmission Huawei, HiSilicon
R1-1717395 Details of CBG-based transmissions for NR Intel Corporation
R1-1717499 Support of CBG-based (re)transmission vivo
R1-1717664 CBG-Based UL/DL Retransmissions Samsung
R1-1717720 Discussion on HARQ-ACK feedback for DL CBG based (re-)transmission; Fujitsu
R1-1717835 Remaining aspects of CBG-based operation CATT
R1-1717856 Remaining issues on CBG-based (re)transmission Lenovo, Motorola Mobility
R1-1717967 Considerations on CBG based retransmission for NR LG Electronics
R1-1718035 Discussion on CBG-based (re)transmission Guangdong OPPO Mobile Telecom
R1-1718079 Discussion on the remaining issues of CBG-based (re)transmission ITRI
R1-1718218 Signalling design for CBG-based (re)transmission NTT DOCOMO, INC.
R1-1718270 On HARQ and CBG-based retransmission KT Corp.
R1-1718280 Remaining issues on CBG-based transmission for NR WILUS Inc.
R1-1718288 CBG-based (re)transmission Panasonic
R1-1718313 On CBG-based (re-)transmission Fraunhofer HHI
R1-1718363 CBG-based (re)transmission InterDigital, Inc.
R1-1718402 Remaining details for CBG based re (transmissions) AT&T
R1-1718419 Discussion on CBG-based (re)transmission Sharp
R1-1718471 Remaining issues on CBG-based (re)transmission HTC Corporation
R1-1718570 CBG-based (re)-transmission Qualcomm Incorporated
R1-1718622 On remaining aspects of CBG based transmissions Nokia, Nokia Shanghai Bell
R1-1718646 On CBG Based Transmissions and Retransmissions Ericsson

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R1-1718669 DL control signalling for CBG-based (re)transmission Sony
R1-1718672 Remaining issues on CBG-based (re)transmission China Telecommunications
R1-1718708 CBG A/N multiplexing for CA and cross-slot scheduling Sequans Communications

7.3.3.4 UL data transmission procedure

Including details for single/multiple SR configurations, aspects related to with and without grants, etc.

R1-1718957 Email discussions on UL transmission procedures NTT DOCOMO (Revision of R1-1718814)

Agreements:
- For UL transmission with grant,
  - By UE-specific RRC signaling, a UE can be configured with UL waveform that is different from the one configured by RMSI for Msg3. Once configured;
    - When the non-fallback DCI schedules the PUSCH transmission, the UE uses the UL waveform configured by the UE-specific RRC signaling; when the fallback DCI schedules the PUSCH transmission, the UE uses the UL waveform configured by RMSI for the PUSCH transmission.
  - If the UE is not configured with UL waveform that is different from the one configured by RMSI for Msg3;
    - The UE uses the UL waveform configured by RMSI for the PUSCH transmission.
  - FFS: whether the fallback DCI is based on DCI format/size or on search space.
  - RMSI informs single waveform to the UE

Agreements:
- For Type 1 and Type 2 UL transmission without grant,
  - By UE-specific RRC signaling, a UE can be separately configured with UL waveform that is different from the one configured by RMSI for Msg3.
  - Note: even if the UE is configured with Type 1 and Type 2 UL transmission without grant, the UE may transmit PUSCH that is scheduled by UL grant, in which case the UL waveform determination for UL transmission with grant is used.

Thursday
R1-1719156 Proposals for SR configuration NTT DOCOMO

Proposals:
- For each "SR configuration", the following should be indicated via RRC
  - A configuration index (that corresponds to a periodicity and offset) which identifies the slots/symbols to be used for SR at least for the case when periodicity is larger than a slot

Proposals:
- At least support following Table as the periodicity of resources for SR and for UL transmission without UL grant
  - FFS other values with taking into account the alignment with 14 symbols
  - x=FFS (e.g., 1 and/or 2) – to decide next meeting
  - NOTE: Periodicity of SR is configured independently from periodicity of UL transmission without UL grant
  - FFS the resource for UL transmission without UL grant

Subcarrier spacing (kHz)	Supported periodicities [ms]
15	x symbols, 7 symbols, 1,2,5,10,20,40,80
30	x symbols, 7 symbols, 0.5,1,2,5,10,20,40,80
60	x symbols, 7 symbols (6 symbols for ECP), 0.25,0.5,1,2,5,10,20,40,80
120	x symbols, 7 symbols, 0.125,0.25,0.5,1,2,5,10,20,40,80

INL sustained their offline objection to the low periodicity values in the table
Ask for a lowest periodicity of X OFDM symbols and have X be FFS.
INL commented that since URLLC issues are being deferred to phase 2, RAN1 can deal with these issues after December.

Friday
R1-1719195 Proposals for SR configuration NTT DOCOMO

Agreements:
- For each "SR configuration", the following is indicated via RRC
  - A periodicity and offset which identify the slots/symbols to be used for SR
    - FFS the offset for the SR periodicity shorter than one slot for a given SCS
- Non-periodic SR solutions to meet URLLC latency requirements are not precluded

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- Slide 4 in R1-1719195 is agreed

Agreements:

- At least support following periodicities of resources for UL transmission without UL grant
  - FFS other values with taking into account the alignment with 14 symbols

Subcarrier spacing (kHz)	Supported periodicities [ms]
15	2 symbols, 7 symbols, 1, 2, 5, 10, 20, 32, 40, 64, 80, 128, 160, 320, 640
30	2 symbols, 7 symbols, 0.5, 1, 2, 5, 10, 20, 32, 40, 64, 80, 128, 160, 320, 640
60	2 symbols, 7 symbols (6 symbols for ECP), 0.25,0.5,1,2,5,10,20, , 32, 40, 64, 80, 128, 160, 320, 640
120	2 symbols, 7 symbols, 0.125,0.25,0.5,1,2,5,10,20, 32, 40, 64, 80, 128, 160, 320, 640

R1-1719201 **Proposals for frequency hopping (FH) for PUSCH NTT DOCOMO**

Proposals:

- Frequency hopping is supported for CP-OFDM based NR-PUSCH transmission with contiguous RB allocation
  - At least intra-slot frequency hopping is supported for 14 symbol slot case
- For UL transmission with grant, intra-slot FH hopping can be enabled/disabled by UL grant.
- For PUSCH with grant, at least following are supported and configured by OSI:
  - Inter-slot FH without intra-slot FH.
  - Inter-slot FH + intra-slot FH.

Email discussion/approval till 10/27 – Lihui (NTT DOCOMO)

R1-1719196 **Offline outcome for UL GF** **NTT DOCOMO**

Proposals:

- For UL transmission without grant, for a TB transmission with K repetitions
  - The repetitions follow an RV sequence
  - RV sequences for both CC and IR should be supported, i.e., the pattern with the same RV value is a special case of RV sequence
  - The RV sequence is configured by RRC at least for Type 1.
- For UL transmission without UL grant, for each configuration
  - The number of HARQ processes is explicitly configured by RRC
  - Each configuration can have multiple HARQ processes

Friday: Ericsson objected agreeing above proposals – fine to have them further discussed over email.

Email discussion/approval till 10/27 – Lihui (NTT DOCOMO) – including any other potentially missing RRC parameters related issues

R1-1717091 UL data transmission procedure with and without UL grant Huawei, HiSilicon
R1-1717104 High overhead in low periodicity PUCCH-SR and the advantages of Underlay SR Idaho National Laboratory
R1-1717396 UL data transmission procedures in NR Intel Corporation
R1-1717442 Remaining details of UL transmission without grant ZTE, Sanechips
R1-1717665 Procedures for UL Transmissions Samsung
R1-1717721 Discussions on HARQ for UL data transmission without grant Fujitsu
R1-1717836 On UL transmission procedures CATT
R1-1717859 On UL transmission procedures to reduce latency and enhance reilability Lenovo, Motorola Mobility
R1-1717890 Discussion on scheduling for SPS and UL waveform determination CMCC
R1-1717968 Discussion on UL data transmission procedure LG Electronics
R1-1718003 Some considerations on UL grant-free transmission ETRI
R1-1718066 Discussion on the UL waveform indication method Guangdong OPPO Mobile Telecom
R1-1718085 On physical signaling of uplink grant-free transmission ITRI
R1-1718219 UL data transmission procedures NTT DOCOMO, INC.
R1-1718230 Remaining issues on UL transmission without grant NEC
R1-1718289 UL data transmission procedure Panasonic
R1-1718354 On UL data transmission without grant design and configuration MediaTek Inc.
R1-1718420 Type 2 Transmission without UL Grant: L1 Signaling Is Needed Sharp
R1-1718459 Data transmission and HARQ-ACK feedback for URLLC Shenzhen Coolpad Technologies
R1-1718465 Discussion on Grant-Free UL transmission ITL
R1-1718495 On remaining details of UL data transmission without grant InterDigital, Inc.
R1-1718571 UL data transmission procedures Qualcomm Incorporated

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R1-1718623 UL transmission without grant Nokia, Nokia Shanghai Bell
R1-1718647 On UL Data Trandmission Procedures Ericsson
R1-1718670 Discussion on the waveform determination of UL transmissionSony
R1-1718724 UL Transmission without Grant Sequans Communications
R1-1718725 Resource Configuration and HARQ RV details for Uplink Grant Free TCL Communication
R1-1718761 On Support of UL Grant-Free and Grant-Based Configured Access Fraunhofer IIS
R1-1717500 UL data transmission procedure vivo
R1-1718776 Discussion on the UL waveform indication method Guangdong OPPO Mobile Telecom
R1-1718801 Way Forward on SR Periodicity for NR Idaho National Laboratory, IITH, CEWIT, IITM, Tejas Networks
R1-1718802 Way Forward on SR Periodicity for NR Idaho National Laboratory, IITH, CEWIT, IITM, Tejas Networks, Interdigital, KDDI
R1-1718815 Summary of open issues for AI 7.3.3.4 NTT DOCOMO

7.3.3.5 Soft-buffer management for NR

Including multi-carrier aspects within NR and DC with LTE

R1-1718813 Summary for 7.3.3.5 Intel Corporation

Agreements:

- For DL, limited buffer rate matching (LBRM) is supported and is applied per HARQ process.
  - NR limits transmit buffer corresponding to a largest TBS coded at rate R_{LBRM}.
  - R_{LBRM} =½ is supported.
- Largest TBS for LBRM for DL should at least take into account UE capability
  - Details FFS (e.g., based on UE signalling, gNB configuration w.r.t. highest mod order, etc.)
    - Note: this does not prevent the possibility of defining a single largest TBS used for LBRM in Rel-15

Agreement:

- Dynamic sharing of soft buffer is possible for DL reception by UE implementation
  - No spec impact

Friday
R1-1719251 Summary of Offline discussions on 7.3.3.5 Intel Corporation

Email discussion on the issues raised in 9251 till 10/27 – Ajit (Intel)

R1-1717045 Considerations for soft-buffer management ZTE, Sanechips
R1-1717076 Soft buffer management Huawei, HiSilicon
R1-1717397 Soft-buffer management in NR Intel Corporation
R1-1717501 Soft-buffer management for NR vivo
R1-1717666 Soft Buffer Management Samsung
R1-1717837 Soft buffer management for NR CATT
R1-1717969 Discussion on soft buffer management for NR LG Electronics
R1-1717994 On Transmit Buffer and Soft Buffer Management Ericsson
R1-1718080 Soft Buffer Handling for CBG-based (re)transmissionITRI
R1-1718220 Views on soft-buffer management for NR NTT DOCOMO, INC.
R1-1718349 On HARQ buffering MediaTek Inc.
R1-1718572 Soft buffer management Qualcomm Incorporated
R1-1718624 On the HARQ soft buffer handling Nokia, Nokia Shanghai Bell
R1-1719061 Way Forward on DL LBRM Code Rate MediaTek, ZTE, Sanechips, ITRI, LG Electronics, CATT
R1-1719062 Discussion on DL LBRM Code Rate MediaTek
R1-1719066 WF on UL LBRM Ericsson, ZTE, Nokia, NSB, MediaTek

7.3.3.6 Multiplexing data with different transmission durations

R1-1718820 Summary of multiplexing data with different transmission durations vivo

Agreements:

- The time duration of the reference downlink resource for pre-emption indication equals to the monitoring periodicity of the group-common DCI carrying the pre-emption indication
  - In TDD, at least the semi-statically configured UL symbols are excluded from the reference downlink resource

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- Note: This means the reference downlink resource only includes the DL or unknown symbols given by semi-static configuration within the semi-statically configured time duration of the reference downlink resource.
- FFS for the handling of reserved resource especially at RE level

Conclusion

- Discuss further offline on the possibility of having RRC configured frequency region of the reference downlink resource considering impact of UE-specific BWP configuration, granurality of configurations, etc.

Agreements:

- For minimum monitoring periodicity of pre-emption indication:
  - At least slot level monitoring periodicity of preemption indication is supported
  - FFS to additionally support other cases (e.g. non-slot level monitoring)

Agreements:

- For slot level monitoring periodicity, UE is not required to monitor preemption indication for a slot in which PDSCH is not scheduled
- UE is not required to monitor preemption indication in DRX slots
- UE is not required to monitor preemption indication for the deactivated DL BWP
- Note: not necessarily all of the above bullets will have spec impacts

Proposal: DCI for preemption indication and DCI for SFI are distinguished by different RNTIs

Agreement: The HARQ timeline for a PDSCH transmission is not affected by preemption indication.

Proposal: A UE can be separately configured with preemption indication and CBG based (re)transmission

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Friday

Agreements:

- No concensus to introduce an explicit RRC configuration for frequency region of the reference downlink resource for pre-emption indication in Rel-15
- (working assumption) the frequency region of the reference downlink resource for pre-emption indication is the active DL BWP

Agreements:

- A fixed payload size (excluding CRC and potential reserved bits) of the group-common DCI carrying the downlink pre-emption indication (PI), in the format of a bitmap is used to indicate preempted resources within the semi-statically configured DL reference resource
  - The bitmap indicates for one or more frequency domain parts (N>=1) and/or one or more time domain parts (M>=1)
    - There is no RRC configuration involved in determining the frequency or time-domain parts
  - The following combinations are supported and predefined {M, N} = {14, 1}, {7, 2}
  - A combination of {M,N} from this set of possible {M,N} is indicated 1bit by RRC configuration for a UE

R1-1717043 On preemption indication ZTE, Sanechips
R1-1717081 On pre-emption indication for DL multiplexing of URLLC and eMBB Huawei, HiSilicon
R1-1717398 Multiplexing of different data channel durations Intel Corporation
R1-1717502 Multiplexing data with different transmission durations vivo
R1-1717667 Indication of Preempted Resources in DL Samsung
R1-1717722 On eMBB and URLLC multiplexing Fujitsu
R1-1717838 Remaining details of pre-emption indication CATT
R1-1717848 Multiplexing of UL eMBB and URLLC in NR ASUSTEK COMPUTER (SHANGHAI)
R1-1717970 Remaining issues on pre-emption indication for downlink LG Electronics
R1-1717999 Discussion on DL preemption indication ETRI
R1-1718013 Discussion on DL preemption indication NEC
R1-1718049 Multiplexing between slot-based and symbol-based transmissions and pre-emption indication Guangdong OPPO Mobile Telecom
R1-1718221 Multiplexing data with different transmission durations NTT DOCOMO, INC.

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R1-1718281 Remaining issues on pre-emption indication and UE behavior WILUS Inc.
R1-1718403 Scheduling aspects of mini-slots AT&T
R1-1718462 Discussion on the design of DL preemption indication CATR
R1-1718496 On UL multiplexing of data with different transmission durations InterDigital, Inc.
R1-1718573 URLLC DL pre-emption and UL suspension indication channel design Qualcomm Incorporated
R1-1718648 On Multiplexing Data with Different Transmission Durations Ericsson
R1-1718657 Myths and remaining issues in Pre-emption Indicator Sony
R1-1718701 Discussion on PUSCH/PUCCH and UCI multiplexing Motorola Mobility, Lenovo
R1-1718705 On open issues for DL preemption Sequans Communications
R1-1718731 Remaining details on preemption indication KT Corp.

7.3.3.7 Other

R1-1717058 On uplink data scheduling and hopping Huawei, HiSilicon
R1-1717059 On data channel scrambling Huawei, HiSilicon
R1-1717060 Discussion on the UE category Huawei, HiSilicon
R1-1717082 Support of URLLC for TDD Huawei, HiSilicon
R1-1717083 On supporting ultra reliability in a resource efficient way Huawei, HiSilicon
R1-1717085 Summary on open issues for non-slot-based transmission Huawei, HiSilicon
R1-1717087 PDSCH reliability for URLLC Huawei, HiSilicon
R1-1717089 Discussion on UL multiplexing of eMBB and URLLC Huawei, HiSilicon
R1-1717090 Consideration on subsequent transmission after pre-emption Huawei, HiSilicon
R1-1717092 HARQ feedback indication design for UL grant-free transmission Huawei, HiSilicon
R1-1717093 Link adaption and CSI reporting for URLLC transmission Huawei, HiSilicon
R1-1717095 Discussion on over-the-air time synchronization for URLLC Huawei, HiSilicon
R1-1717153 Frequency hopping for NR UL PUSCH NEC
R1-1717399 On link adaptation enhancements to support URLLC Intel Corporation
R1-1717503 Discussion on scheduling and HARQ for URLLC reliability vivo
R1-1717521 Ultra-reliable part of URLLC for scheduling/HARQ procedure ZTE, Sanechips
R1-1717668 Flushing Indication of Preempted Resources for TB-based re-transmission Samsung
R1-1717669 Average User Plane Latency for Pre-emption based Multiplexing in DL Samsung
R1-1717670 Multiplexing Transmissions with Different Durations Samsung
R1-1717671 Scheduling/HARQ Procedures for URLLC Samsung
R1-1717672 Indication of Preempted Resources in UL Samsung
R1-1717673 On Granularity of Pre-emption Indicator in DL Samsung
R1-1717674 On SS Block/PDSCH/DMRS Multiplexing Samsung
R1-1717857 HARQ design for uplink grant-free transmission Lenovo, Motorola Mobility
R1-1717971 Discussion on scheduling and HARQ procedure for URLLC LG Electronics
R1-1718222 Scheduling and HARQ procedures for URLLC NTT DOCOMO, INC.
R1-1718315 Early HARQ for URLLC Fraunhofer HHI
R1-1718355 On repetition scheme for UL transmission without grant MediaTek Inc.
R1-1718356 On use of scrambling for UL transmission without grant MediaTek Inc.
R1-1718364 Supporting downlink SPS in NR InterDigital, Inc.
R1-1718497 URLLC UL grant-free transmission under Multi-TRP III
R1-1718574 Timing advance for different numerology Qualcomm Incorporated
R1-1718575 UL URLLC Capacity Based on URLLC and eMBB dynamic multiplexing Qualcomm Incorporated
R1-1718576 MPR issue with distributed RB allocation in UL Qualcomm Incorporated
R1-1718579 Scheduling data in slots containing SS blocks in multi-beam scenario Qualcomm Incorporated
R1-1718610 Discussion on URLLC transmitted in same or different numerology resources ASUSTEK COMPUTER (SHANGHAI)
R1-1718649 On FDD Support for NR Ericsson
R1-1718650 On Supporting High Reliability for Data Transmissions Ericsson

7.3.4 Other aspects on carrier aggregation and bandwidth parts

R1-1717500 UL data transmission procedure vivo

7.3.4.1 Other aspects on bandwidth Parts

R1-1718901 Summary of Bandwidth Part Operation MediaTek

Agreements:

- For paired spectrum, DL and UL BWPs are configured separately and independently in Rel-15 for each UE-specific serving cell for a UE

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  - For active BWP switching using at least scheduling DCI, DCI for DL is used for DL active BWP switching and DCI for UL is used for UL active BWP switching
    - FFS whether or not to support a single DCI switching DL and UL BWP jointly
- For unpaired spectrum, a DL BWP and an UL BWP are jointly configured as a pair, with the restriction that the DL and UL BWPs of such a DL/UL BWP pair share the same centre frequency but may be of different bandwidths in Rel-15 for each UE-specific serving cell for a UE
  - For active BWP switching using at least scheduling DCI, DCI for either DL or UL can be used for active BWP switching from one DL/UL BWP pair to another pair
  - Note: there is no additional restriction on DL BWP and UL BWP pairing
  - Note: this applies to at least the case where both DL & UL are activated to a UE in the corresponding unpaired spectrum

Agreement:
- For a UE, a configured DL (or UL) BWP may overlap in frequency domain with another configured DL (or UL) BWP in a serving cell

Conclusion:
- Discuss offline regarding the set of parameters that a UE is configured with for each DL BWP and for each UL BWP for a serving cell (including RRC configuration impact)

Agreements:
- For each serving cell, the maximal number of DL/UL BWP configurations is
  - For paired spectrum: 4 DL BWPs and 4 UL BWPs
  - For unpaired spectrum: 4 DL/UL BWP pairs
  - For SUL: 4 UL BWPs

Agreements:
- For paired spectrum, support a dedicated timer for timer-based active DL BWP switching to the default DL BWP
  - A UE starts the timer when it switches its active DL BWP to a DL BWP other than the default DL BWP
  - A UE restarts the timer to the initial value when it successfully decodes a DCI to schedule PDSCH(s) in its active DL BWP
    - FFS other cases
  - A UE switches its active DL BWP to the default DL BWP when the timer expires
    - FFS other conditions (e.g. interaction with DRX timer)
- For unpaired spectrum, support a dedicated timer for timer-based active DL/UL BWP pair switching to the default DL/UL BWP pair
  - A UE starts the timer when it switches its active DL/UL BWP pair to a DL/UL BWP pair other than the default DL/UL BWP pair
  - A UE restarts the timer to the initial value when it successfully decodes a DCI to schedule PDSCH(s) in its active DL/UL BWP pair
    - FFS other cases
  - A UE switches its active DL/UL BWP pair to the default DL/UL BWP pair when the timer expires
    - FFS other conditions (e.g. interaction with DRX timer)
- FFS the range and granularity of the timer

Proposals:
- Support scheduling DCI with "zero" assignment (i.e. without scheduling downlink or uplink transmission) for active DL/UL BWP switching
  - For DL scheduling DCI, UE is expected to send positive HARQ-ACK for zero-size PDSCH transmission
  - FFS implicit or explicit indication of "zero" assignment, and the corresponding details

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Thursday

Agreements:
- For an Scell, RRC signaling for Scell configuration/reconfiguration indicates the first active DL BWP and/or the first active UL BWP when the Scell is activated
  - NR supports Scell activation signaling that doesn't contain any information related to the first active DL/UL BWP
- For an Scell, active DL BWP and/or UL BWP are deactivated when the Scell is deactivated
  - Note: it's RAN1 's understanding that Scell can be deactivated by an Scell timer

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Agreements:
- For an Scell, a UE can be configured with the following:
  - a timer for timer-based active DL BWP (or DL/UL BWP pair) switching, along with a default DL BWP (or the default DL/UL BWP pair) which is used when the timer is expired
    - The default DL BWP can be different from the first active DL BWP
- For Pcell, the default DL BWP (or DL/UL BWP pair) can be configured/reconfigured to a UE
  - If no default DL BWP is configured, the default DL BWP is the initial active DL BWP

Agreement: In a serving cell where PUCCH is configured, each configured UL BWP includes PUCCH resources

Discuss further offline on the interaction between CSS vs. BWP, especially whether or not the UE needs to perform re-tuning (also consider mmw related CORESET aspects)

Proposals:
- For RRC connected mode in Scell, a PRB offset is indicated for each BWP for common PRB indexing, where PRB offset is relative to the lowest PRB of the respective BWP
- Also discuss the caes for initial access, and RRC connected mode in Pcell

Discuss the possible BWP configuration and sizes

Agreements:
- For a UE, DCI format size itself is not part of RRC configuration irrespective of BWP activation & deacviation in a serving cell
  - Note: DCI format size may still depend on different operations and/or configurations (if any) of different information fields in the DCI

Friday

Agreements:
- In Pcell, for a UE, common search space for at least RACH procedure can be configured in each BWP
  - FFS whether or not there are any additional UE behavior that needs to be specified
- In a serving cell, for a UE, common search space for group-common PDCCH (e.g. SFI, pre-emption indication, etc.) can be configured in each BWP

Agreements:
- A DL (or UL) BWP is configured to a UE by resource allocation Type 1 with granularity as follows
  - Granularity of starting frequency location: 1 PRB
  - Granularity of bandwidth size: 1 PRB
  - Note: The above granularity doesn't imply that a UE shall adapt its RF channel bandwidth accordingly

Agreements:
- A UE is RRC signaled an offset between PRB 0 for common PRB indexing and a reference location
  - For DL in Pcell, the reference location is the lowest PRB of the cell-defining SSB
  - For UL in Pcell of paired spectrum, the reference location is the frequency location of the UL indicated in the RMSI
  - For Scell, the reference location is the frequency location indicated in the SCell configuration
  - For SUL, the reference location is the frequency location indicated in the SUL configuration
  - Note: For UL of unpaired spectrum, the reference location is the same with the DL of the unpaired spectrum.
  - Note: the PRB 0 is intended for scrambling initialization, reference point for BWP configuration, etc.
  - The range of offset values should be >276*4, with the detailed values FFS

R1-1717077	Remaining issues on bandwidth part	Huawei, HiSilicon
R1-1717400	Remaining details for bandwidth parts	Intel Corporation
R1-1717504	Remaining details for bandwidth part operation	vivo
R1-1717675	On Bandwidth Part Operation	Samsung
R1-1717839	Remaining aspects of BWP operation	CATT
R1-1717972	Remaining issues on bandwidth parts	LG Electronics
R1-1718050	Remaining issues on bandwidth part configuration and activation	Guangdong OPPO Mobile Telecom
R1-1718223	Remaing issues on bandwidth parts for NR	NTT DOCOMO, INC.
R1-1718327	Remaining details on bandwidth part operation in NR	MediaTek Inc.

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R1-1718365 Remaining details of BWPInterDigital, Inc.
R1-1718404 Remaining details for bandwidth parts AT&T
R1-1718523 On bandwidth parties Ericsson
R1-1718580 Open issues on BWP Qualcomm Incorporated
R1-1718607 On remaining aspects of BWPs Nokia, Nokia Shanghai Bell
R1-1718765 Discussion on relation between (group) common control channels and DL BWP Panasonic
Late submission

7.3.4.2 Other aspects on carrier aggregation

Including dual connectivity (if any), SUL

R1-1718781 Summary on CA AspectsSamsung

Agreements:
- The following working assumption is confirmed:
  - In case of cross-carrier scheduling, UESS search spaces for the scheduling cell and for the scheduled cell(s) are separated by offset(s) if they are in the same CORESET
    - The offset(s) depends on CIF
    - FFS details
    - FFS the case of same DCI size (whether to have shared search space or not)

Agreements:
- When a UE is configured for cross-carrier DL/UL scheduling, CIF is present in DL/UL scheduling DCIs for both the serving cell under self-scheduling and the serving cells being cross-carrier scheduled
  - FFS whether CIF is present or not in other DCI cases

Thursday
Discuss further offline regarding how to activate/deactivat Scells (MAC CE vs. DCI based)
Discuss further offline regarding whether or not CBG based HARQ-ACK feedback would have RRC impact or not
Discuss further offline whether or not to support SRS cell switching before Dec.
Discuss further offline whether LTE-like max code rate mechanism is to be used for NR UCI feedback

Friday

Proposals:
- Option #1
  - NR supports Scell activation via DCI signaling
    - FFS for deactivation
    - FFS interactions between Scell deactivation timer and BWP timer
- Option #2:
  - NR supports Scell activation/deactivation via MAC CE signalling
  - Optionally,
    - BWP switching DCI to switch bandwidth part can be used to activate Scell
      - FFS details
- Option #3:
  - NR supports Scell activation/deactivation via MAC CE signalling only

Email discussion/approval till 10/27 (Peter A., Qualcomm)

Agreements:
- 'Semi-static' HARQ-ACK codebook (per PUCCH group) is at least determined by
  - Configured number of DL Cells
  - The max number of TBs based on configuration for each DL cell
  - Configured number of CBGs per TB per configured DL cell
  - FFS: Handling of different numerology between UL and DL
  - Details FFS
- Dynamic HARQ-ACK codebook (per PUCCH group) with CBG configuration at least for one serving cell
  - Details FFS

Proposals:
- A configurable max coding rate is used for a UE to determine how to feedback UCI on PUCCH
  - FFS details how to use the configuration. The LTE mechanism is the baseline

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Email discussion/approval till 10/27 (Aris – Samsung)

R1-1717080	Other issues on NR CA and DC including SRS switching and SUL	Huawei, HiSilicon
R1-1717401	Remaining aspects for carrier aggregation	Intel Corporation
R1-1717505	On NR carrier aggregation	vivo
R1-1717522	PUCCH transmission in case of Carrier Aggregation	ZTE, Sanechips
R1-1717676	CA Operation Aspects	Samsung
R1-1717840	Remaining aspects of CA operation	CATT
R1-1717858	HARQ-ACK codebook size determination for CA with different numerologies	Lenovo, Motorola Mobility
R1-1717891	Discussion on design of msg2 for SUL	CMCC
R1-1717973	Discussion on carrier aggregation for NR	LG Electronics
R1-1718224	Views on other aspect on carrier aggregation	NTT DOCOMO, INC.
R1-1718405	Remaining details for carrier aggregation	AT&T
R1-1718581	Open issues on CA	Qualcomm Incorporated
R1-1718608	On remaining aspects of NR CA/DC	Nokia, Nokia Shanghai Bell
R1-1718651	On Carrier aggregation related aspects	Ericsson

7.3.5 Rate matching aspects for NR DL and UL

Including PDCCH vs. PDSCH, RS related rate matching/puncturing, considerations for LTE/future compatible related matching/puncturing, etc.

R1-1718827 Summary of open issues related to rate-matching in NR Nokia, Nokia Shanghai Bell

Conclusion:

- Discuss further offline to come up with framework on how rate matching/puncturing should be done at least for NR-PDSCH & NR-PUSCH especially in terms of signalling details (granularity in time-domain and frequency-domain), considering different important use cases (LTE/NR co-existence, RS/channels/CORESETs defined in NR, etc.).
  - The applicable use cases can be clarified with notes, but not necessarily part of the proposed signalling details

Thursday

Agreements:

- On a RE level, NR-PDSCH of SCS 15kHz can be rate-matched around the following resources:
  - LTE CRS
    - Rate-matching resource can be semi-statically configured (using LTE v_shift and up to 4 CRS antenna port(s)) for a NR UE
- A UE is not expected to handle the case where NR-PDSCH DMRS REs are over-lapping, even partially, with any RE(s) indicated by the rate-matching configuration.

Agreements:

- On the RB-symbol level, UE can be configured with one or multiple DL resource set(s), each resource set configuration includes a first bitmap of RB granularity and a second bitmap of OFDM symbols within a slot for which the first bitmap applies (i.e. the intersection of two bitmaps).
  - These resource set(s) can be identified as resource sets(s) for which the PDSCH is or is not mapped based on the L1 signalling.
    - FFS whether or not the presence of the information field to indicate the resource set is RRC configurable – conclude by Friday
  - FFS whether a resource set is applicable in every slot or not (e.g., via a periodic configuration, etc.)
    - Conclude by Friday whether or not there is RRC impact
  - FFS the case of one DCI scheduling multi-slot transmission
  - Note: covers future/backward compatible resource, parts of CORESETs, multiple CORESETs
  - FFS L1 signaling is GC PDCCH or scheduling DCI
- CORESET(s) configured to a UE for monitoring can be included in resource set(s)
  - If included, the entire COREST is assumed for rate matching when applicable
  - These resource set(s) can be identified as resource sets(s) for which the PDSCH is or is not mapped based on the L1 signalling.
- FFS the configuration details of rate matching for semi-static case (w/o L1 signalling)

Proposals:

- NR-PUSCH can be rate-matched around the following UL resource sets:
  - Resource set can be configured at least in the last 6-symbols

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- PUSCH symbols is contiguous after rate matching
  - FFS: Can be non-contiguous
  - FFS: continuous set of RBs at least in the last 6 symbol of the slot
- UL resource set(s) can be identified as resource sets(s) for which the NR-PUSCH is or is not mapped based on the L1 signalling
  - FFS: whether L1 signalling is covered by RA time-domain signalling
  - FFS the configuration details of rate matching for semi-static case (w/o L1 signalling)
- Note: For the purpose of NR and LTE SRS, short PUCCH

Friday

Proposals:

- On the RB-symbol level, for semi-static configuration of a rate-matching resource
  - Configure a first bitmap of RBs
  - Configure a second bitmap of [14, 28 or 56] symbols (i.e. 1 2 4 slot(s)) in time for which the first bitmap applies
  - Configure a third bitmap indicating, in units of second bitmap, the units for which time-frequency units configured by the first and the second bitmaps apply, for the duration of min(40ms,[1, 5, 10, 20 or 40] units)
  - The rate-matching resource set configuration repeats in time.
  - FFS: remaining details of configuration for rate-matching resource sets with and without L1 signalling.

For email approval till 10/27 (including per cell vs. per BWP, max # resource sets, DCI field presence or not and/or by configuration or not)

R1-1717044	On Dynamic resource sharing	ZTE, Sanechips
R1-1717079	Remaining issues on reserved resources	Huawei, HiSilicon
R1-1717402	On RE mapping for NR	Intel Corporation
R1-1717482	Discussion on rate matching for DL and UL	vivo
R1-1717677	On Rate Matching	Samsung
R1-1717723	Discussion on PDSCH rate matching	Fujitsu
R1-1717841	Details of rate matching for PDSCH and PUSCH	CATT
R1-1717974	Discussion on rate matching for PDSCH/PUSCH	LG Electronics
R1-1718030	On PDSCH and PUSCH Rate matching	Guangdong OPPO Mobile Telecom
R1-1718225	Rate-matching aspects for DL and UL	NTT DOCOMO, INC.
R1-1718282	Discussion on dynamic resource sharing for NR	WILUS Inc.
R1-1718290	Resource reservation for NR DL and UL	Panasonic
R1-1718406	Rate matching aspects of LTE-NR coexistence and further details on resource sets	AT&T
R1-1718522	On matching transmissions to available resources	Ericsson
R1-1718582	On PDSCH and PUSCH RE mapping	Qualcomm Incorporated
R1-1718609	On rate-matching in NR	Nokia, Nokia Shanghai Bell
R1-1718661	Reserved resources for NR coexistence with LTE-M	Sony

7.3.6 Other

Including remaining aspects related to forward compatibility (if any)

R1-1717678	On UL Transmission Timing Aspects	Samsung
R1-1717679	Triggered UCI Transmissions	Samsung
R1-1717904	Coexistence of different UE types on a wideband carrier	Huawei, HiSilicon
R1-1717905	Bandwidth part activation and adaptation	Huawei, HiSilicon
R1-1718051	On resource reservation	Guangdong OPPO Mobile Telecom
R1-1718687	Open issues on RRC parameters for CA, BWP and rate matching aspects	Ericsson

7.4 Channel coding

R1-1719254 **Chairman's notes of AI 7.4 Channel coding** **Ad-Hoc chair (Nokia)** (rev of R1-1719116)
The document was presented by Matthew Baker of Nokia.
Decision: The document is endorsed, and content incorporated below.

7.4.1 LDPC code

7.4.1.1 Remaining issues of bit-level interleaver

R1-1718346 **Remaining issues on bit-level interleaver** **MediaTek Inc.**
R1-1717404 **Remaining issues of LDPC bit-level interleaver** **Intel Corporation**

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R1-1718583 **Bit-level interleaving** **Qualcomm Incorporated**
Late submission

Agreements:
- Reverse mapping is not supported.
- Working assumption is confirmed that interleaver is located after the whole rate matching functionality including repetition

R1-1717680 Bit-reversal mapping in bit-level interleaver Samsung
R1-1717975 On bit reverse mapping of LDPC LG Electronics
R1-1718673 Reverse order mapping for retransmissions Nokia, Nokia Shanghai Bell
R1-1718823 Mapping of interleaved LDPC bits to modulation symbols Huawei, HiSilicon
R1-1718888 Remaining Issues of Channel Interleaver for LDPC Codes Ericsson
R1-1718981 On bit reversal in bit-level interleaver ZTE, Sanechips

7.4.1.2 RV order for special cases

R1-1717405 **LDPC RV ordering for special cases** **Intel Corporation**

Observations:
- If performance is the priority, {0,2,3,1} should be used.
- If self-decodability is the priority, it should be taken into account that the upper limit of the code rate at which each RV is self-decodable is in the following order: 0>3>>2>1

Agreement:
- The default RV order is {0,2,3,1} for cases where RV index is not explicitly signalled or otherwise specified and there is no ambiguity about which instance of a transmission occurred, for both BG1 and BG2

Conclusion for other cases, e.g. grant-free and unlicensed:
- The respective session should determine the requirements (ambiguity, number of repetitions, self-decodability, existence of configuration signalling) and RV(s) should then be determined accordingly in the channel coding session.

R1-1717681 RV order for special case Samsung
R1-1717976 RV order for special cases LG Electronics
R1-1718347 On RV order for special cases MediaTek Inc.
R1-1718376 RV order for LDPC codes Huawei, HiSilicon
R1-1718409 On RV order for special cases ZTE, Sanechips
R1-1718498 Performance Evaluation of RV Order InterDigital, Inc.
R1-1718674 Default RV order Nokia, Nokia Shanghai Bell
R1-1718804 Considerations for RV order Qualcomm Incorporated
R1-1718889 RV Order for LDPC HARQ Ericsson

7.4.1.3 Other

Including confirmation of Working Assumptions on segmentation and BG selection.
Including handling highest code rate supportable by each BG with acceptable performance

Max code rate for BG1
R1-1717406 Remaining issues for LDPC BG usage and segmentation Intel Corporation
Section 4
R1-1717683 Highest code rate supportable by BG1 Samsung
R1-1718676 Highest code rates for LDPC base graphs Nokia, Nokia Shanghai Bell
R1-1717991 Highest Code Rate Supported by LDPC Codes Ericsson
R1-1717977 Remaining issues in LDPC code LG Electronics
Section 2.2
R1-1718410 Remaining issues of segmentation and BG selection ZTE, Sanechips
Section 4
R1-1718348 Remaining issues on BG applications for NR MediaTek Inc.
Section 2

Values proposed: 0.935, 0.9375, 0.949, 0.95, 0. 9565, 0.96, 0.97

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Agreement:
- UE can skip decoding with BG1 when the effective code rate is > 0.95.

Observation:
- BG1 performance is good for 256QAM up to 0.9375, and for QPSK up to 0.9565.

BG selection and segmentation

R1-1717993 **Application of BG1 and BG2 for NR Data Channel** **Ericsson**
R1-1718997 **Highest code rate supportable by BG2** **Samsung** (Revision of R1-1717684)
R1-1718377 Base graph usage for small block lengths Huawei, HiSilicon
Section 2
R1-1718348 **Remaining issues on BG applications for NR** **MediaTek Inc.**
Section 3

Agreement:
- For block lengths K≤308:
  - BG2 is used for all code rates

R1-1717686 **Discussion on BG2 segmentation** **Samsung**
R1-1717406 **Remaining issues for LDPC BG usage and segmentation** **Intel Corporation**
Section 2
Proposals::
- Alt 1: Zero padding is added during segmentation if there are cases where the relevant BG does not support the required TBS.
- Alt 2: Cases are not supported where the TBS determination procedure cannot achieve the criterion that TBS plus TB-CRC can be factored into the number of CBs multiplied by the CBS (before addition of LDPC encoding filler bits).
- Alt 3: Transport block sizes that are supported by BG2 are also supported by BG1, and the maximum number of code block sizes supported by BG2 is at most two.
- Alt 4: Transport block sizes that are supported by BG1 are also supported by BG2, and zero padding is added during segmentation if necessary.

Agreement: TBSs are byte-aligned

Agreement:
The first Working Assumption from RAN1#90 AI 6.1.4.1.2 and the first Working Assumption from NR AH#3 AI 6.4.1.3 are combined and agreed as modified below:
- 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
- TBS determination for all code rates shall ensure that no zero padding is necessary with BG1 segmentation; TBS determination shall also strive to achieve no zero padding also with BG2 segmentation; any special cases are only permitted for BG2.
  - If needed for BG2 segmentation, zero padding is added during segmentation, with the padding being placed at the beginning of the first code block prior to CB-CRC calculation; padding bits are transmitted.

FFS: Byte- or something-alignment of CB sizes.

R1-1717992 TB Size and Code Block Segmentation for NR Data Channel Ericsson
R1-1718675 Remaining details of CB segmentation Nokia, Nokia Shanghai Bell
R1-1718410 Remaining issues of segmentation and BG selection ZTE, Sanechips
Sections 2&3
R1-1718499 LDPC Base Graph Selection for Small Code Blocks InterDigital, Inc.
R1-1717977 Remaining issues in LDPC code LG Electronics
Section 2.1

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R1-1717842 BG selection for NR data channel CATT

Nominal code rate determination from DCI
R1-1718377 Base graph usage for small block lengths Huawei, HiSilicon
Section 3

Question: How to determine the BG of the initial transmission, including when segmentation with BG2 is applied?

Problem: How to let the receiver identify the BG on a retransmission when the MCS is changed such that the BG seelction would differ from the initial transmission when initial PDCCH assignment is missed, followed by DTX->NACK error?

Options:
- Alt 1: Explicit indication of BG in DCI
  - Most robust solution, fixes all error cases
  - But increases overhead
  - LG, ZTE, Nok, Fuji, CATT, MTK
- Alt 2: Determine TBS and BG from MCS field in DCI, and either:
  - Intel, Sams, DCM, Eri, QC, HW,
  - a) apply additional* restrictions to the MCS set of all retransmissions to ensure that the TBS calculation results in the same BG selection as for the initial transmission
  - b) enable TBS and BG to be derived from the MCS field unambiguously for both initial and retransmissions, without additional* restrictions on the MCS set for retransmissions

* additional meaning on top of the restrictions that would anyway apply if the BG was explicitly known.

Study further until RAN1#91. (Can check on Friday if consensus around a solution emerges.)
Friday: No change.

R1-1717685 Code rate definition for BG selection Samsung
R1-1717406 Remaining issues for LDPC BG usage and segmentation Intel Corporation
Section 3
R1-1718585 Considerations for BG2 segmentations Qualcomm Incorporated
Late submission

R1-1717682 Coding chain for data channel Samsung

7.4.2 Polar code

7.4.2.1 Remaining issues of code construction

Frozen bit values, scrambling, CRC masking
R1-1717407 Remaining issues for Polar code construction Intel Corporation
Sections 3,4
R1-1718343 On UE-specific scrambling design for DL control MediaTek Inc.
R1-1718368 Linear Codeword Scrambling to Support Early Termination on DCI Blind Detection and other Modes of Block Discrimination Coherent Logix

Observations:
- No loss of ET opportunities compared to the case of no masking is foreseen by masking the RNTI onto the last N_{RNTI} CRC bits, provided that N_{RNTI} <= 17.
- No significant loss of ET opportunities compared to the case of no masking is foreseen by masking the RNTI onto the last N_{RNTI} CRC bits, provided that N_{RNTI} <= 21.
- Masking RNTI on the distributed CRC bits:
  - if the UE is configured to monitor only 1 RNTI:
    - may increase the ET possibilities in the case of a valid codeword for another RNTI being received
  - if the UE is configured to monitor >1 RNTI:
    - reduces possibilities for ET
    - may require decoder to maintain two decoding trees in some implementations.

Agreement:
- RNTI is masked onto the last N_{RNTI} CRC bits on the PDCCH, where N_{RNTI} is the number of bits of the RNTI
- Working Assumption that N_{RNTI} is 16 bits.

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- Prepare a draft LS to RAN2 (R1-1719086 – Yufei – approved in R1-1719094) to let them know that RAN1's channel coding design for PDCCH is capable of carrying RNTIs on the DCI up to at least 17 bits, and possibly up to 21 bits, asking RAN2 to inform RAN1 when they have decided the necessary RNTI length.
  - Check the LS in the control channel session in case additional information should be included before sending it.

Note that this preserves the ET gains in cases of interference that is effectively AWGN or QPSK constituting an invalid codeword.
Working assumption: no additional UE-specific scrambling motivated by channel coding; can be revisited on Thursday or at RAN1#91 if it is shown that valid codeword interference occurs sufficiently frequently to cause significant overall loss in ET gain (in which case, the following examples of scrambling may be considered, provided that the number of required blind decodes is not increased: u-domain or c-domain or before mapping to modulation symbols, or payload scrambling after CRC calculation but before CRC attachment).

Observations on scrambling:

- When input to decoder is effectively AWGN or random QPSK, there is no difference in ET gain between cases with and without UE-ID-based u-domain scrambling
- Pros and cons of scrambling:
  - When input to decoder is another valid codeword, scrambling gives ET benefits in cases of high SINR to the unintended UE
  - May increase latency (different opinions)

R1-1718677	Frozen bit values and scrambling	Nokia, Nokia Shanghai Bell
R1-1718504	**Simplified UE-Specific Scrambling for DL Control**	**Tsofun Algorithm**
R1-1718370	UE-ID and value of frozen bits for Polar code	Huawei, HiSilicon
R1-1718884	Consideration of UE ID scrambling for DCI	Qualcomm Incorporated (Revision of R1-1718586)
R1-1718226	UEID scrambling design for Polar codes	NTT DOCOMO, INC.
R1-1717687	UE-specific scrambling for downlink control channels	Samsung
R1-1718407	On Setting the values of Frozen bit locations for Polar codes	AT&T
R1-1717978	Scrambling of downlink control channel	LG Electronics
R1-1717752	RNTI scrambling for PDCCH Polar code	Spreadtrum Communications
R1-1718500	On UE Specific Scrambling	InterDigital, Inc.
R1-1718887	Remaining Issues of Polar Code Construction for UCI and DCI	Ericsson
R1-1718577	Consideration of the number of CRC bits for uplink	Qualcomm Incorporated

7.4.2.2 Remaining details of DL channel interleaver

R1-1718860	**Performance evaluation of DL channel interleaver**	**LG Electronics** (Revision of R1-1717979)
R1-1718893	**Channel bit interleaver for DL control**	**MediaTek Inc.** (Revision of R1-1718344)
R1-1718371	DL Channel interleaver	Huawei, HiSilicon
R1-1717844	Interleaver design for NR DL control channel	CATT
R1-1718501	On Downlink Channel Interleaver	InterDigital, Inc.
R1-1717996	**On Downlink Channel Interleaver for Polar Codes**	**Ericsson**
R1-1717688	**Design of channel interleaver for downlink control channels**	**Samsung**
R1-1718678	Downlink Channel Interleaver for Polar codes	Nokia, Nokia Shanghai Bell
R1-1718411	**Performance evaluation of downlink channel interleaver**	**ZTE, Sanechips**

Proposed Agreement:
- Adopt the interleaver only for the AL=1 case.
- Use simple rectangular block interleaver

Objections from Intel, Ericsson, Docomo, Samsung

Conclusion: DL channel interleaver is not adopted.

R1-1718587	Considerations on downlink interleaver design	Qualcomm Incorporated

Late submission

7.4.2.3 Other

Segmentation for large UCI

R1-1718914	**Segmentation of Polar code for large UCI**	**ZTE, Sanechips** (Revision of R1-1718412)

Agreement:

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- UCI segmentation into two segments with equal segment sizes (with a single zero-padding bit inserted at the beginning of the first segment if needed) is used for certain ranges of K (before segmentation) and R, e.g. K>= threshold (e.g. 352) and R<= threshold (e.g. 0.4)
  - exact values FFS until RAN1#91
- CRC appended to the first segment is calculated based on the first segment only
- CRC appended to the second segment uses the same polynomial as for the first segment, and is calculated based on the second segment only

R1-1717407 Remaining issues for Polar code construction Intel Corporation
Section 5
R1-1718372 Segmentation for Polar codes Huawei, HiSilicon
R1-1718589 Segmentation design for large UCI Qualcomm Incorporated
Miscellaneous
R1-1718227 Polar coding for CSI reporting NTT DOCOMO, INC.
R1-1718413 Joint coding scheme for UCI ZTE, Sanechips
R1-1717689 Polar code construction for short UCI Samsung
R1-1718506 On nFAR for UL code construction Huawei, HiSilicon
R1-1718588 Consideration nFAR determination for uplink Qualcomm Incorporated
R1-1717997 RNTI and Scrambling for DCI Ericsson
R1-1719138 Polar code FAR performance study ZTE

7.4.3 PBCH

R1-1718373 Polar code for PBCH and soft combining Huawei, HiSilicon
R1-1717690 Polar code construction for PBCH Samsung
R1-1717998 Polar Code Design for NR-PBCH Ericsson
R1-1718959 WF on polar code construction for PBCH Ericsson, Qualcomm

Agreement from RAN1#89:
- Polar coding is adopted for NR-PBCH
  - Using same polar code construction as for the control channel
  - N_{max} = 512

Clarification of the above agreement:
- Reuse Polar code design of PDCCH, i.e., 24-bit D-CRC with the associated interleaver.

Agreement:
- Working assumption from RAN1#89 is confirmed, that the data, including time index if carried by NR-PBCH, is transmitted explicitly

R1-1719136 WF on bit-field order for NR PBCH Ericsson, Mediatek

Next steps:
Study further until RAN1#91 the order of the PBCH fields, considering whether one or more PBCH fields that have known bit values in certain scenarios are placed in a specific order to enable potentially improved PBCH decoder performance/latency (with the CRC being calculated based on the order of the payload after this ordering)
- Examples of field(s) to be considered in particular include:
  - SS block time index;
  - SFN bits (e.g. for handover cases when the SFN is known a priori);
  - reserved bits
- Note that backward compatibility problems in future releases should be avoided.

R1-1717845 Discussion on Polar codes for PBCH CATT
R1-1717980 Coding aspects of PBCH transmission LG Electronics
R1-1718524 Scrambling sequence design for PBCH Sequans Communications
R1-1718590 PBCH design using Polar codes Qualcomm Incorporated
R1-1718894 PBCH coding design MediaTek Inc.
R1-1719202 Remaining details of PBCH Nokia, Nokia Shanghai Bell

7.4.4 Other

R1-1717727 Essential enhancement to rate matching of Reed Muller code Sequans Communications
R1-1718374 Channel coding for URLLC Huawei, HiSilicon

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R1-1718505 Channel Coding for URLLC Tsofun Algorithm

R1-1719253 WF on coding for 6G Accelercomm, CATT, Coherent Logix, Ericsson, Fujitsu, HiSilicon, Huawei, Intel, InterDigital, LG, MediaTek, Nokia, NSB, NTT Docomo, Orange, Qualcomm, Samsung, Sanechips, Sony, Tsofun, Xilinx, ZTE, Satoshi
With this proposal, 6G is now complete as well as 5G.

7.5 NR-LTE co-existence

R1-1719119 Chairman's notes of AI 7.5 NR-LTE co-existence Ad-Hoc chair (Nokia)
The document was presented by Matthew Baker of Nokia.
Decision: The document is endorsed, and content incorporated below.

R1-1717780 TDM single uplink transmission in NR NSA and comparison to dual uplink Apple Inc.
R1-1718178 Remaining issues on single uplink transmission NTT DOCOMO, INC.

Proposal:
- 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), UE operating on only one of the carriers at a given time among a pair of LTE and NR can optionally be configured with UE-specific subframe offset for the LTE carrier for the HARQ timing of the DL-reference UL/DL configuration for Case 1 (DL-reference UL/DL configuration defined for LTE-FDD-SCell in LTE-TDD-FDD CA with LTE-TDD-PCell).

Agreement:
- For Case 1, FDD timing configuration (i.e., periodicity and offset) is applied to LTE PRACH and SRS on LTE UL carriers.
- The UE is not required to support transmission of LTE PRACH or SRS transmission which does not coincide with the configured HARQ-ACK transmission occasions

R1-1718521 On single-UL transmission and DL/UL TDM Ericsson

Agreements:
- DL/UL TDM (to avoid self-interference due to harmonics) is a network decision on a per-UE basis
  - No RRC configuration signalling is provided to the UE for this purpose (except FFS for the LTE RRC signalling to configure Case 1 HARQ timing)
  - UEs can be scheduled for NR or LTE uplink transmission in an arbitrary slot
  - UEs can be scheduled for NR or LTE downlink transmission in an arbitrary slot
- For the case of a UE configured with multiple uplink carriers (regardless of SUL or not) but where the UE is assumed to only operate on one uplink carrier at a time:
  - No RRC configuration signalling is provided to the UE for this purpose (except for the LTE RRC signalling to configure Case 1 HARQ timing)
  - UEs can be scheduled for uplink NR transmission in an arbitrary slot
  - The UE behaviour in case of being simultaneously scheduled on LTE and NR uplinks is not specified

R1-1717410 Remaining issues of NR-LTE coexistence Intel Corporation
R1-1718460 Discussion on the Pattern Type for Harmonic Interference Handling China Telecommunications
R1-1717507 Remaining issues on UE self-interference handling vivo
R1-1718775 Further discussion on the solution to the NR-LTE self-interference Guangdong OPPO Mobile Telecom

R1-1718934 WF on SUL operations Huawei, HiSilicon, Vodafone, China Mobile, Orange, Deutche Telekom, China Telecom, China Unicom, vivo

Note following agreements from RAN2:

Agreements for SUL operation in connected mode:
1 When SUL is configured there are 2 ULs configured for one DL of the same cell. (FFS how much configuration is provided for the 2 ULs)
2 At any point in time, each serving cell has at most one PUSCH for transmission

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Options for further discussion on RRC signalling to configure SUL
1 RRC configured 2 ULs (one if a full UL configuration and 2nd is just SRS configuration). RRC reconfiguration to provide a full UL configuration for a different carrier is used to switch UL data between 2 different ULs.
2 RRC configures 2 UL. Signalling (e.g. DCI or MAC CE) is defined to enable UE to switch between the 2 different UL configurations, or 2 use both ULs

=> Offline to progress the FFS and to try to conclude between the 2 options. Can consider any RAN1 progress made during this week. (Offline discussion #22, Huawei)

Comeback session on Wednesday:

Clarification of agreements
1 In any slot, one PUSCH is used for transmission for a single serving cell (i.e. associated to a single DL). This excludes simultaneous transmission on 2 PUSCH wihin a single slot but does not restrict switching between the two PUSCH based on L1 /MAC/RRC signalling options.
2 RAN2 consider that it is up to RAN1 to decide where PUCCH is transmitted
3 Option 2 is clarified to " RRC configures 2 UL. Signalling (e.g. DCI or MAC CE) is defined to enable UE to switch between the 2 different UL configurations, to use both ULs but not schedule them simultaneously based on agreement 1 above"
4 Final decision to use MAC CE signalling would be a RAN2 decision.
5 Final decision to use L1 signalling would be a RAN1 decision.
6 There is no RAN2 motivation to adopt DCI signalling.

R1-1719112 WF on SUL operation Huawei, HiSilicon

Proposals:

- UE specific RRC signaling is used to configure one of the following cases for potential PUSCH transmission on the SUL carrier and the non-SUL UL carrier in a SUL band combination
  - Case 1: PUSCH is only transmitted on the SUL carrier
    - i.e. the UE is not expected to receive UL grant for PUSCH on the non-SUL UL carrier
  - Case 2: PUSCH is only transmitted on the non-SUL UL carrier
    - i.e. the UE is not expected to receive UL grant for PUSCH on the SUL carrier
  - Case 3: PUSCH is transmitted on both the SUL carrier and non-SUL UL carrier
    - A carrier indicator field in the UL grant is used to indicate where the corresponding PUSCH is transmitted, i.e. on the SUL carrier or the non-SUL UL carrier
    - There is one active BWP on the SUL carrier and one active BWP on the non-SUL UL carrier
    - Note: Simultaneous PUSCH transmission on the SUL carrier and non-SUL UL carrier is not supported according to existing RAN2 agreement
- The above two UE specific RRC signalings for PUCCH and PUSCH are independent
- SRS related RRC parameters are independently configured for SRS on the SUL carrier and SRS on the non-SUL UL carrier
  - SRS can be configured on the SUL carrier and non-SUL UL carrier, irrespective of the carrier configuration for PUSCH and PUCCH

LG alternative: For UEs in RRC Connected, only one UL carrier is activated for PRACH/PUSCH/PUCCH, which can be switched between SUL and non-SUL by RRC signalling.

Agreement:

- UE specific RRC signalling (re-)configures the location of the PUCCH, either on the SUL carrier or on a non-SUL UL carrier in a SUL band combination
  - The default location of the PUSCH is the same carrier as used by PUCCH
- UE specific RRC signalling may (de-)configure that PUSCH may be dynamically scheduled on the other (i.e. non-PUCCH) carrier in the same cell as the SUL
  - In this case, a carrier indicator field in the UL grant is used to indicate dynamically whether the PUSCH is transmitted on the PUCCH carrier or on the other carrier
    - Note: Simultaneous PUSCH transmission on the SUL carrier and non-SUL UL carrier is not supported according to existing RAN2 agreement
    - FFS in DCI discussion whether the SUL CIF is always present
  - There is one active BWP on the SUL carrier and one active BWP on the non-SUL UL carrier
- SRS related RRC parameters are independently configured for SRS on the SUL carrier and SRS on the non-SUL UL carrier in the SUL band combination
  - SRS can be configured on the SUL carrier and non-SUL UL carrier, irrespective of the carrier configuration for PUSCH and PUCCH

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R1-1718948 WF on PUSCH transmission with SUL ZTE, Sanechips, China Telecom, CATR, Huawei, vivo, China Unicom

R1-1717691 On LTE-NR Coexistence Samsung
R1-1717981 Remaining issues in NR LTE coexistence LG Electronics
R1-1717097 HARQ/CSI feedback and scheduling timing for SUL Huawei, HiSilicon
R1-1718503 Remaining issues in NR-LTE coexistence ZTE, Sanechips
R1-1717154 RACH procedure towards SUL carrier NEC

R1-1718694 Transmission switching time between SUL carrier and NR TDD carrier CMCC
R1-1718939 WF on switching time between SUL carrier and NR TDD carrier CMCC, China Telecom, Orange, China Unicom, Nokia, Nokia Shanghai Bell, Huawei, HiSilicon, ZTE, Sanechips, Deutsche Telekom
For discussion in RAN4.

R1-1717849 Remaining issues on LTE/NR coexistence CATT
R1-1718688 Open issues on RRC parameters for NR-LTE co-existence Ericsson

Friday
R1-1719194 WF on UL TDM in single Tx EN-DC Qualcomm, Vodafone
Decision: For email discussion/approval till 10/27 – Peter (Qualcomm)

7.6 UL power control

R1-1719117 Chairman's notes of AI 7.6 UL Power control Ad-Hoc chair (Samsung)
The document was presented by Younsun Kim of Samsung.
Decision: The document is endorsed, and content incorporated below.

7.6.1 NR power control framework

R1-1718883 Offline summary for Al 7.6 NR UL power control ZTE

Agreement: For N closed-loop power control processes, i.e., fc(i,l), for NR PUSCH power control for serving cell c, the following working assumption is confirmed:
- N is up to 2

Agreement: For closed loop power control process, f(i) in case of accumulative TPC command mode can be reset by RRC reconfiguration of P_0 and alpha

Agreements:
- Support PH calculation for PUSCH transmission
  - Calculation for current transmission
  - FFS: Calculation for non-current transmission

$$PH_c = P_{\text{cmax},c}(i) - \{10\log_{10}(M_{\text{PUSCH}c}(i)) + P_{0,c}(j) + \alpha_c(j)\cdot PL_c(k) + \Delta_{TF,c}(i) + f_c(i,l)\}$$

Agreements: Confirm the following working assumption:
- For NR-PUSCH
  - Absolute TPC command mode is supported.
  - FFS on K_{PUSCH}

R1-1719008 Offline summary for Al 7.6 NR UL power control ZTE

Agreement
Support the following PUSCH power control in NR:

$$P_{\text{PUSCH},c}(i) = \min\begin{Bmatrix} P_{\text{CMAX},c}(i), \\ 10\log_{10}(M_{\text{PUSCH},c}(i)) + P_{0,c}(j) + \alpha_c(j)\cdot PL_c(k) + \Delta_{TF,c}(i) + f_c(i,l) \end{Bmatrix}$$

- For the pathloss measurement RS indication.
  - k is indicated by beam indication for PUSCH (if present)
    - A linkage between PUSCH beam indication and *k* which is index of downlink RS resource for PL measurement is pre-configured via high layer signal
  - Only one value k is RRC configured in UE specific way if PUSCH beam indication is not present

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- Value of P_0 is composed by cell specific component and UE specific component
  - At least three cell specific component values of P_0 can be configured
- alpha is 1 by default before UE specific configuration
  - Candidate values are the same as in LTE
- j can be configured for the following aspects
  - grant-based PUSCH, grant-free PUSCH and PUSCH for msg 3
  - PUSCH beam indication (if present) for grant-based PUSCH
  - FFS: logical channel of PUSCH
  - slot sets (if supported)
  - Working assumption: for two uplinks of SUL band combination
- If N=2 (number of closed loop process) is configured for UE, *l* can be configured for the following aspects
  - PUSCH beam indication (if present) for grant-based PUSCH
  - slot sets (if supported)
  - grant-free PUSCH and grant based PUSCH
  - FFS: logical channel(s) carried by PUSCH
  - Working assumption: for two uplinks of SUL band combination
- FFS: whether delta_TF takes into account received SNR target difference between DFT-s-OFDM and CP-OFDM or not.
- Capturing the agreement in the NR specification is up to the editor

R1-1718902 **WF on PHR** **NTT DOCOMO, InterDigital, Nokia, NSB, Samsung**

Agreement:
- Support Pcmax,c reporting for PHR corresponding to NR PUSCH only transmission

Above is supported at least for sub-6GHz.

Agreement:
- Support one PHR format: PH and Pcmax,c
  - FFS: PHR reporting restriction for short UE timeline cases (ex: reporting virtual PHR)

R1-1718996 **WF on timeline impact of PHR** **Qualcomm**
R1-1718940 Reply LS on power sharing for LTE-NR Dual connectivity RAN4
R1-1719063 **[draft] Response LS on power sharing for LTE-NR Dual connectivity** **LG**
LS approved in R1-1719045

Agreement:
- Support closed power control commands by downlink DCI for PUCCH power control and by uplink grant for PUSCH power control
  - FFS: SRS
- Support closed power control commands by group common DCI with TPC-PUSCH-RNTI, TPC-PUCCH-RNTI, TPC-SRS-RNTI

Agreement: Support 2 bits TPC command for accumulative power control and absolute power control

R1-1719132 **Offline summary for Al 7.6 NR UL power control ZTE**

Working Assumption:
- Support $P_{cmax,c}(i)$, $P_{0\_PUCCH}(F)$, $PL_c(k)$, g(i) for NR PUCCH power control in slot i for serving cell c.

$$P_{PUCCH}(i) = \min\left\{\begin{array}{l} P_{CMAX,c}(i), \\ P_{0\_PUCCH} + PL_c(k) + 10\log_{10}\left(M_{PUCCH,c}(i)\right) + \Delta_{F\_PUCCH}(F) + \Delta_{PUCCH\_TF,c}(i) + g(i) \end{array}\right\} \text{[dBm]}$$

  - F is the index of PUCCH formats, e.g., $F = 0$ for PUCCH format 0, $F = 1$ for PUCCH format 1, $F = 2$ for PUCCH format 2, $F = 3$ for PUCCH format 3
  - P_{0_PUCCH} is a parameter composed of the sum of a parameter $P_{0\_NOMINAL\_PUCCH}$ configured by higher layers and a parameter $P_{0\_UE\_PUCCH}$ configured by higher layers.
  - k is the index of RS resource(s) for pathloss measurement is RRC configured
    - Multiple values of k can be configured by RRC signalling
    - *FFS: Other approaches not requiring RRC configuration for the determination of k*
  - FFS: exact $P_{cmax,c}(i)$ definition and notation for above 6 GHz
  - Full path-loss compensation for NR PUCCH power control

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- Note: 10*log10(M_PUCCH,c(i)) should be deleted
- Note: P_0_PUCCH should be revised to P_0_PUCCH(b)
- Note: g(i) should be revised to g(*i,l*)
- Multiple P_0_PUCCH(b) can be configured by RRC signalling

- Support up to 2 closed-loop power control processes, i.e., *l*
  - The closed-loop control process is configured by RRC signalling
  - Reset trigger by RRC re-configuration of P_0, FFS: beam changing, etc.
  - Only accumulative TPC command
- Support $\Delta_{PUCCH\_TF,c}(i)$ to reflect at least UCI payload size, UCI type (e.g., SR, HARQ, CSI), different coding gains, PUCCH format, coding schemes and different effective coding rates:
  - FFS: details on $\Delta_{PUCCH\_TF,c}(i)$
    - Whether $\Delta_{PUCCH\_TF,c}(i)$ includes $M_{PUCCH,c}(i)$
      - $M_{PUCCH,c}(i)$ is related to the PUCCH BW in slot *i*, FFS on the details
  - FFS: whether $\Delta_{PUCCH\_TF,c}(i)$ takes into account received SNR target difference between DFT-s-OFDM and CP-OFDM or not.

R1-1719189 **Offline summary for Al 7.6 NR UL power control ZTE**

$$P_{SRS,c}(i) = \min\left\{\begin{array}{l} P_{CMAX,c}(i), \\ P_{SRS\_OFFSET,c}(m) + 10\log_{10}(M_{SRS,c}(i)) + P_{0,c}(j) + \alpha_c(j)\cdot PL_c(k) + h_c(i,l) \end{array}\right\}$$

- For power control for SRS transmission at least for CSI acquisition tied with PUSCH power control, support at least $P_{cmax,c}(i)$, $P_{SRS\_OFFSET,c}(m)$, $M_{SRS,c}(i)$, $P_{0,c}(j)$, $\alpha_c(j)$, $PL_c(k)$, $h_c(i,l)$ for power control of SRS resource set
  - In case SRS power control is tied with corresponding PUSCH power control,
    - $h_c(i,l) = f_c(i,l)$
    - $P_{0,c}(j)$, $\alpha_c(j)$, $PL_c(k)$ are shared with the corresponding PUSCH power control
  - i is slot number
  - j is the index of open-loop parameter
  - m is the index of power offset
  - k is the index of RS resource(s) for pathloss measurement
  - FFS details of $P_{0,c}(j)$
  - $P_{SRS\_OFFSET,c}(m)$ is RRC configured
    - *FFS:* $P_{SRS\_OFFSET,c}(m)$ can be configured separately for SRS for CSI acquisition and beam management
  - $M_{SRS,c}$ is related to the SRS transmission BW, FFS on the details
    - The value of $M_{SRS,c}$ should be kept unchanged in the same slot
  - *l* is the index of close-loop power control process
  - SRS transmission power within the slot(s) of the SRS resource set is the same
    - FFS: for UL power control, how to support SRS transmission with different beam within the same slot
    - FFS how to support beam management SRS for multiple slots.
  - FFS: exact $P_{cmax,c}(i)$ definition and notation for above 6 GHz
  - FFS the linkage between {j,m,k,l} of SRS and {j,k,l} of PUSCH

Email discussion until Oct 27 – Hyunseok (Samsung)

R1-1718903 **WF on LTE-NR power sharing** **NTT DOCOMO, InterDigital, CATT, Fujitsu, AT&T**
Also supported by Nokia, NSB, Orange

R1-1719113 **WF on power offset of SUL** **Huawei, HiSilicon**
Also supported by Orange

Working Assumption:

- For PRACH/PUSCH/PUCCH/SRS on an SUL carrier associated with a NR DL/UL carrier, the maximum pathloss including penetration loss difference between two UL carriers to be compensated is 76 dB.
  - 76dB can be revisited in RAN1#91 if there is a technical issue
  - Note: This maximum number is based on the assumption that the downlink carrier frequency can be up to 70GHz

R1-1719177 **[DRAFT] LS on power headroom report DOCOMO**

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R1-1717311	General considerations on UL power control design	Huawei, HiSilicon
R1-1717438	On NR power control	ZTE, Sanechips
R1-1717408	Remaining Details On UL Power Control Framework	Intel Corporation
R1-1717508	Remaining issues on NR UL power control	vivo
R1-1717692	On UL Power Control	Samsung
R1-1717738	Discussion on Power Offset for SUL	China Telecommunications
R1-1717846	NR Power Control Aspects	CATT
R1-1717892	Discussion on power control framework	CMCC
R1-1717917	Power control on different SRS groups	ASUSTEK COMPUTER (SHANGHAI)
R1-1717919	Discussion on NR power control framework	Panasonic Corporation
R1-1717983	Discussion on UL power control for NR	LG Electronics
R1-1718031	Uplink power control for NR	Guangdong OPPO Mobile Telecom
R1-1718228	Power control framework for PUSCH	NTT DOCOMO, INC.
R1-1718502	On NR Power Control Framework	InterDigital, Inc.
R1-1718592	Power control and PHR for NR	Qualcomm Incorporated
R1-1718625	UL power control and PHR	ITL
R1-1718652	NR power control framework	Ericsson
R1-1718692	Discussion on NR power control framework	Nokia, Nokia Shanghai Bell
R1-1718704	On NR Power control	Motorola Mobility, Lenovo
R1-1719179	NR PUCCH power control framework	Samsung

7.6.2 Other

Including any remaining details for power sharing

R1-1717693	On UL Power Sharing for Multi-Cell Transmissions	Samsung
R1-1718654	Power headroom reporting	Ericsson
R1-1717312	Power control for CA and DC	Huawei, HiSilicon
R1-1717409	Remaining aspects on power sharing between LTE and NR	Intel Corporation
R1-1717694	On PHR Requirements and Calculation	Samsung
R1-1717739	Discussion on Power Sharing for NR-LTE co-existence	China Telecommunications
R1-1717847	Network Assist Dynamic Power Sharing Mechanism	CATT
R1-1717906	Power offset range for SUL	Huawei, HiSilicon
R1-1717984	Discussion on remainin details on dynamic power sharing for LTE-NR DC	LG Electronics
R1-1718056	Discussion on PHR and other Issues for LTE-NR Dual Connectivity	Guangdong OPPO Mobile Telecom
R1-1718229	LTE-NR power sharing mechanism	NTT DOCOMO, INC.
R1-1718252	General considerations on power headroom calculation and reporting	Huawei, HiSilicon
R1-1718366	Power Control Modes for NR DC and NR CA	InterDigital, Inc.
R1-1718653	Further details on beam specific power control	Ericsson
R1-1718655	Further details on closed loop power control	Ericsson
R1-1718656	Further discussion on Power control for SUL	Ericsson
R1-1718689	Open issues on RRC parameters for UL power control	Ericsson
R1-1718693	Considerations on Power headroom report in NR	Nokia, Nokia Shanghai Bell

7.7 Aspects related to FDD

R1-1718960 **Summary for AI7.7 - Aspects related to FDD** **ZTE, Sanechips** (rev of R1-1718783)
Decision: The document is noted.

Agreements:

- Same scheduling framework is supported for paired and non-paired spectra
  - Note: This applies to both slot based and non-slot (mini-slot) based scheduling
  - Note: This includes that data transmission can be indicated with start symbol and duration
  - Note: this also includes SFI
- Same HARQ framework is supported for paired and non-paired spectra
  - Dynamic HARQ management is supported in the same way for both paired and non-paired spectra
  - All PUCCH formats are supported for both paired and non-paired spectra
- Unless necessary, no intention to distinguish paired vs. non-paired spectra in the relevant specifications

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Wednesday

Agreements:

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- It is already possible to have an offset between DL and UL by using UL TA.
  - No additional specification impact is necessary
  - Note: the finalizing the UL TA range of values will take into account the need of the offset

Conclusion:
- The UL carrier information is already in RMSI
  - No additional spec impact is necessary

R1-1717098 Some NR FDD design aspects Huawei, HiSilicon
R1-1717412 On NR FDD Intel Corporation
R1-1717695 FDD Operation Samsung
R1-1717850 FDD Related Aspects CATT
R1-1717982 Discussion on FDD support in NR LG Electronics
R1-1718357 Aspects related to FDD MediaTek Inc.
R1-1718593 FDD Design Considerations Qualcomm Incorporated

7.8 Other

Including handling RAN plenary LS in R1-1716676

R1-1719129 Chairman's notes of AI 7.8 on Channel Model - Other Ad-Hoc chair (Nokia)
The document was presented by Matthew Baker of Nokia.
Decision: The document is endorsed, and content incorporated below.

Channel Modelling
R1-1717851 Correction on 3D-InH channel model in TR 36.873 CATT, CATR, Huawei, ZTE
Decision: Agreed in R1-1719087 36.873CR0034R1 with corrected release on the cover sheet (Rel-12).

R1-1717900 Correction on 3D-InH channel model in TR 38.901 CATT
Decision: CR0022 to 38.901 Rel-14, F is agreed.

R1-1717870 Correction on car penetration loss in TR 38.901 CATT, CATR, Huawei, Keysight, ZTE
Withdrawn.
R1-1718756 On the channel model CR for car penetration loss Ericsson

UE Categories & Capabilities
R1-1718690 On UE categories for NR Ericsson

Agreement:
- Agree in principle to define a simple formula to send to RAN plenary to derive approximate maximum data rates, based on at least max TBS (normalised to a particular unit of time). Check details until RAN1#91, including identifying exactly which parameters should be included in the formula.

R1-1717314 On UE categories and capabilities in NR Intel Corporation

Conclusions:
- Continue discussion on any RAN1-specific aspects (e.g. where UE's peak rate may be lower than the calculated peak rate, and any relation to soft buffer sizes) at RAN1#91.
- Other aspects should be left to RAN2.

R1-1718596 UE Categories Qualcomm Incorporated
Late submission

V2X
R1-1717293 Summary of email discussion [90-30] on eV2X evaluation methodology LG Electronics
R1-1717291 Preliminary analysis of vehicle antenna pattern for V2X LG Electronics
R1-1717292 Draft TR 37.885 Study on evaluation methodology of new Vehicle-to-Everything V2X use cases for LTE and NR LG Electronics
R1-1717916 NR V2X channel modeling Huawei, HiSilicon, Spirent, Keysight, Cohere Technologies

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R1-1717918 eV2X Phase III Channel Modeling Cohere Technologies
Late submission

NOMA
R1-1717896 Discussion on the effect of EVM to non-linear receiver for NoMA CMCC

Unlicensed spectrum operation
R1-1717899 LBT Considering Beamforming in Unlicensed Spectrum ASUSTEK COMPUTER (SHANGHAI)
R1-1717911 High level consideration on NR unlicensed band operation Huawei, HiSilicon
R1-1717912 NR Numerology on unlicensed bands HuaWei Technologies Co., Ltd
R1-1717913 NR Frame structure on unlicensed bands Huawei, HiSilicon
R1-1717914 Coexistence and Channel access for NR unlicensed band operations Huawei, HiSilicon
R1-1717915 NR standalone operation on unlicensed bands Huawei, HiSilicon
R1-1718231 Technology Components for Unlicensed Operation Ericsson Japan K.K.
R1-1718232 On Physical Layer Design Policies for Unlicensed Operation of NR Ericsson Japan K.K.
R1-1718233 On NR Operation in the 60 GHz Unlicensed Band Ericsson Japan K.K.
R1-1718234 On Channel Access Mechanisms for NR in Unlicensed Spectrum Ericsson Japan K.K.
R1-1718235 On Autonomous UL Transmissions for NR in Unlicensed Spectrum Ericsson Japan K.K.
R1-1718236 Discussion of Multi-Antenna and Highly Directional Beam-Forming for Operation in Unlicensed Spectrum Ericsson Japan K.K.

Non-terrestrial networks
R1-1718317 Considerations on satellite channel model - updates THALES
R1-1718319 Considerations on HAPS channel model THALES
R1-1719024 Outcomes of the 1st NTN channel modelling workshop Thales, Hugues Network Systems, Dish Network

ITU Self-evaluation
R1-1718709 IMT-2020 self-evaluation: On eMBB spectral efficiency Ericsson
R1-1718726 IMT-2020 self evaluation: mMTC connection density for LTE-MTC and NB-IoT Ericsson
R1-1718727 IMT-2020 self-evaluation: Peak data rate and peak spectrum efficiency evaluations for NR Ericsson
R1-1718728 IMT-2020 self-evaluation: CP latency in NR Ericsson
R1-1718729 IMT-2020 self-evaluation: UP latency in NR Ericsson

Miscellaneous
R1-1717509 Measurement results and analysis on UE power consumption vivo
R1-1717510 NR UE power saving vivo
R1-1717776 Discussion on symbol alignment in NR duplex Panasonic
R1-1717777 Discussions on intended DL/UL direction configuration via Xn signalling Panasonic
R1-1717778 Discussions on UE-to-UE interference measurement and report Panasonic
R1-1717907 UE-to-UE measurement for cross-link interference mitigation Huawei, HiSilicon
R1-1717908 Timing alignment on cross-link Huawei, HiSilicon
R1-1717909 UL Power control for cross-link interference mitigation Huawei, HiSilicon
R1-1717910 Remaining issues on ECP Huawei, HiSilicon
R1-1718001 Discussion on dynamic TDD and cross-link interference measurement in high-speed train scenario ETRI
R1-1718594 Low PAPR Modulation Qualcomm Incorporated

Positioning
R1-1718691 On Rel. 15 NR positioning measurements Ericsson

Agreement:
- Introduce the measurement definitions in Section 2 of R1-1718691 into TS 38.215
- For RSTD, should identify in the measurement titles that these are E-UTRAN measurements.

8 Elections

The candidatures received for the Vice Chairmanship prior to meeting start are indicated below:

Name	Company / Partner

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Dr. Havish Koorapaty	Ericsson LM / ETSI
Dr. Kazuaki Takeda	NTT DOCOMO INC. / ARIB
Dr. Hanbyul Seo	LG Electronics Inc. / TTA

Monday 9th Oct.
The position of Vice Chairman had three candidates, as listed above.

Observers: Sharat Chandler (AT&T), 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	71 % ?
Dr. Kazuaki Takeda	**67**	25,000%	NO
Dr. Havish Koorapaty	**154**	57,463%	NO
Dr. Hanbyul Seo	**47**	17,537%	NO
ABSTAIN or spoiled	**0**	0,000%	
total votes cast:	268	100,000%	
total returned papers	268		
number of proxy votes cast:	115		
number of non-returned papers	52		

Both Dr. Kazuaki Takeda (NTT DOCOMO, ARIB) and Dr. Hanbyul Seo (LG Electronics, TTA) then decided to step down.

Dr. Havish Koorapaty (Ericsson LM, ETSI) was therefore appointed to the position of WG RAN1 Vice Chairman.

9 Closing of the meeting

RAN1 chair thanked all the delegates for their hard work, with a particular attention to the feature leads. He acknowledged the commitment of all to cooperate and achieve progress despite challenges and obstacles (many parallel offline sessoins, lack of meeting rooms).
Special thanks were given to Matthew Baker and his contributions to RAN1 since 2009 as chairman and vice-chair.
He also welcomed Havish Koorapaty as the new elected vice chairman, looking forward to the upcoming challenging years.
Final words to tell RAN1, though still a lot needs to be achieved by November meeting, that all should be proud of what RAN1 is doing as a group.

Meeting was closed at 17:15.
See you all in Reno.

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Annex A: List of Tdocs at RAN1 #90bis

Please see excel file attached to this report

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Annex B: List of CRs agreed at RAN1 #90bis

TS/TR	CR	Rev	Rel	Title	Cat	Vsn	@ Mtg	TD#	Source to WG	Work Item
36.211	393	-	Rel-13	Correction on MPDCCH frequency hopping	F	13.7.1	R1#90bis	R1-1718831	Samsung	LTE_MTCe2_L1-Core
36.211	394	-	Rel-13	CR on clarification on DMRS ports associated with PDSCH	F	13.7.1	R1#90bis	R1-1718835	Qualcomm Incorporated	LTE_EBF_FDMIMO-Core
36.211	395	-	Rel-14	CR on clarification on DMRS ports associated with PDSCH	A	14.4.0	R1#90bis	R1-1718836	Qualcomm Incorporated	LTE_EBF_FDMIMO-Core
36.211	396	-	Rel-14	Correction on MPDCCH frequency hopping	A	14.4.0	R1#90bis	R1-1718837	Samsung	LTE_MTCe2_L1-Core
36.211	397	-	Rel-14	SRS to SRS retuning in UpPTS	F	14.4.0	R1#90bis	R1-1719080	Qualcomm Incorporated	LTE_feMTC-Core
36.211	398	-	Rel-14	Correction on power boosting for UL DMRS	F	14.4.0	R1#90bis	R1-1718842	Qualcomm Incorporated	LTE_eFDMIMO-Core
36.212	266	1	Rel-14	Correction to multi-carrier NPRACH IE name in PDCCH order DCI format N1	F	14.4.0	R1#90bis	R1-1718867	Huawei, HiSilicon, Ericsson	NB_IOTenh-Core
36.213	979	1	Rel-14	PUSCH and SRS Transmission in UpPTS	F	14.4.0	R1#90bis	R1-1719088	MediaTek, CMCC	LTE_UL_CAP_enh-Core
36.213	980	-	Rel-13	TBS for TDD special subframe for BL/CE UE without repetition	F	13.7.0	R1#90bis	R1-1718830	Ericsson	LTE MTCe2 L1-Core
36.213	981	-	Rel-14	CR on CSI report reference subframe for an LAA SCell	F	14.4.0	R1#90bis	R1-1718838	Intel Corporation	LTE_eLAA-core
36.213	982	-	Rel-13	Correction of RRC parameter name for Number of PUCCH repetitions	F	13.7.0	R1#90bis	R1-1718832	Xiaomi	LTE MTCe2 L1-Core
36.213	983	-	Rel-14	Renaming of duplicated table 7.2.1-1A	D	14.4.0	R1#90bis	R1-1718843	Qualcomm Incorporated	LTE_eFDMIMO-Core
36.213	984	1	Rel-13	Corrections of parameter names for NB-IoT	F	13.7.0	R1#90bis	R1-1719082	Ericsson, Huawei, HiSilicon	NB_IOT-Core
36.213	985	1	Rel-14	Corrections of parameter names for NB-IoT	A	14.4.0	R1#90bis	R1-1719083	Ericsson, Huawei, HiSilicon	NB_IOT-Core
36.213	986	1	Rel-14	Clarification on timing relationships of 2HARQ process	F	14.4.0	R1#90bis	R1-1718964	Huawei, HiSilicon, Ericsson, Qualcomm	NB_IOTenh-Core
36.213	987	-	Rel-14	TBS for TDD special subframe for BL/CE UE without repetition	A	14.4.0	R1#90bis	R1-1719075	Ericsson	LTE_MTCe2_L1-Core
36.213	988	-	Rel-13	Non-repeated PUCCH SR transmissions on invalid UL subframes	F	13.7.0	R1#90bis	R1-1719077	Nokia, Nokia Shanghai Bell	LTE MTCe2 L1-Core
36.213	989	-	Rel-14	Non-repeated PUCCH SR transmissions on invalid UL subframes	A	14.4.0	R1#90bis	R1-1719078	Nokia, Nokia Shanghai Bell	LTE MTCe2 L1-Core
36.213	990	-	Rel-14	Clarification on supporting lower frequency domain density for Class A NZP CSI-RS	F	14.4.0	R1#90bis	R1-1719079	Qualcomm Incorporated	LTE_eFDMIMO-Core
36.213	991	-	Rel-14	Corrections on HARQ-ACK bundling	F	14.4.0	R1#90bis	R1-1719092	Qualcomm Incorporated	LTE_feMTC-Core

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TS/TR	CR	Rev	Rel	Title	Cat	Vsn	@ Mtg	TD#	Source to WG	Work Item
36.214	47		Rel-14	Revision of UE measurement report definitions considering NB-IoT UEs	F	14.3.0	R1#90bis	R1-1717024	Ericsson	NB_IOTenh-Core
36.873	34	1	Rel-12	Correction on 3D-InH channel model in TR 36.873	F	12.6.0	R1#90bis	R1-1719087	CATT, CATR, Huawei, ZTE	FS_LTE_3D_channel
38.901	22	-	Rel-14	Correction on 3D-InH channel model in TR 38.901	F	14.2.0	R1#90bis	R1-1717900	CATT	FS_NR_newRAT

Endorsed CRs/draftCRs

TS/TR	CR	Rev	Rel	Title	Cat	Vsn	@ Mtg	TD#	Source to WG	Work Item
36.211	0385	3	Rel-15	Introduction of shortened processing time and shortened TTI - 36.211 s03-05	Ericsson	14.4.0	R1#90bis	R1-1719232	Ericsson	LTE_sTTIandPT-Core
36.211	0399	1	Rel-15	Introduction of shortened processing time and shortened TTI - 36.211 s06-08	Ericsson	14.4.0	R1#90bis	R1-1719233	Ericsson	LTE_sTTIandPT-Core
36.212	draft	-	Rel-15	Introduction of shortened processing time and shortened TTI into 36.212	Huawei	14.4.0	R1#90bis	R1-1719234	Huawei	LTE_sTTIandPT-Core
36.213	0992	-	Rel-15	Introduction of shortened processing time and shortened TTI into 36.213, s00-s05	Motorola Mobility	14.4.0	R1#90bis	R1-1719235	Motorola Mobility	LTE_sTTIandPT-Core
36.213	0993	-	Rel-15	Introduction of shortened processing time and shortened TTI into 36.213, s06-s09	Motorola Mobility	14.4.0	R1#90bis	R1-1719236	Motorola Mobility	LTE_sTTIandPT-Core
36.213	0994	-	Rel-15	Introduction of shortened processing time and shortened TTI into 36.213, s10-s13	Motorola Mobility	14.4.0	R1#90bis	R1-1719237	Motorola Mobility	LTE_sTTIandPT-Core

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Annex C-1: List of Outgoing LSs from RAN1 #90bis

TDoc #	Title	Source	Release	Related WIs	Reply to	To	Cc	Original LS	Reply in
R1-1718829	Reply LS on mixed numerologies FDM operation	RAN1, Intel	Rel-15	NR_newRAT-Core		RAN4			
R1-1719039	LS on UE minimum bandwidth	RAN1, CATT	Rel-15	NR_newRAT-Core		RAN2, RAN			
R1-1719040	LS Reply on RSRP Measurements for Mobility in NR	RAN1, Huawei, Ericsson	Rel-15	NR_newRAT-Core		RAN4			
R1-1719044	LS on NR UL codebook for 4Tx	RAN1, Qualcomm	Rel-15	NR_newRAT-Core		RAN2			
R1-1719045	Response LS on power sharing for LTE-NR Dual connectivity	RAN1, LG Electronics	Rel-15	NR_newRAT-Core		RAN2			
R1-1719084	LS on 2Gbps category	RAN1, Qualcomm	Rel-14	TEI14		RAN2			
R1-1719090	LS on TBS for TDD special subframe for BL/CE UE without repetition	RAN1, Ericsson	Rel-13	LTE_MTCe2_L1-Core		RAN2			
R1-1719091	LS on MBSFN subframe configuration in handover signalling for eMTC	RAN1, Qualcomm	Rel-13	LTE_MTCe2_L1-Core		RAN2			
R1-1719093	LS on Comb 2 SRS enhancements for BL/CE UEs	RAN1, Qualcomm	Rel-14	LTE_feMTC-Core		RAN2			
R1-1719094	LS on Supportable RNTI length on DCI	RAN1, Ericsson	Rel-15	NR_newRAT-Core		RAN4	RAN2		
R1-1719103	LS on agreements on early data transmission during random access procedure for NB-IoT and BL/CE UEs in Rel-15	RAN1, HiSilicon	Rel-15	NB_IOTenh2-Core, LTE_eMTC4-Core		RAN2			
R1-1719151	LS to RAN2 on carrier selection for Rel-15 V2X	RAN1, Huawei	Rel-15	LTE_eV2X-Core	R4-1709187	RAN4			
R1-1719154	LS reply on SPS for short TTI	RAN1, Huawei	Rel-15	LTE_sTTIandPT-Core	R3-173439	RAN3			
R1-1719159	LS to RAN4 on resource selection for Mode-4 sidelink CA	RAN1, Intel Corporation	Rel-15	LTE_eV2X-Core		RAN2			
R1-1719164	LS on NR Paging Mechanisms	RAN1, Huawei	Rel-15	NR_newRAT-Core		RAN2			
R1-1719165	Reply LS on NR minimum carrier bandwidth and SS block numerology	RAN1, Ericsson	Rel-15	NR_newRAT-Core		RAN2			
R1-1719203	Reply LS on NR L1 processing chain	RAN1, NTT DOCOMO	Rel-15	FS_NR_CU_DU_LLS		RAN2			
R1-1719204	LS on higher layer signalling for special subframe configuration 10	RAN1, CMCC	Rel-14	LTE_UL_CAP_enh-Core		RAN2			
R1-1719205	LS on updates to TS36.300 for short TTI and short processing time	RAN1, Ericsson	Rel-15	LTE_sTTIandPT-Core		RAN2			
R1-1719206	LS on agreements on UL HARQ-ACK feedback in Rel-15 LTE efeMTC	RAN1, ZTE	Rel-15	LTE_eMTC4-Core	S2-176689	SA2, RAN4	RAN2		

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TDoc #	Title	Source	Release	Related WIs	Reply to	To	Cc	Original LS	Reply in
R1-1719207	LS on wake-up signal configuration and procedures for NB-IoT and BL/CE UEs in Rel-15	RAN1, HiSilicon	Rel-15	NB_IOTenh2-Core, LTE_eMTC4-Core	R2-1709800	RAN2			
R1-1719209	LS on RAN1 observation on RSRP statistics for aerial vehicles	RAN1, NTT DOCOMO	Rel-15	FS_LTE_Aerial		RAN2, RAN4			
R1-1719210	LS on Ultra Reliable Low Latency Communication for LTE	RAN1, Ericsson	Rel-15	LTE_HRLLC-Core		RAN4			
R1-1719211	Response LS on simultaneous transmission and/or reception over EPC/E-UTRAN and 5GC/NR	RAN1, Intel	Rel-15	5GS_Ph1, NR_newRAT-Core		RAN4			
R1-1719214	LS on response to RACH agreements	RAN1, CATT	Rel-15	NR_newRAT-Core		RAN2, RAN			
R1-1719217	LS on HCS	RAN1, Huawei	Rel-15	LTE_1024QAM_DL-Core		RAN4			
R1-1719218	LS on QCL assumption for RLM Reference Signal	RAN1, Intel	Rel-15	NR_newRAT-Core		RAN2			
R1-1719219	LS reply to RAN4 on UE timing advance adjustment step size	RAN1, Huawei	Rel-15	NR_newRAT-Core	R4-1709899	RAN4			
R1-1719223	Reply LS on short processing time and short TTI	RAN1, Ericsson	Rel-15	LTE_sTTIandPT-Core	R2-1706159	RAN2			
R1-1719231	LS on RRC parameters for WI on shortened TTI and processing time for LTE	RAN1, Ericsson	Rel-15	LTE_sTTIandPT-Core		RAN2			
R1-1719238	LS on maximum TA and processing time for LTE shortened processing time and short TTI	RAN1, Nokia	Rel-15	LTE_sTTIandPT-Core		RAN2, RAN4			
R1-1719239	LS on eV2X evaluation methodology	RAN1, LG Electronics	Rel-15	FS_LTE_NR_V2X_eval		5GAA, AECC Consortium, SAE C-V2X Technical Committee	RAN, SAE DSRC Technical Committee		
R1-1719248	LS reply on SPS for short TTI	RAN1, Huawei	Rel-15	LTE_sTTIandPT-Core	R2-1709972	RAN2			
R1-1719250	LS on RRC parameters for NR	RAN1, Ericsson	Rel-15	NR_newRAT-Core		RNA2			

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Annex C-2: List of Incoming LSs from RAN1 #90bis

TDoc #	Title	Source	Release	Related WIs	Reply to	To	Cc	Original LS	Reply in
R1-1716944	LS on CSG support in NB-IoT	RAN2, Nokia	Rel-15	NB_IOTenh2-Core		RAN3, RAN4	RAN1	R2-1709705	
R1-1716945	Reply LS on Relay UE discovery	RAN2, Nokia	Rel-15	FS_feD2D_IoT_relay_wearable	R1-1709621	RAN1		R2-1709782	
R1-1716946	Response LS to RAN1 on P2X	RAN2, LG Electronics	Rel-14	LTE_V2X-Core	R1-1709334	RAN1		R2-1709948	
R1-1716947	Reply LS on QoS support over PC5	RAN2, Nokia	Rel-15	FS_feD2D_IoT_relay_wearable	S2-173877	SA2	RAN1	R2-1709949	
R1-1716948	Reply LS on sPDCCH monitoring in sTTI	RAN2, Ericsson	Rel-15	LTE_sTTIandPT-Core	R1-1703579	RAN1		R2-1709951	
R1-1716949	LS on UE GNSS RTK measurement for high accuracy positioning	RAN2, Nokia	Rel-15	LCS_LTE_acc_enh-Core		RAN4	RAN1	R2-1709961	
R1-1716950	LS on RAN2 agreements on Enhancements to LTE operation in unlicensed spectrum	RAN2, Nokia	Rel-15	LTE_unlic-Core		RAN1		R2-1709967	
R1-1716951	LS on SPS and SR for sTTI	RAN2, Huawei	Rel-15	LTE_sTTIandPT-Core		RAN1		R2-1709972	
R1-1716952	LS on latency requirement for Aerial Vehicles	RAN2, NTT DOCOMO	Rel-15	FS_LTE_Aerial		RAN1		R2-1709974	
R1-1716953	Reply LS on LTE Rel-14 UE feature list for MUST	RAN4, MediaTek inc.	Rel-14	LTE_MUST	R1-1704123	RAN2	RAN1	R4-1708704	
R1-1716954	LS reply on TM10 / FD-MIMO UE capability signalling	RAN4, Intel Corporation	Rel-14	LTE_EBF_FDMIMO-Core	R2-1702346	RAN2	RAN1	R4-1708730	
R1-1716955	LS on effect of SRS switching in TDD + FDD CA	RAN4, Qualcomm	Rel-14	LTE_SRS_switch-Core		RAN1	RAN2	R4-1708772	
R1-1716956	LS on new UE power class for Rel-15 efeMTC	RAN4, Ericsson	Rel-15	LTE_eMTC4-Core		RAN2	RAN1	R4-1708835	
R1-1716957	LS on Rel-14 RAN4 UE feature list	RAN4, Intel Corporation	Rel-14	TEI14		RAN2	RAN1, RAN3	R4-1709180	
R1-1716958	Reply LS on support of CACC and platooning applications by 3GPP systems	SA1, LG Electronics	Rel-15	LTE_eV2X-Core		SAE DSRC Technical Committee	SA2, RAN2, RAN1, SAE Cellular V2X Technical Committee	S1-173531	
R1-1716959	LS on FS_REAR study outcome	SA2, Huawei	Rel-15	FS_feD2D_IoT_relay_wearable	R2-1703967	RAN, RAN1, RAN2, RAN3	SA3, CT1	S2-176446	
R1-1716960	LS on RAR reception for NB-IoT	RAN2, Nokia	Rel-14	NB_IOTenh-Core		RAN1		R2-1709902	
R1-1716961	LS on scenarios of multiple SSB	RAN4, Huawei	Rel-15	NR_newRAT-Core		RAN2	RAN1	R4-1709890	

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TDoc #	Title	Source	Release	Related WIs	Reply to	To	Cc	Original LS	Reply in
R1-1716962	LS on RSSI Definition in Signal Quality Measurements for Mobility in NR	RAN4, Ericsson	Rel-15	NR_newRAT-Core		RAN1	RAN2	R4-1709910	
R1-1716963	Reply LS to RAN2 for NR UE categories and UE capabilities	RAN4, Ericsson	Rel-15	NR_newRAT-Core	R2-1709979	RAN2	RAN, RAN1	R4-1710079	
R1-1718940	Reply LS on power sharing for LTE-NR Dual connectivity	RAN4, LG Electronics	Rel-15	NR_newRAT-Core		RAN1		R4-1709968	
R1-1719192	LS to RAN1 on SCell activation and deactivation	RAN2, OPPO	Rel-15	NR_newRAT-Core		RAN1			
R1-1719193	LS to RAN1 on SPS and Grant-free	RAN2, Samsung	Rel-15	NR_newRAT-Core		RAN1			

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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 #90bis

Tdoc Number	Title	Source	Conclusion/Decision
R1-1718819	TS 38.214 v1.1.0 NR; Physical layer procedures for data	Nokia	Endorsed as basis for further updates
R1-1719105	TS38.211 v1.1.0 NR; Physical channels and modulation	Ericsson	Endorsed as basis for further updates
R1-1719106	TS38.212 v1.1.0 NR; Multiplexing and channel coding	Huawei	Endorsed as basis for further updates
R1-1719107	TS38.213 v1.1.0 NR; Physical layer procedures for control	Samsung	Endorsed as basis for further updates
R1-1719108	TS38.215 v1.1.0 NR; Physical layer measurements	Intel Corporation (UK) Ltd	Endorsed as basis for further updates
R1-1721046	TS38.201 v1.1.0 NR; Physical layer general description	NTT DOCOMO	Endorsed as basis for further updates – RAN1#91 Tdoc#
R1-1721047	TS38.202 v1.1.0 NR; Physical layer services provided by the physical layer	Qualcomm	Endorsed as basis for further updates – RAN1#91 Tdoc#
R1-1721048	TS38.211 v1.2.0 NR; Physical channels and modulation	Ericsson	Endorsed as basis for further updates – RAN1#91 Tdoc#
R1-1721049	TS38.212 v1.2.0 NR; Multiplexing and channel coding	Huawei	Endorsed as basis for further updates – RAN1#91 Tdoc#
R1-1721050	TS38.213 v1.2.0 NR; Physical layer procedures for control	Samsung	Endorsed as basis for further updates – RAN1#91 Tdoc#
R1-1721051	TS38.214 v1.2.0 NR; Physical layer procedures for data	Nokia	Endorsed as basis for further updates – RAN1#91 Tdoc#
R1-1721052	TS38.215 v1.2.0 NR; Physical layer measurements	Intel Corporation (UK) Ltd	Endorsed as basis for further updates – RAN1#91 Tdoc#

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Annex F: List of actions

- **Outgoing LS**

[90b-NR-06] – Huang Huang (Huawei)
R1-1719215 [Draft] LS reply to RAN4 on UE timing advance adjustment step size Huawei
For email approval till 10/20
Done: Final LS is approved in R1-1719219.

[90b-NR-03] – Hanbyul (LGE)
Email discussion (including whether or not to send)/approval on LS to send 5GAA (and others) regarding asking feedback of eV2X evaluation methodology till 10/27.
Done: As per Mr Chair's decision on Nov 1st, final LS is approved in R1-1719239
R1-1719239 LS on eV2X evaluation methodology RAN1, LG Electronics To: 5GAA, AECC Consortium, SAE C-V2X Technical Committee Cc: RAN, SAE DSRC Technical Committee

[90b-LTE-15] – Laetitia (Ericsson)
Email approval on UL HARQ RTT for FS2 including sending an LS to RAN2, from 18th of Oct to 25th of Oct.
Done: As per Mr Chair's decision on Oct.27th, final LS is approved in R1-1719223 Reply LS on short processing time and short TTI RAN1, Ericsson

[90b-LTE-17] – Klaus (Nokia)
Email approval on LS to RAN4 related to the maximum TA and processing time agreement and its impact to the RAN4 specifciations, from 18th Oct to 25th Oct.
Done: As per Mr Chair's decision on Oct.31st, final LS is approved in R1-1719238 LS on maximum TA and processing time for LTE shortened processing time and short TTI RAN1, Nokia

- **CR approval**

[90b-LTE-03-xx]
Rapporteurs to have summary of agreements for feCoMP by 10/20
Editors to provide initial draft CRs for feCoMP by 11/15, to be commented and to update by 11/21 [90b-LTE-03-xxx], where xxx is the spec #
Done: List of agreements for Further enhancements to Coordinated Multi-Point (CoMP) Operation for LTE up to RAN1#90 meeting was already shared in R1-1715318 [RAN1#90-16 email discussion]

[90b-NR-01-xxx]
Editors to update CRs based on this meeting's agreements and working assumptions by 11/1, to be commented and updated by 11/10 [90b-NR-01-spec#]
Done: The following draft TSs are submitted:
R1-1719224 TS38.211 v1.1.1 NR; Physical channels and modulation Ericsson
Further revised in R1-1719685 (v1.1.2), in R1-1720850 (v1.1.3) and endorsed as version 1.2.0 in R1-1721048.
R1-1719225 TS38.212 v1.1.1 NR; Multiplexing and channel coding Huawei

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Further revised in R1-1719245 (v1.1.2) and endorsed as version 1.2.0 in R1-1721049.
R1-1719226 TS38.213 v1.1.1 NR; Physical layer procedures for control Samsung
Further revised in R1-1719243 (v1.1.2) and endorsed as version 1.2.0 in R1-1721050.
R1-1719227 TS 38.214 v1.1.1 NR; Physical layer procedures for data Nokia
Further revised in R1-1720113 (v1.1.2), in R1-1720114 (v1.1.3) and endorsed as version 1.2.0 in R1-1721051.
R1-1719228 TS38.215 v1.1.1 NR; Physical layer measurements Intel Corporation (UK) Ltd
Further revised in R1-1719244 (v1.1.2) and endorsed as version 1.2.0 in R1-1721052.
R1-1719229 TS38.202 v1.0.1 NR; Physical layer services provided by the physical layer Qualcomm
Endorsed as version 1.1.0 in R1-1721047.
R1-1719242 TS38.201 v1.0.1 NR; Physical layer general description NTT DOCOMO
Endorsed as version 1.1.0 in R1-1721046.
Email discussion/approval of RRC parameters prepared by 11/1, to be commented and updated by 11/10 – Daniel (Ericsson) [90b-NR-01-RRC]
Done: As per Mr Chair's decision on Nov 18th, the list of RRC parameters for NR is endorsed in:
R1-1719249 List of physical layer related RRC parameters for NR Ericsson
Final LS to inform RAN2 is approved inR1-1719250 LS on RRC parameters for NR RAN1, Ericsson

- **Miscellaneous**

[90b-LTE-01] - Alberto (Qualcomm)
Discuss whether PUCCH format 4/5 must be configured if a UE is configured with more than 5 CCs.
Email discussion until 28th October
Done: According to the conclusion posted by Mr Chair on Nov 1st, the following is agreed:
- **A UE can be configured with PUCCH format 3 and not fmt4/5 for the case of more than 5CC**
  - **The operation in this case is the same as if the UE was configured with fmt4/5 and falls back to format 3**
  - **The UE is not expected to have to transmit UCI of more than 22 bits in a single subframe.**
  - **The UE can be configured with codebooksizeDetermination-r13 = dai or cc.**
- **CR capturing these changes to be prepared for RAN1#91.**

[90b-LTE-02] - Yi Shi (Huawei)
R1-1718967 Way forward on LTE Rel-14 V2X rate-matching NXP, Huawei, HiSilicon, Ericsson, CATT
Email discussion on slide 3 bullet 2

[90b-LTE-04] – Mårten (Ericsson)
Email approval on reached offline consensus at RAN1#90bis, from 16th Oct to 20th Oct.
Done: As per RAN1 chair's decision (emails posted on Oct 24th and Oct 28th), the following are agreed:
Agreements: Amend the following fields to DCI format 0 and format 4 of an UL grant scheduling PUSCH with reduced processing time:
- **HARQ ID**
  - **ceil(log2(UL HARQ processes for sTTI)) if configured with sTTI, 3 bit otherwise**

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- **2 bit RV indicating {0,1,2,3}**
  - **In case DCI format 4, the indicated RV applies to both PUSCH CWs**

Agreements:
For a CRS-based sPDCCH RB set, the frequency-first, time-second mapping of the sREGs within an sPDCCH set is performed from lower RB to higher RB for the first symbol, and from higher RB to lower RB for the second symbol.
NOTE: After deciding all resource elements for a candidate, details mapping FFS.

Agreement: For A-CSI triggered by sDCI, the reporting timeline is the same as the sPUSCH scheduling timeline

Agreement: A zero power/non-zero power CSI-RS configuration with an increased periodicity as compared to the legacy LTE is not supported/introduced

Agreement: For the sTTI based aperiodic CSI reporting, the subband sizes are increased at least for 2/3os sTTI as compared to those of the legacy LTE.
- **The subband size is FFS**

Agreement: Only aperiodic CSI reporting is intended to be supported for the sTTI operation in Rel-15 WI with up to 3-bit trigger.
- **FFS: Restrictions**

[90b-LTE-05] – Mårten (Ericsson)
Email approval on list of physical layer related RRC parameters including sending an LS to RAN2 (Ericsson(Mårten), From 20th Oct to 27th Oct)
Done: According to Mr Chair's decision on Nov 1st, updated RRC parameters list is agreed in R1-1719230.
LS to RAN2 is approved in R1-1719231.

[90b-LTE-06-xxx]
Rapporteur to update the summary of agreements by 10/14
Done:
R1-1719212 RAN1 decisions for WI Shortened TTI and processing time for LTE (LTE_sTTIandPT) (revision of R1-1714999) Ericsson
R1-1719213 Shortened TTI and short processing time - Collection of RAN1 agreements sorted per topic (revision of R1-1714998) Ericsson
Editors to provide updated CRs by 10/19, to be commented on and update by 10/24 [90b-LTE-06-xxx], where xxx is the spec #
Done: The following CRs/draft CRs are endorsed:
[90b-LTE-06-211]

R1-1719232	Introduction of shortened processing time and shortened TTI - 36.211 s03-05	Ericsson	Rel-15	36.211	14.4.0	CR0385R3, B
R1-1719233	Introduction of shortened processing time and shortened TTI - 36.211 s06-08	Ericsson	Rel-15	36.211	14.4.0	CR0399R1, B

[90b-LTE-06-212]

R1-1719234	Introduction of shortened processing time and shortened TTI into 36.212	Huawei	Rel-15	36.212	14.4.0	draftCR, B

[90b-LTE-06-213]

R1-1719235	Introduction of shortened processing time and shortened TTI into 36.213, s00-s05	Motorola Mobility	Rel-15	36.213	14.4.0	draftCR, B
R1-1719236	Introduction of shortened processing time and shortened TTI into 36.213, s06-s09	Motorola Mobility	Rel-15	36.213	14.4.0	draftCR, B
R1-1719237	Introduction of shortened processing time and shortened TTI into 36.213, s10-s13	Motorola Mobility	Rel-15	36.213	14.4.0	draftCR, B

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[90b-LTE-07] – Kyuhwan (LGE)
Email approval on details of sDCI formats, from 20th of Oct to 3rd of Nov.
Done: According to Mr Chair's decision on Nov 10th, the following is agreed:
Agreements:

- **RA header field (RA type 0/type1) is removed from the baseline fields of DL sDCI format.**
- **If a single resource allocation type for sPDSCH is RRC configured, RA header field (RA type 0/type2) is not supported in DL sDCI format. Otherwise, 1-bit RA header field (RA type 0/type2) is inserted into the baseline fields of DL sDCI format.**

[90b-LTE-08] – Chengyan (Huawei)
Email approval on remaining details of sPDCCH design and search space, from 20th of Oct to 3rd of Nov.
Done: According to Mr Chair's decision on Nov 10th, the following is agreed:
Agreements:

- **2-port DMRS-based sPDCCH is not supported in this WI.**
- **For DMRS-based sPDCCH, the mapping of the modulated symbols to resource elements (k, l) on antenna port p, shall be in increasing order of first the index k and then the index l.**
- **For distributed CRS-based sPDCCH, the mapping of the modulated symbols to resource elements (k, l) on antenna port p, shall be in increasing order of first the index k and then the index l.**
- **A predefined DMRS antenna port is used for single port DMRS-based sPDCCH transmission.**
  - **The DMRS pattern for the predefined DMRS antenna port is the same as that for the first DMRS antenna port for 2/3-symbol sPDSCH.**
- **For CRS-based sPDCCH and distributed configuration, the sREG corresponding to an sCCE index n are given by**

$$n \bmod \left\lfloor \frac{N_{RB}^{X_m}}{N_{SREG}^{SCCE}} \right\rfloor + \left\lfloor \frac{n}{\left\lfloor \frac{N_{RB}^{X_m}}{N_{SREG}^{SCCE}} \right\rfloor} \right\rfloor \cdot N_{RB}^{X_m} + j \cdot \left\lfloor \frac{N_{RB}^{X_m}}{N_{SREG}^{SCCE}} \right\rfloor$$

Where $j = 0, \cdots, N_{SREG}^{SCCE} - 1$, $N_{RB}^{X_m}$ represents the number of SREGs per each configured OFDM symbol in the SPDCCH resource set X_m.

[90b-LTE-09] – Karol (Nokia)
Email discussion on remaining details of sPDCCH multiplexing with data, from 20th Oct to 3rd of Nov.
Done: According to Mr Chair's decision on Nov 10th, a summary of views should be prepared and presented as input to RAN1#91.

[90b-LTE-10] – Xianghui (ZTE)
Email approval on remaining details of sPUCCH design (including HARQ-ACK bundling for {2,7}), from 20th of Oct to 3rd of Nov.
Done: According to Mr Chair's decision on Nov 13th, the following is agreed:

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Agreements:

- **No HARQ-ACK bundling across DL sTTI is supported when configured with {2,7} sTTI operation.**
  - **FFS on supporting HARQ-ACK bundling**
- **Both semi-static and dynamic codebook size are supported for sHARQ-ACK feedback in sTTI.**
  - **Independent RRC signalling between using semi-static and dynamic codebook size is separately configured for sTTI configuration {2,2}, {2,7}, {7,7} and 1ms TTI.**

[90b-LTE-11] – Kianoush (Qualcomm)
Email discussion of remaining details of CSI reporting, from 20th of Oct to 3rd of Nov)
Done: According to Mr Chair's decision on Nov 10th, a summary of views should be prepared and presented as input to RAN1#91.

[90b-LTE-12] – Hyunho (LGE)
Email approval on remaining issues of sPUSCH/sPUCCH PC + sTTI/TTI collisions, from 20th of Oct to 3rd of Nov)
Done: According to Mr Chair's decision on Nov 10th, the following is agreed:
Agreements:

- **If a UE is not configured with simultaneous transmission of PUSCH and PUCCH, and if more than two three UL channels are collided within the same subframe on a given carrier, collision handling between two UL channels of same TTI length is first applied, followed by collision handling of two UL channels of different TTI length.**
- **PHR can be transmitted via either sPUSCH or PUSCH on a serving cell configured with sTTI operation.**
- **In case of collision between PUCCH and sPUCCH in the same subframe on a given carrier, CSI of PUCCH is dropped.**
- **When HARQ-ACK for PDSCH is transmitted on sPUCCH due to collision between PUCCH and sPUCCH in the same subframe on a given carrier, HARQ and sHARQ bits are determined independently**
- **If a UE is configured with simultaneous transmission of PUSCH and PUCCH, and if PUSCH, PUCCH, and sPUSCH are collided within the same subframe on a given carrier, the UE should attempt to drop/stop as soon as possible (up to UE implementation) the whole/remaining transmission of PUSCH and PUCCH, and shall transmit sPUSCH. The UE shall not resume the dropped/stopped transmission.**
  - **HARQ-ACK of PDSCH is transmitted on sPUSCH**
  - **CSI on PUSCH or PUCCH is dropped**
- **If a UE is configured with simultaneous transmission of PUSCH and PUCCH, and if PUSCH is collided with sPUSCH and sPUCCH of the same sTTI within the same subframe on a given carrier, the UE should attempt to drop/stop as soon as possible (up to UE implementation) the whole/remaining transmission of PUSCH, and shall transmit sPUSCH and sPUCCH. The UE shall not resume the dropped/stopped transmission.**
  - **HARQ-ACK of PDSCH is transmitted on sPUCCH**
  - **CSI on PUSCH is dropped**
- **If a UE is configured with simultaneous transmission of PUSCH and PUCCH, and if PUCCH is collided with sPUSCH and sPUCCH of the same sTTI within the same subframe on a given carrier, the UE should attempt to drop/stop as soon as possible (up to UE implementation) the whole/remaining transmission of PUCCH, and shall transmit sPUSCH and sPUCCH. The UE shall not resume the dropped/stopped transmission.**
  - **HARQ-ACK of PDSCH is transmitted on sPUCCH**
  - **CSI on PUCCH is dropped**

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- **If a UE is configured with simultaneous transmission of PUSCH and PUCCH, and if PUSCH and PUCCH are collided with sPUSCH and sPUCCH of the same sTTI within the same subframe on a given carrier, the UE should attempt to drop/stop as soon as possible (up to UE implementation) the whole/remaining transmission of PUSCH and PUCCH, and shall transmit sPUSCH and sPUCCH. The UE shall not resume the dropped/stopped transmission.**
  - **HARQ-ACK of PDSCH is transmitted on sPUCCH**
  - **CSI on PUSCH or PUCCH is dropped**
- **If a UE is not configured with simultaneous transmission of PUSCH and PUCCH, the UE is not expected to transmit sPUCCH and only DMRS of sPUSCH simultaneously within the same sTTI (i.e., within sTTI#n+1 in case { DD | R } is indicated for sTTI#n and sTTI#n+1 respectively**
- **Regarding UE behaviour in case simultaneous transmission of the same TTI lengths across different carriers and the UE is power-limited, reuse the legacy power allocation principles captured in 3GPP TS 36.213, subclause 5.1.**
- **If transmitting PHR on sPUSCH is supported, both type 1 and type 2 PHR are supported.**
- **The calculation of PHR for sTTI follows the same principle as the PHR equation for 1ms TTI**
  - **PH for a sTTI and a given carrier = {Maximum allowed power – Estimated power for sPUSCH} for type 1 PHR**
  - **PH for a sTTI and a given carrier = {Maximum allowed power – Estimated power for sPUSCH and sPUCCH} for type 2 PHR**
- **For sPUSCH power control, and for FDD, K_PUSCH = 4 when the UL sTTI length is slot, and K_PUSCH = X_P when the UL sTTI length is subslot, where X_P is the processing time configured by higher-layer signaling.**
- **For sPUSCH power control, and for TDD, K_PUSCH is given according to the timing between UL grant and sPUSCH (depending on TDD UL/DL configuration and special subframe configuration).**
- **For sPUSCH power control, both TPC accumulation and TPC non-accumulation modes for closed-loop power adjustment are supported.**
  - **FFS on whether to reuse the parameter "Accumulation-enabled" for 1ms TTI operation in order to indicate the mode for closed-loop power adjustment of sPUSCH.**
- **For sPUCCH power control, and for FDD, M=1. k_m = 4 when the DL sTTI length is slot, and k_m = X_P when the DL sTTI length is subslot, where X_P is the processing time configured by higher-layer signaling.**
- **For sPUCCH power control, and for TDD, M and k_m are given according to the timing between sPDSCH and the corresponding HARQ-ACK (depending on TDD UL/DL configuration and special subframe configuration).**
- **The delta-F for sPUCCH format 1 is supported only for slot-sPUCCH.**
  - **FFS on candidate values of delta-F for slot-sPUCCH format 1**
- **If a UE is (re)configured with sTTI operation for a serving cell, the initial value of fc(*) for a serving cell c is determined as zero, and the UE shall reset accumulation, regardless of whether P_0_UE_PUSCH,c is changed or not.**
- **If a UE is (re)configured with sTTI operation for the primary cell, the initial value of g(*) for the primary cell is determined as zero, and the UE shall reset accumulation, regardless of whether P_0_UE_PUCCH is changed or not.**

[90b-LTE-13] – Yubo (Huawei)
Email approval on remaining details of sPDSCH/sPUSCH design, UCI mapping on sPUSCH, 20th Oct to 3rd of Nov.
Done: According to Mr Chair's decision on Nov 13th, the following is agreed:
Agreements:

- **For 4-layer 2/3OS sPDSCH, the baseline DMRS pattern is as the figure below. FFS the collision with CRS and CSI-RS.**

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- **For 4-layer 1-slot sPDSCH, the baseline DMRS pattern is as the figure below. FFS the collision with CRS and CSI-RS.**



- **For sPDSCH/sPUSCH scheduling:**
  - **The resource allocation signalling for sPDSCH and sPUSCH is system bandwidth dependent.**
  - **Every RB in the system bandwidth can be scheduled in DL assignment of sPDSCH.**
- **The subframe type (MBSFN and non-MBSFN) dependent TM configuration supported. FFS on CSI reporting on the configured TM.**
  - **Note: The configured processing timeline and the maximum TA are applicable to both TMs configured for MBSFN and non-MBSFN subframes.**
- **In case there is one RB remaining for 1-slot sPDSCH within an sPRG, the DMRS-based sPDSCH is not mapped to that single RB.**

[90b-LTE-14]- Jeongho (Samsung)
Email approval on remaining issues for 1 ms + FS2 (sTTI and 1 ms) + FS3, from 20th Oct to 3rd of Nov.
Done: According to Mr Chair's decision on Nov 10th, the following is agreed:
Agreements:

- **For a carrier configured with shortened processing time, DL HARQ-ACK timing from PDSCH to HARQ-ACK, bit ordering, and PUCCH resource are determined by using the table below:**

TDD UL/DL Configuration	Subframe n									
	0	1	2	3	4	5	6	7	8	9
0	-	-	(6)	3	(4),3	-	-	(6)	3	(4),3
1	-	-	(7), 6, 3	(4),3	-	-	-	(7), 6, 3	(4),3	-
2	-	-	(8), 7, 4, 6, 3	-	-	-	-	(8), 7, 4, 6, 3	-	-
3	-	-	7, 6, (11), 5	(6), 5, 4	(5), 4, 3	-	-	-	-	-
4	-	-	(12), 8, 7, 11, 6	6, 5, 4, (7), 3	-	-	-	-	-	-
5	-	-	(13), 12, 9, 8, 7, 5, 4, 11, 6, 3	-	-	-	-	-	-	-
6	-	-	(7), 6	(7), 4	(5), 4	-	-	(7), 6	(7), 3	-

Notes:

- **DL subframes only for UEs not configured with shortened processing time are in parentheses**
- **DL subframes only for UEs configured with shortened processing time are highlighted in red.**
- **DL subframes highlighted in green are common for both above UE types**
- **A UE configured with shortened processing time should take into account:**
  - **DL subframes for UEs with applying either processing time (numbers highlighted in green), and DL subframes only for UEs configured with shortened processing time (numbers highlighted in red) in order to determine HARQ-ACK codebook for a certain UL subframe**

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- Additionally, the UE should also consider DL subframes only for UEs not configured with shortened processing time (the ones in parentheses) in order to reserve PUCCH resource.i.e. implicit resource allocation is applied, without an additional RRC configured starting position

- For shortened processing time with 1ms TTI, the modified DCI formats for n+3 timing are applied only to USS, and the legacy DCI formats 0/4 are applied to CSS.
- HARQ-ACK transmission in subframe n can consist of HARQ-ACK bits for PDSCH(s) scheduled with shortened processing timing on some serving cells and HARQ-ACK bits for PDSCH(s) scheduled with legacy processing timing on other serving cells.
- For semi-static HARQ-ACK codebook determination in FS1,
  - HARQ-ACK transmission in subframe *n* consists of HARQ-ACK bits
    - for PDSCH(s) transmitted in the serving cell(s) configured with shortened processing time correspondingto PDCCH detected in USS in subframe *n-3* or corresponding to PDCCH detected in CSS in subframe *n-4*,
    - and for PDSCH(s) transmitted in the serving cell(s) not configured with shortened processing time corresponding to PDCCH/EPDCCH detected in subframe *n-4*.
  - Note: HARQ-ACK bit index is increased over cell index.
- For FS1, if a UE detects DCI format 3/3A in subframe n and also detects dedicated UL grant with n+3 timing in subframe n+1, then for PUSCH transmission in subframe n+4, the UE shall use TPC command provided in the dedicated UL grant transmitted in subframe n+1.
- When shortened processing time is configured for a UE, the following table is used to determine K_{PUSCH} for power control.

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	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	-
The highlighted values with red are for special subframe configuration 10.										

- For slot sTTI in FS2 and for SSC 1,2,3,4,6,7,8, the following pre-defined table is used for the timing between UL grant and sPUSCH. In the following table describing k, sPUSCH is transmitted in slot n+k, where the corresponding UL grant is received in slot n.

TDD UL/DL	slot number *n*																		
Configuration	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1	4	4	4	4							4	4	4	4						
2	4	4									4	4								
3	6	6	6	6															6	6
4	4	4	4	4																
5	4	4																		
6	6	6	6	6							4	4	4	4					6	6

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- Note: The values for TDD UL/DL configuration 1-5 were agreed in RAN1#90bis.
- FFS on TDD UL/DL configuration 0

- **For slot sTTI in FS2 and SSC 0,5,9,10, the following pre-defined table is used for the timing between UL grant and sPUSCH. In the following table describing k, sPUSCH is transmitted in slot n+k, where the corresponding UL grant is received in slot n.The red-colored font is for SSC 10.**

TDD UL/DL	slot number *n*																		
Configuration	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
0	4,5	5,6	6,7,11								4,5	5,6	6,7,11							
1	5	5	5						5	5	5	5	5						5	5
2	4	4								4	4	4								4
3	7	7	7														7	7	7	7
4	5	5	5																5	5
5	4	4																		4

- FFS on TDD UL/DL configuration 6

[90b-LTE-16] – Yubo (Huawei)
Email approval on SPS details, 27th of Oct until 10th of Nov.
Done: According to Mr Chair's email posted on Nov 15th, the following is agreed:
Agreements:

- **SPS validation of activation/release of assignment for sPDSCH/sPUSCH is supported.**
- **UE shall monitor at least sPDCCH of sTTI#1 to #5 for validation of a sDCI with SPS assignment for sPDSCH and sPUSCH.**
  - **FFS UE shall monitor PDCCH of sTTI#0 for validation of a sDCI with SPS assignment for sPDSCH and sPUSCH.**
- **A UE shall validate a SPS assignment control channel for sPDSCH/sPUSCH if at least all the following conditions are met:**
  - **the CRC parity bits obtained for the control channel payload are scrambled with the Semi-Persistent Scheduling C-RNTI,**
  - **the new data indicator field is set to '0'.**
  - **FFS other conditions**
- **The 2-bit SPUCCH resource indication field is used to indicate one of the four resources/resource groups configured by higher layer as the sPUCCH resource for HARQ-ACK feedback to SPS sPDSCH.**
- **In case of collision between SPS PUSCH and SPS sPUSCH in the same subframe on a given carrier, The UE shall transmit SPS sPUSCH transmission and drop/stop SPS PUSCH transmission.**
  - **HARQ-ACK of SPS PUSCH is transmited via SPS sPUSCH.**
  - **CSI of SPS PUSCHis dropped.**
- **In case of collision between SPS PUSCH and non-SPS sPUSCH in the same subframe on a given carrier, the UE shall transmit non-SPS sPUSCH transmission and drop/stop SPS PUSCH transmission.**
  - **HARQ-ACK of SPS PUSCH is transmitted via non-SPS sPUSCH.**
  - **CSI of SPS PUSCH is dropped**

  FFS on collision handling between SPS PUSCH and non-SPS sPUCCH in the same subframe on a given carrier

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- **In case of collision between non-SPS PUCCH and SPS sPUSCH in the same subframe on a given carrier, the UE shall transmit SPS sPUSCH transmission and drop/stop non-SPS PUCCH transmission**
  - **HARQ-ACK of non-SPS PUCCH is transmitted via SPS sPUSCH.**
  - **CSI of non-SPS PUCCH is dropped.**
- **The SPS intervals for sPDSCH/sPUSCH can be 1 sTTI minimally and 40ms maximally**
  - **FFS on exact list of SPS intervals**
- **Send RAN2 LS to indicate the agreements of support on SPS validation for sTTI traffic and SPS intervals.**

Final LS is approved in R1-1719248.

[90b-LTE-18] – Liyuan (Huawei)
Email discussion on partial UL subframes Nov 15th
Done: According to Mr Chair's decision on Nov 16th, a summary should be prepared and presented as input to RAN1#91.

[90b-LTE-19] – Timo (Nokia)
Email discussion on AUL resource allocation Nov 15th
Done: According to Mr Chair's decision on Nov 16th, a summary should be prepared and presented as input to RAN1#91.

[90b-LTE-20] – Reem (Ericsson)
Email discussion on AUL HARQ Nov 15th
Done: According to Mr Chair's decision on Nov 16th, a summary should be prepared and presented as input to RAN1#91.

[90b-LTE-21] – Jeon J (Intel)
Email discussion on AUL channel Access Nov 15th
Done: According to Mr Chair's decision on Nov 16th, a summary should be prepared and presented as input to RAN1#91.

[90b-LTE-22] – Zhilan (Nokia, NSB)
Email Discussion on what type of field measurement results and how to capture in TR till 10/27.
Done: According to Mr Chair's email posted on Nov 2nd, the following is agreed:
Agreements:

- **One or more field measurement results are to be included in the TR, where the field measurement results are chosen from (a subset or all of them, up for further discussion in RAN1#91) at least the following:**
  - **Number of detected cells**
  - **Serving cell RSRP/RSRQ**
  - **Neighbour cell RSRP/RSRQ**
  - **RSSI**
  - **RSRP gap between serving cell and each other detected cells**
  - **Distance to serving cell**

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- **Distance to neighbor cells**
- **RS-SINR (refer to section 5.1.23 of TS 36.214)**
- **PDCCH BLER**
- **UL data rate**

[90b-LTE-23] – Siva (Ericsson)
Email Discussion on TP for Agreements from RAN1#90bis till 10/27.
Done: According to Mr Chair's email posted on Nov 1st, the following is agreed:
Agreements:

- **TP for capturing agreements from RAN1#90bis in TR36.777v4 is agreed in R1-1719053**
- **RSRP statistics will be captured in the TR**
  - **The TP to do so will be prepared in RAN1#91**

R1-1719053 TP for capturing agreements from RAN1#90bis in TR36.777 Ericsson

[90b-LTE-24] - Mårten (Ericsson)
Email approval on the system level evaluation assumptions and methodology to compute the reference SINR, Q. The email approval discussion is kicked off at the latest one week before the deadline.
Deadline: 3rd November
Done: According to Mr Chair's emails posted on Nov 11th and Nov 13th, the following is agreed:
Agreements:

- **The SINR from system level evaluations is based on long-term SINR at a given position in the network and excludes fast fading component.**
- **The SINR collected in system level simulations is the one at the antenna connector reference point (no combination of antenna ports are considered).**
- **Since the SINR is derived at the antenna connector without combination between ports, it is assumed that the assumption on number of antenna elements for the UE does not have an impact to the derived SINR point.**
- **The channel model used for system level evaluations is the one described in 3GPP TR 38.901 (also called model B in ITU Eval document).**
- **The following simulation settings for Urban Macro-URLLC are used:**

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Parameter	Value
Carrier frequency for evaluation	700 MHz
Inter-site distance	500 m
UE power class	23 dBm
BS antenna height	25 m
Inter-site interference modelling	Explicitly modelled
BS noise figure	5 dB
BS antenna element gain	8 dBi
UE antenna element gain	0 dBi
Thermal noise level	-174 dBm/Hz
UE antenna height	1.5 m
Traffic model	Full buffer (Note: it is for SINR CDF distribution derivation)
Number of URLLC UEs/TRxP	10 for SINR CDF distribution derivation
URLLC UE location	80% outdoor,
20% indoor	
Total transmit power per TRxP	49 dBm for 20 MHz bandwidth
46 dBm for 10 MHz bandwidth	
Simulation bandwidth	20 MHz
UL PUSCH power control parameters	α=1.0, P0,PUSCH=-106 (suggested value for UL SINR CDF distribution derivation and calibration)
Other values are not precluded. If other values are used, it shall be reported.	
UL PUCCH power control parameters	P0, subframe-PUCCH = -116
P0, slot-SPUCCH = -113	
P0, subslot-SPUCCH = -108	
(suggested value for UL SINR CDF distribution derivation and calibration)	
Bandwidth allocation	PUSCH: FFS
PUCCH: 1 RB (To get a full load SINR for PUCCH, the same mutual interferers as for PUSCH are assumed but on a bandwidth of 1 RB)	
Number of antenna elements per TRxP	16 Tx/Rx, (M,N,P,Mg,Ng) = (8,1,2,1,1),
(dH,dV) = (N/A, 0.8)λ	
Number of TXRU per TRxP	2TXRU, =(Mp,Np,P,Mg,Ng) = (1,1,2,1,1)
Handover margin (dB)	0 (i.e., the strongest cell is selected)
UT attachment	Based on RSRP (formula (8.1-1) in TR36.873) from port 0

- **In addition to the Urban Macro-URLLC scenario, an indoor scenario is also defined, following the same ITU methodology. Details are FFS but Indoor Hotspot-eMBB from ITU IMT2020 Eval document is used as a starting point for setting the details.**

[90b-LTE-25] - Huawei (Yubo)
Email discussion on the link level evaluation assumptions taking as basis the NR URLLC assumptions defined in TR38.802. The email discussion should also address the FFS related to other link level methodologies. The email discussion is kicked off at the latest two weeks before the deadline.
Deadline: 15th November
Done: According to Mr Chair's decision on Nov 16th, a summary should be prepared and presented as input to RAN1#91.

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[90b-NR-02] – Hanbyul (LGE)
Email discussion on eV2X evaluation methodology till next meeting.

[90b-NR-04] – Da Ren (CATT)
Proposals:

- The maximum number of bits for CORESET and RMSI timing configuration in PBCH is 8 bits excluding the subcarrier spacing.
- (Working assumption) PBCH contents, except the SSB index, should be the same for all SS/PBCH blocks within an SSB burset set for the same center frequency
- CORESET and RMSI configuration should consider the following properties:
  - bandwidth (PRBs)
  - frequency position (frequency offset relative to SS/PBCH block)
  - A set of OFDM symbol indices in a slot corresponding to a CORESET
  - CORESET transmission periodicity
    - Note that this CORESET may also carry control scheduling other channels
  - RMSI timing configuration (including CORESET monitoring window periodicity)
- Email discussion/approval till 10/27

Done: As per RAN1 chair's decision (emails posted on Nov 1st), the following is agreed:
Agreements:

- **(Working assumption) PBCH contents, except the SSB index, should be the same for all SS/PBCH blocks within an SSB burst set for the same center frequency**
- **The maximum number of bits for configuration of RMSI CORESET(s) and RMSI timing in PBCH is X bits excluding the subcarrier spacing.**
  - **X is TBD, and can be chosen to be up to [8] bits.**
  - **Note: RMSI CORESET(s) means the CORESET(s) configured by PBCH**
- **Configuration of RMSI CORESET(s) should consider at least the following properties:**
  - **bandwidth (PRBs)**
  - **frequency position (frequency offset relative to SS/PBCH block)**
  - **A set of consecutive OFDM symbol indices in a slot corresponding to a single CORESET**
  - **FFS: signaling details including what is captured in specifications and what is signaled in the MIB**
- **RMSI timing configuration should consider at least the following properties:**
  - **RMSI PDCCH monitoring window periodicity y**
  - **RMSI PDCCH monitoring window duration x**
  - **FFS: RMSI PDCCH monitoring window offset**
  - **FFS: The number of RMSI PDCCH monitoring occasions per SSB within the RMSI PDCCH monitoring window periodicity**
  - **FFS: signaling details including what is captured in specifications and what is signaled in the MIB**
- **Note: QCL per CORESET vs. search space is up to control session's decision.**

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[90b-NR-05] – Byoung-Hoon (LGE)
Email discussion/approval on UL initial BWP.
Done: As per RAN1 chair's decision (emails posted on Nov 1st and Nov 3rd), the following is agreed:
Agreements:
- **The numerology of the initial active UL BWP is the same as the numerology of Msg3 PUSCH configured in RMSI.**
- **For paired spectrum, the frequency position of the initial active UL BWP can be configured in RMSI.**
  - **FFS how to indicate the frequency position**
- **For unpaired spectrum, initial active DL and initial active UL BWP share the same center frequency.**
- **For SUL, the frequency position of the initial active UL BWP can be configured in RMSI.**
- **The bandwidth of the initial active UL BWP can be configured in RMSI.**

Agreements:
- **UE minimum Tx bandwidth is defined as the largest bandwidth that all UEs must support regardless of UE capability.**
  - **Note: The UE minimum Tx bandwidth will be finally determined by RAN4.**
- **Bandwidth of the initial active UL BWP is equal to or narrower than UE minimum Tx bandwidth.**

Agreements:
- **At least a single initial active UL BWP configured per cell-defining SSB is supported from UE's perspective.**
- **When SUL is configured, an additional initial active UL BWP for SUL can be independently configured.**

Agreements:
- **FFS whether all FDMed PRACH transmission occasions configured by RMSI are confined within the initial active UL BWP or not.**
- **The transmission of PUSCH for Msg.3 and the transmission of PUCCH for Msg.4 HARQ feedback are confined within the initial active UL BWP.**

[90b-NR-07] – Nazmul (Qualcomm)
- FFS: The range of the number of preambles – email discussion/approval till 11/27

Done: As per RAN1 chair's decision posted on Nov 1st, the following is agreed:
- **For contention based RACH, support the same number of PRACH preambles for all actually transmitted SS blocks.**
  - **FFS: Same/different number of PRACH preambles for SS blocks in CFRA.**
- **Support following values for the configuration of the number of PRACH preambles for CBRA per SSB:**
  - **4 * N (where 1 <= N <= 16)**
  - **FFS: 0, 1, 2, 3, 5, 6, 7, 10, 14, 18, 22, 26, 30, values greater than 64**
  - **FFS: different granularity for different number of PRACH preambles for CBRA and CFRA per SSB**
- **Preamble indices not used for CBRA in a RACH occasion can be reserved for CFRA as in LTE.**
  - **Note: Consider dividing the total number of preambles per SSB into two parts: one for CBRA and the other for CFRA if the total number of preambles per SSB is configured.**
  - **Note: How to use preamble indices not used for CBRA in a RACH occasion is entirely up to the network.**

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[90b-NR-08] – Nazmul (Qualcomm)

- Email discussion/approval (at least target potential RRC impact related approval) till 10/27

Done: As per RAN1 chair's decision posted on Nov 1st, the following is agreed:

Agreements:

- **Following RRC parameters related to RACH configuration are agreed:**
  - **High speed flag:**
    - **Range of values: {0, 1, 2}**
  - **Prach-ConfigIndex:**
    - **Range of values: [{0,1,..,255}]**
  - **RootSequenceIndex:**
    - **Range of values:**
      - **For long sequence: {0,1,…,837}**
      - **For short sequence: {0,1,…,137}**
  - **RSRP-ThresholdSSBlock**
    - **Range of values is FFS**
  - **RSRP-ThresholdSUL**
    - **Range of values is FFS**
  - **ZeroCorrelationZoneConfig**
    - **Range of values: {0,1,..,15}**
  - **Msg3Waveform**
    - **Range of values: {0, 1}**
    - **Note: Index 0 and 1 refer to CP-OFDM and DFT-s-OFDM respectively**
  - **PreambleInitialReceivedTargetPower**
    - **Range of values is FFS**
- **Companies are encouraged to comment on the range of values that are mentioned FFS above**

Agreements:

- **Following RRC parameters related to RACH configuration are FFS**
  - **Parameters related to the email discussion [90b-NR-07], i.e., the ones that are related to mapping between SSB and PRACH transmission occasions and preambles**
  - **Parameters related to the mapping between CSI-RS and PRACH transmission occasions and preambles**
  - **prach-Msg1SequenceLength**
    - **Range of values: {139,839}**
  - **prach-Msg1SubcarrierSpacing**
    - **Range of values: {15, 30} or {60, 120} kHz**
    - **Note: SCS is only needed for the short sequence. The long sequence SCS is determined by the preamble format.**
  - **prach-StartingSymbolIndex**
    - **Range of values: {0, 2}**
  - **prach-EndSymbolIndex**

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- Range of values: {11, 12, 13}
- prach-PreambleFormat
  - Range of values for long sequence: {0, 1, 2, 3}
  - Range of values for short sequence: {A1/B1, A2/B2, A3/B3, B4, C0, C1, [A0, A1, A2, A3, B1]}
  - Note: Formats A0, A1, A2, A3 are currently FFS
  - Note: One proponent prefers to support format B1
- prach-FreqOffset
  - Note: parameters should be decided after initial active UL BWP discussion
- ra-PreambleIndexConfig
- Masks for RACH resources and/or SSBs
- Number of PRACH transmission occasions FDMed in one time instance
  - Note: Parameters may be decided after initial active UL BWP discussion
- Msg3 tone spacing
  - Note: Decision may depend on initial active UL BWP discussion
- zeroCorrelationZoneConfigDedicated
- rootSequenceIndexDedicated
- ra-ResponseWindowSize
- RACH CORESET configuration
- prach-ConfigIndexDedicated

- **Companies are encouraged to comment whether these parameters should be supported in their contribution. Supporting companies are also encouraged to provide range of values for these parameters.**

[90b-NR-09] – Daewon (Intel)
Email discussion/approval on potential RRC impact till 10/27
Done: As per RAN1 chair's decision posted on Nov 1st, the following is agreed:
Agreements:

- **Include the following IS/OOS threshold pair indication in RRC parameter list**

Parameter name in text	Description	Value range	Default value	UE/Cell Specific
IS/OOS threshold pair indication	Index corresponds to one of the two IS/OOS threshold pair for RLM.	{0, 1}	0*	UE-specific

***Note that default value of '0' for IS/OOS threshold pair indication corresponds to the LTE-like IS/OOS threshold of 2% and 10% BLER, which is subject to RAN4 verification of applicability to NR PDCCH and NR PDSCH.**

Agreements:

- **There is no need to separately capture "number of configured RLM-RS" in the RRC parameter list.**
  - **Note that this is with the understanding number of configured RLM-RS will be part of the RLM-RS configuration.**

Agreements:

- **Delete the controversial RRC parameter row "RLM-RS-type" for now or mark it as 'to be revisited/under discussion'**

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- **Continue discussion on RLM-RS type issue in RAN1 #91**

Agreements:

- **Continue discussion in RAN1 #91 on the following aspects:**
  - **Capability signaling for supporting different maximum number of configured RLM-RS**
  - **UE monitoring a sub-set of the configured RLM-RS**
  - **Relationship between maximum number of configured RLM-RSs and evaluation period of IS and OOS**
  - **Frequency band dependent maximum number of configured RLM-RS**

[90b-NR-10] – Mattias (Ericsson)
Email discussion on the parameters for detemination of c_init for data scrambling until Oct 27th.
Done: As per RAN1 chair's decision posted on Nov 2nd, the following is agreed:
Agreements:

- **The c_init for data scrambling depends at least on a "Scrambling ID" parameter configured to the UE by RRC. FFS whether one RRC parameter is used for c_init for both PUSCH and PDSCH or if two independent RRC parameters is used.**
- **Discuss further this issue and dependence on other parameters, default value etc in RAN1#91.**

[90b-NR-11] - Weidong (MediaTek)
Email discussion on TPMI size until Oct 27th.
Done: As per RAN1 chair's decision posted on Nov 6th, the following is agreed as a working assumption, to provide a good guidance for companies to further develop the related details to finalize the final scheme in RAN1#91:
Working assumption:

- **For UL codebook based transmission with one SRS resource and a given number of SRS ports, NR supports overhead reduction for TPMI and TPMI related signaling .**
  - **Note: TPMI is indicated in uplink DCI**
  - **Note: Joint or separate encoding of TPMI with TRI and/or SRI is a separate issue**
- **Other details are FFS**

[90b-NR-12] - Mark (Ericsson)
Email discussion on SRS grouping until Oct 27th.
Done: As per RAN1 chair's decision posted on Nov 2nd, the following is agreed:
Agreements:

- **When a UE is configured with multiple SRS resource sets, one of three behaviors below applies:**
  - **Alt 1: Only one resource in each of multiple SRS sets can be transmitted at a given time instant**
    - **The SRS resources in different SRS resource sets (for a subset of the configured SRS resource sets) can be transmitted simultaneously**
  - **Alt 2: All resources in one of a UE's SRS resource sets can be transmitted simultaneously**
    - **The SRS resources in different SRS resource sets may or may not be transmitted simultaneously**
  - **Alt 3: A subset of or all resources in one of a UE's SRS resource sets can be transmitted simultaneously**

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        - **The SRS resources in different SRS resource sets (for a subset of the configured SRS resource sets) can be transmitted simultaneously**
    - **Select in RAN1#91 which of the three behaviors is supported and strive to minimize the impact on SRS configuration framework**
    - **FFS: whether or not specification in addition to UE capability is needed to support the selected behavior**
- **The UE can indicate its capability to gNB of its supported number of resource sets and supported number of SRS resources per set, and/or, for Alt 3), either**
    - **per subset, or**
    - **the supported number of SRS resources that can be transmitted simultaneously per set**
- **Decide in RAN1#91 if this applies to either UL beam management or non-codebook based precoding, or to both UL beam management/non-codebook based precoding**

[90b-NR-13] – Ruyue (ZTE)
Email discussion on the value of N for aperiodic CSI-RS is triggering until 27th of Oct.
Done: As per RAN1 chair's decision posted on Nov 2nd, the following is agreed:
Agreements:

- **Confirm the working assumption with the following refinement**
    - **N = {0, 1, 2, …, Nmax} is configurable via RRC signaling**
        - **Decide in RAN1#91 the value of Nmax from one of {3,4,5,6,7,8} taking into account both carrier aggregation and MIMO aspects**
        - **Note: N is the bitwidth of a CSI request field in DCI which includes signaling at least the triggering of CSI report setting(s) and/or aperiodic CSI-RS resource set(s) for channel and/or interference measurement on one or more CCs.**
    - **When the number of RRC configured CSI triggering states for the CSI request field Sc >2^N–1, MAC CE activation signaling maps the (2^N–1) code points of the CSI request field to a subset of the Sc RRC configured CSI triggering states.**
        - **If Sc <2^N, MAC CE activation does not apply**
    - **The first code point is mapped to "no CSI request"**

[90b-NR-14] – Sebastian (Ericsson)
Emails discussion on resource setting for P/SP/AP CSI, until Oct 27th.
Done: As per RAN1 chair's decision posted on Nov 1st, the following is agreed:
Agreements:

- **For both CSI acquisition and beam management, an aperiodic Resource Settings can contain more than one CSI-RS Resource set**
- **For CSI acquisition, periodic and semi-persistent Resource Settings contain only one CSI-RS Resource set**

[90b-NR-15] – Sebastian (Ericsson)
Email discussion to down-select among the 3 alternatives for A-CSI on short PUCCH with single CSI report, until Oct 27th.
Done: As per RAN1 chair's decision posted on Nov 2nd, the following is agreed:
Agreements:

- **For triggering A-CSI on short PUCCH, the scheme(s) are to be decided by control channel and/or scheduling/HARQ session(s) in RAN1#91.**
    - **Choose at least one from Alt1, Alt2, and Alt3**

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- **In choosing the scheme(s), consider CA (multi-cell) operation as well as transmission of HARQ-ACK and A-CSI in separate TDMed short PUCCH allocations and in a same short PUCCH allocation**

[90b-NR-16] – Sebastian (Ericsson)
Email discussion on semi-persistent CSI on PUSCH, until Oct 27th.
Done: As per RAN1 chair's decision posted on Nov 7th, the following is agreed:
Agreements:

- **For SP-CSI reporting on PUSCH, detailed scheme(s) are to be decided by UL scheduling section in RAN1 91 including which RNTI to use**
  - **Strive to align SP-CSI transmission mechanism as much as possible with UL data transmission mechanism**

[90b-NR-17] – Sundar (Qualcomm)
Emails discussion to finalize the parameter list for BM, until Oct 27th.
Done: As per RAN1 chair's decision posted on Nov 7th, the following is agreed:
Agreements:

- **Include the RRC parameter: Num-Reported-RS-Measure. Value Range – {1,2,3,4}, Default – 1.**
  - **The number N of measured RS resources to be reported per report setting in a non-group-based report. N <= N_max, where N_max is either 2 or 4 depending on UE capability. The value range for N is {1,2,3,4}.**
  - **Note: this parameter may not be needed for certain RS and/or report settings**
  - **FFS: The signaling mechanism for the gNB to select a subset of N beams for the UE to measure and report.**
- **FFS the inclusion of the parameter Apply_Same_SpatialFilter_Mult-SRS-Resource.**
- **Beam management to not discuss the RRC parameter on power control for SRS and merge it with the power control discussion in UL PC.**
- **Support parameter Is-TCI-Present**
  - **Whether for the case when at least spatial QCL is configured/indicated, if TCI field is present or not present in DL-related DCI. FFS: Details on whether it is per-CORESET or per-UE configured**
  - **Boolean**
  - **Default is True**
- **For the case when TCI is not present in DL-related DCI, continue discussion of the details regarding higher-layer signaling of QCL parameters/indication for determining QCL parameters for PDSCH**
- **NR supports a mechanism to identify the spatial QCL if the offset between the time of reception of DL assignment for the PDSCH and time of reception of PDSCH is less than Threshold-Sched-Offset.**
  - **FFS: if the identification requires explicit RRC signaling or rule based.**
- **NR does not support the RRC parameter in beam management: Threshold-Sched-Offset.**
  - **FFS if such a parameter is included as a UE capability**
- **Support the following parameter:**
  - **SRS-SpatialRelationInfo Configuration/indication of the spatial relation between a reference RS and the target SRS. Reference RS can be SSB/CSI-RS/SRS. Source: R1-1718920**
  - **Value range: {SSB, CSI-RS, SRS}**

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- **Support the following RRC parameter:**
  - **resource-config-SS-list List of SSB resources used for beam measurement and reporting in a resource set. Source: R1-1719059**
  - **Value range: {SSB indices}**
- **Support an RRC parameter to configure RS resources for the purpose of new candidate beam identification.**
  - **FFS whether the parameter is the type of reference signal or the actual resources used for beam failure recovery.**
- **Confirm the following working assumption:**
  - **Beam failure detection is determined based on the following quality measure:**
    - **Hypothetical PDCCH BLER**
- **FFS: if RRC parameter is required to set different threshold values for UE to detect beam failure.**
- **Continue discussion on the threshold type, and whether or not the need for RRC parameter for Candidate-Beam-Identification-Threshold**
- **Support parameter "Beam-failure-recovery-request-RACH-Resource"**
  - **Parameters for dedicated PRACH resources for beam failure recovery:**
    - **Preamble sequence related parameters, e.g., root sequence, cyclic shift, and preamble index.**
    - **Maximum number of transmissions**
    - **Maximum number of power rampings**
    - **Target received power**
    - **Timer for retransmission**
    - **Retransmission Tx power ramping step size**
    - **Beam failure recovery timer**
  - **Note: could be a subset of above parameters if re-using the same parameter as initial access**
  - **FFS details of the structure and elements**
- **No need to introduce RRC parameter Beam-Failure-Resource as it is covered by "Beam-failure-recovery-request-RACH-Resource"**
- **FFS potential RRC parameter Beam-Failure-Recovery-Response-CORESET & Candidate-Beam-BFR-Resource-List**

[90b-NR-18] - Chia-Hao (MediaTek)
Email discussion to discuss the remaining beam failure recovery issues in slides 8, 9, 10 of R1-1719174, until Oct 27th.
Done: As per RAN1 chair's decision posted on Nov 3rd, the following is agreed:
Agreements:

- **Support RRC configuration of a time duration for a time window and a dedicated CORESET for a UE to monitor gNB response for beam failure recovery request.**
  - **UE assumes that the dedicated CORESET is spatial QCL'ed with DL RS of the UE-identified candidate beam in the beam failure recovery request.**
  - **FFS: multiple dedicated CORESETs can be configured to a UE, where each CORESET can have different spatial QCL configuration**
  - **Note: the time window is determined by a fixed time offset defined in the spec with respect to beam failure recovery request transmission and the RRC configurable time duration starting from the fixed time offset.**
    - **FFS the value of fixed time offset k (slots).**

[90b-NR-19] - Xi (Huawei)

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3GPP TSG RAN WG1 Meeting #91 **R1-1719301**
Reno, USA, 27th November – 1st December 2017

Email discussion until 27th of Oct on CSI-RS open issues with RAN2 impact
Done: As per RAN1 chair's decision posted on Nov 7th, the following is agreed:
Agreements:

- **At least the following set of RRC parameters are to be used for configuring CSI-RS**
  - **Decide in RAN1#91 on whether or not to support the parameters in brackets and possible revisions**

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RRC Parameter Name	Description	Value range / Sub-parameters
NZP-CSI-RS-ResourceConfig	NZP CSI-RS resource configuration	
NZP-CSI-RS-ResourceConfigId	NZP-CSI-RS resource configuration ID	0 .. NZP-CSI-RS-ResourceMax – 1
ResourceConfigType	Time domain behavior of resource configuration	aperiodic, semi-persistent, or periodic
CSI-RS-timeConfig	Contains periodicity and slot offset for periodic/semi-persistent CSI-RS	Periodicity: {5, 10, 20, 40, 80, 160, 320, 640} slots Slot offset: For CSI-RS periodicity P, the supported offsets are 0…P-1
NrofPorts	Number of ports	1, 2, 4, 8, 12, 16, 24, 32
CSI-RS-ResourceMapping	Include parameters to capture OFDM symbol location(s) in a slot and subcarrier occupancy in a PRB of the CSI-RS resource FFS: how to configure CSI-RS in different slots for fine time/frequency tracking	FFS
CDMType	Includes parameters to capture CDM value (1, 2, 4, or 8), CDM pattern (freq only, time and freq, time only)	FFS
CSI-RS-Density	Density of CSI-RS resource measured in RE/port/PRB	{1/2, 1, 3} for X = 1 {1/2, 1} for X = {2, 16, 24, 32} {1} for X = {4, 8, 12} Note: Other densities and restriction based on functionality can be added later if agreed
CSI-RS-FreqBand	Includes parameters to enable configuration of wideband and partial band CSI-RS	FFS
Pc_PDSCH	Power offset of NZP CSI-RS RE to PDSCH RE	FFS
[Pc_PDCCH_DMRS]	[Power offset of NZP CSI-RS RE to PDCCH DMRS RE]	FFS
Pc_SS	Power offset of NZP CSI-RS RE to SS RE Note: This parameter is optional	FFS
[CC/BWP-Info]	[Indication of which CC/BWP the configured CSI-RS is located in FFS: whether or not this parameter belongs within a CSI-RS resource configuration or within a CSI-RS resource set configuration]	FFS
[QCL-Info]	[QCL info (e.g., QCL relation(s), QCL parameters, QCL type) between reference RS(s) (e.g., SS, CSI-RS on same or different CC/BWP) and the target CSI-RS, also captures QCL amongst ports within the CSI-RS resource FFS: whether to merge this parameter to TCI]	[For QCL amongst ports within the CSI-RS resource, include the following two cases: Case 1: All ports are QCLed with respect to all parameters Case 2: No QCLed (FFS on QCLed w.r.t. partial parameters; FFS on QCLed within the same port group and number of port groups)]
[NonPMI-FeedackPortIndices]	[For non-PMI feedback, configuration of port index selection for RI/CQI calculation per rank]	FFS
ScramblingID	Scrambling ID	FFS
ZP-CSI-RS-ResourceConfig	ZP CSI-RS resource configuration	FFS
ZP-CSI-RS-ResourceConfigId	ZP-CSI-RS resource configuration ID	0 .. ZP-CSI-RS-ResourceMax - 1
ZP-CSI-RS-ResourceMapping	Include parameters to capture OFDM symbol and subcarrier occupancy of the ZP CSI-RS resource within a slot	FFS
ZP-CSI-RS-timeConfig	Contains periodicity and slot offset for periodic/semi-persistent ZP-CSI-RS	FFS
ZP-CSI-RS-FreqBand	Includes parameters to enable configuration of wideband and partial band ZP-CSI-RS	FFS

[90b-NR-20] – Alex (Qualcomm)

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Emails discussion on the DMRS of 2/4/7-symbol for non-slot based scheduling, until Oct 27th
Done: As per RAN1 chair's decision posted on Nov 2nd, the following is agreed:
Agreements: For the higher layer signaling related to DMRS:

- **A UE may be configured with a number of additional DMRS which may be different for slot-based and non-slot-based transmission/scheduling and may be different for DL and UL.**
- **A UE, in DL or UL, may be configured with the same or different DMRS configuration type for slot-based and non-slot-based transmission/scheduling**
  - **It will be further discussed in RAN1#91 if and when a UE expects to be configured with the same DMRS configuration type for slot-based and non-slot-based transmission/scheduling (e.g., scenarios with concurrent slot/non-slot-based).**
  - **It will be further discussed in RAN1#91 if configuration type is fixed to be type 2 in case of 2 or 4 symbols non-slot-based transmission/scheduling.**
- **A UE may be configured with configuration type which may be different for DL and UL.**
- **A UE in DL may be configured with UE-specific scrambling ID(s) which will be used for PN sequence initialization of PDSCH's DMRS which is the same for both slot-based and non-slot-based transmission/scheduling.**
  - **It will be further discussed in RAN1#91 whether one or multiple scrambling ID(s) may be configured.**
- **A UE in UL CP-OFDM may be configured with UE-specific scrambling ID(s) which will be used for PN sequence initialization of PUSCH's DMRS which is the same for both slot-based and non-slot-based transmission/scheduling.**
  - **It will be further discussed in RAN1#91 whether one or multiple scrambling ID(s) may be configured.**
- **A UE for the PUSCH's DMRS for DFT-S-OFDM may be configured with a UE-specific parameter (UL-DMRS-Identity-Transform-precoding) used for sequence initialization which is the same for both slot-based and non-slot-based transmission/scheduling.**
- **At least for slot-based transmission/scheduling, a UE may be configured with the maximum number of front-load DMRS symbol which may be different for DL and UL.**
  - **It will be further discussed in RAN1#91 whether the above applies also for non-slot-based transmission/scheduling.**
- **When a UE is configured with a maximum number of 1 symbol for front-load DMRS (DL-DMRS-max-len=1), the UE may be configured with DL-DMRS-add-pos={0,1,2,3}. When UE is configured with a maximum number of 2 symbols front-load DMRS (DL-DMRS-max-len=2), the UE may be configured with DL-DMRS-add-pos.**
  - **It will be further discussed in RAN1#91 the allowable number of additional DMRS when DL-DMRS-max-len=2 and the UE is dynamically scheduled with 1-symbol for front-load DMRS.**
- **Keep the "dmrs-group" RRC parameters as placeholder until discussions on how to specify the RRC signaling and configuration of DMRS groups are concluded.**
- **It will be further discussed in RAN1#91 whether a new RRC parameter is needed to be introduced which enables DMRS port table restriction or subset selection for both DL and UL.**
- **It will be further discussed in RAN1#91, the relation between PDSCH (or PUSCH) mapping type, associated DMRS parameters, PDSCH (or PUSCH) starting symbol and PDSCH (or PUSCH) duration, any signaling (if needed) for configuration (if needed) of slot-based and non-slot-based.**

[90b-NR-21] – Kiran (Indian Institute of Tech (H))
Email discussion on RS design based on pi/2 BPSK for DFT-s-OFDM, until Oct 27th.
Done: As per RAN1 chair's decision posted on Nov 1st, as no consensus could be achieved and the issue will be discussed further in RAN1#91.

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[90b-NR-22]
Email discussion/approval till 10/27 whether or not to introduced UE capability related to the max number of blind decodes interacting with time (per slot, periodicity of monitoring, etc.) and with frequency (e.g., # of carriers configured for a UE) - Fred (DCM)

Done: As per RAN1 chair's decision posted on Nov 1st, the following is agreed:

Agreements:

- **PDCCH candidates having different DCI payload sizes count as separate blind decodes**
- **PDCCH candidates comprised by different sets of CCE(s) count as separate blind decodes.**
- **PDCCH candidates in different CORESETs count as separate blind decodes.**
- **PDCCH candidates having the same DCI payload size and comprised by the same set of CCE(s) in the same CORESET count as one blind decodes.**

Agreements:

- **For non-CA and for PDCCH monitoring periodicity of 14 or more symbols, the maximum number of PDCCH blind decodes per slot is:**
  - **Working assumption: 44 for SCS = 15kHz.**
  - **Working assumption: less than 44 at least for SCS = 60kHz and 120kHz.**
  - **For the given SCS, all UEs support the maximum number of PDCCH blind decodes per slot.**
- **Companies are encouraged to complete the following table.**
  - **Aiming to finalize this at RAN1#91.**

No. of PDCCH BDs per slot	SCS			
	15kHz	30kHz	60kHz	120kHz
Periodicity of 14 or more symbols	44	[22-44]	[11-44]	[6-44]
Periodicity of less than 14 symbols	[44-86]	[22-86]	[11-44]	[6-44]

Agreements:

- **Companies are encouraged to provide the views on the following aspects:**
  - **Whether to specify upper limit of channel estimations a UE can perform for PDCCH;**
  - **If yes, how channel estimation is defined (e.g., per CCE or per REG bundle, whether common counting principle between narrowband RS and wideband RS), and;**
  - **What is the exact value of the upper limit of channel estimation a UE can perform for PDCCH.**

No. of CCEs that the UE can perform channel estimation per slot	SCS			
	15kHz	30kHz	60kHz	120kHz
Periodicity of 14 or more symbols	[48-74]			
Periodicity of less than 14 symbols				

Agreements:

- **For CA with up to N CCs, maximum number of PDCCH blind decodes per slot for a UE depends on the number of configured CCs.**
  - **All UEs supporting CA with the same set of CCs supports the same maximum number of PDCCH blind decodes.**
  - **No explicit UE capability signaling to inform the maximum number of PDCCH blind decodes is reported.**
- **For CA with more than N CCs, maximum number of PDCCH blind decodes per slot for a UE depends on the explicit UE capability.**
  - **All UEs supporting CA with the same set of CCs supports at least the same number of PDCCH blind decodes.**
- **FFS: the value of N (no more than 8).**

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Agreements:

- **For each SCS, whether or not separate UE capabilities for PDCCH monitoring periodicities are needed is concluded at RAN1#91.**

	SCS			
	15kHz	30kHz	60kHz	120kHz
Need of separate UE capabilities for (i) PDCCH monitoring of 14 or more symbols and (ii) PDCCH monitoring of less than 14 symbols	Y/N	Y/N	Y/N	Y/N

[90b-NR-23] – Fred (NTT DOCOMO)
Email discussion/approval till 10/27

- For a given CORESET, an association among the following is given where FFS: how to achieve
  - A search space set
  - A DCI format size
  - RNTI
- FFS: Configuration of CORESET periodicity/offset

Done: As per RAN1 chair's decision posted on Nov 1st, the following is agreed:

Agreements:

- **For PDCCH monitoring occasion of 1-slot, 2-slot, [5-slot], [10-slot], and [20-slot],**
  - **Slot-level offset value for PDCCH monitoring occasion is also supported.**
    - **For N-slot monitoring occasion, the offset is one from [0, N-1].**
  - **Note: symbol-level bit-map of monitoring occasion within a slot agreed at RAN1#90bis is still available.**

Agreements:

- **For the DMRS of NR-PDCCH in a CORESET,**
  - **The QCL configuration/indication is on a per CORESET basis (Alt.1).**

Agreements:

- **The value(s) of TPC-PUSCH-RNTI, TPC-PUCCH-RNTI, and/or TPC-SRS-RNTI, are provided by RRC signaling.**
- **The association between at least each of the following RNTIs and a DCI format is specified in the specification.**
  - **C-RNTI, TPC-PUSCH-RNTI, TPC-PUCCH-RNTI, TPC-SRS-RNTI, INT-RNTI, SFI-RNTI. FFS: other RNTI(s).**
- **The value of C-RNTI is obtained as part of random access procedure.**
- **The association between a DCI format and a type of search space (UE-common search space and UE-specific search space) is specified in the specification.**
  - **UE-common search space contains a DCI format of C-RNTI, RNTI(s) for SPS/grant-free, TPC-PUSCH-RNTI, TPC-PUCCH,RNTI, TPC-SRS-RNTI, and INT-RNTI.**
  - **UE-specific search space contains a DCI format of C-RNTI and RNTI(s) for SPS/grant-free.**

Agreements:

- **By PBCH, a UE obtains at least one-CORESET configuration at least for PDCCH scheduling RMSI associated with a given SS block.**
  - **The set of aggregation levels and candidates per aggregation level for PDCCH scheduling RMSI is specified in the specification.**

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- **FFS the indication of the support of aggregation level 16 in the cell**
  - **FFS: Set of search spaces for OSI, random access, and paging.**
- **By RMSI, the UE can be configured with at least one ~~a~~ CORESET configuration at least for PDCCH for random access.**
  - **If not configured by RMSI, the CORESET configuration(s) for random access is/are the one(s) configured by PBCH.**
  - **FFS: whether the CORESET configuration can be configured outside of the initial active DL BWP.**
- **By UE-specific RRC signalling, the UE can be configured with one or more CORESET configuration(s) at least for PDCCH scheduling UE-specific data.**
  - **Each CORESET configuration is associated with one or more sets of search spaces.**
  - **Note: each set of search spaces is associated with one CORESET configuration.**

[90b-NR-24] – Jing (Qualcomm)
Proposals:
- For the blind decoding of GC-PDCCH carrying SFI, the GC-PDCCH blind decoding is configured with one decoding candidate at a configured starting CCE with a configured aggregation level in a CSS or group-CSS in a configured coreset

On overwriting rules across semi-static DL/UL assignment, dynamic SFI, DCI, etc
- Need to decide the overwriting rules between
  - Semi-static DL/UL assignment (including states DL, UL, unknown)
  - Dynamic SFI (indicated in GC-PDCCH with states DL, UL, and unknown)
  - UE specific data transmission (UE specific DCI triggered PDSCH, PUSCH, and PUCCH with A/N for a PDSCH)
    - FFS: Broadcast transmission (sync, PRACH, RAR,…)
    - FFS: SPS transmission
  - Measurement: Measurement related signals semi-statically configured by RRC (eg. periodic/semi-persistent CSI-RS for CSI report, periodic CSI report, periodic/semi-persistent SRS) where a DL or UL direction will be assumed
    - FFS: CSI-RS for RRM, TRS, etc
  - FFS: Other signals, measurements, and monitoring (including configured coreset monitoring)
- Consider the following directions of potential overwriting in Rel. 15:
  - States from semi-static DL/UL assignment overwritten by measurement, dynamic SFI, or UE specific data
  - State from measurement overwritten by dynamic SFI or UE specific data
  - Dynamic SFI overwritten by UE specific data
- For the states from semi-static DL/UL assignment
  - "Unknown" in semi-static DL/UL assignment can be overwritten by measurement, dynamic SFI, and UE specific data
  - DL/UL in semi-static DL/UL assignment cannot be overwritten to the other direction (DL to UL or UL to DL) by measurement, dynamic SFI and UE specific data
  - DL/UL in semi-static DL/UL assignment cannot be overwritten by "unknown" by dynamic SFI
- For the states from measurement in symbols not under DL/UL from semi-static DL/UL assignment:
  - DL/UL direction implied by measurement can be overwritten by unknown in dynamic SFI
    - UE behavior will be the cancellation of the measurement or measurement related transmission
  - DL/UL direction implied by measurement can be overwritten by UL/DL from dynamic SFI
    - UE behavior will be the cancellation of the measurement or measurement related transmission

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- DL/UL direction implied by measurement can be overwritten by UE's own UE-specific data if the UE specific data imples the other direction
  - UE behavior will be the cancellation of the measurement or measurement related transmission
  - UE will follow the DCI for UE-specific data transmission and reception
- For the states in dynamic SFI in symbols not under DL/UL from semi-static DL/UL assignment (Already agreed in other agreements and only include for completeness)
  - UL/DL in dynamic SFI cannot be overwritten by UE specific data
    - UE will treat it as an error case when UE specific data and dynamic SFI imply different transmit directions
  - Unknown in dynamic SFI can be overwritten by UE specific data (change to DL or UL)
    - UE will follow the DCI for UE-specific data transmission and reception
- When a configured GC-PDCCH carrying dynamic SFI is not detected (detection erasure event)
  - UE assumes "unknown" dynamic SFI is received for all symbols in the current monitoring period
- Email discussion/approval till 10/27

Done: As per RAN1 chair's decision posted on Nov 2nd and Nov 7th, the following is agreed:

Agreement:

- **For the blind decoding of GC-PDCCH carrying SFI, the GC-PDCCH blind decoding is configured with up to two decoding candidates with a configured aggregation level in a CSS or group-CSS in a configured corset**

Agreements:

- **On overwriting rules across semi-static DL/UL assignment, dynamic SFI, DCI, etc**
  - **Need to decide the overwriting rules between**
    - **Semi-static DL/UL assignment (including states DL, UL, unknown)**
    - **Dynamic SFI (indicated in GC-PDCCH with states DL, UL, and unknown)**
    - **UE specific data transmission (UE specific DCI triggered PDSCH, PUSCH, and PUCCH with A/N for a PDSCH)**
      - **Also include DCI triggered aperiodic measurement related signals, such as aperiodic CSI-RS, aperiodic SRS, etc**
      - **FFS: Broadcast transmission, sync, PRACH, RAR, UL data transmission without UL grant, …**
    - **Measurement: Measurement related signals semi-statically configured by UE-specific RRC (eg. periodic/semi-persistent CSI-RS for CSI report, periodic CSI report, periodic/semi-persistent SRS) where a DL or UL direction will be assumed**
      - **FFS: CSI-RS for RRM, TRS, etc**
    - **FFS: Other signals, measurements, and monitoring (including configured coreset monitoring)**
  - **Consider the following directions of potential overwriting in Rel. 15:**
    - **States from semi-static DL/UL assignment overwritten by measurement, dynamic SFI, or UE specific data**
    - **State from measurement overwritten by dynamic SFI or UE specific data**
    - **Dynamic SFI overwritten by UE specific data**
    - **FFS: UE-specific data and measurement related signals not semi-statically configured by RRC overwritten by "unknown" in dynamic SFI**
      - **The timing requirement for overwriting**
      - **UE behavior will be the cancellation of the measurement/data reception or measurement/data related transmission**
  - **For the states from semi-static DL/UL assignment**
    - **"Unknown" in semi-static DL/UL assignment can be overwritten by measurement, dynamic SFI, and UE specific data**

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- **DL/UL in semi-static DL/UL assignment cannot be overwritten to the other direction (DL to UL or UL to DL) by measurement, dynamic SFI and UE specific data**
- **DL/UL in semi-static DL/UL assignment cannot be overwritten by "unknown" by dynamic SFI**

- **For the states from measurement in symbols not under DL/UL from semi-static DL/UL assignment:**
  - **DL/UL direction implied by measurement can be overwritten by unknown in dynamic SFI**
    - **UE behavior will be the cancellation of the measurement or measurement related transmission**
  - **DL/UL direction implied by measurement can be overwritten by UL/DL from dynamic SFI**
    - **UE behavior will be the cancellation of the measurement or measurement related transmission**
  - **DL/UL direction implied by measurement can be overwritten by UE's own UE-specific data if the UE specific data imples the other direction**
    - **UE behavior will be the cancellation of the measurement or measurement related transmission**
    - **UE will follow the DCI for UE-specific data transmission and reception**
- **For the states in dynamic SFI in symbols not under DL/UL from semi-static DL/UL assignment (Already agreed in other agreements and only include for completeness)**
  - **UL/DL in dynamic SFI cannot be overwritten by UE specific data**
    - **UE will treat it as an error case when UE specific data and dynamic SFI imply different transmit directions**
  - **Unknown in dynamic SFI can be overwritten by UE specific data (change to DL or UL)**
    - **UE will follow the DCI for UE-specific data transmission and reception**

[90b-NR-25] – Stefan (Ericsson)
Email discussion/approval on DCI contents/formats till next meeting
Done: Status to be checked in RAN1#91.

[90b-NR-26] – Hua (Huawei)
Email approval on the disabled frequency hopping case related to the above agreements till 10/27
Done: As per RAN1 chair's decision posted on Nov 1st and Nov 3rd, the following is agreed:
Agreements:

- **For long PUCCH for UCI of more than 2 bits, if frequency hopping is disabled,**
  - **The number of DMRS symbols is 1 for long PUCCH duration <= X**
  - **The number of DMRS symbols is 2 for long PUCCH duration >X and <= 2X+1**
  - **The number of DMRS symbols (either 2 or 4 symbols) for the long PUCCH with a duration >2X+1 is configurable by RRC UE-specific signaling**
    - **RRC Bit-width is 1 bit (reuse the same RRC for long PUCCH with enabled frequency hopping)**
    - **X is fixed in the spec w/o RRC impact and is the same as specified for long PUCCH with enabled frequency hopping**
      - **Note: As agreed, if frequency hopping is enabled, the number of DMRS symbols (between 1-2 symbol) per hop for long PUCCH with duration per hop > X symbols is configurable by RRC UE-specific signaling**

Agreements:

- **For long PUCCH for UCI of more than 2 bits**

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- **For a long PUCCH with duration > X, the DMRS location within the long PUCCH with frequency hopping disabled, is the same as the DMRS location within long PUCCH (of the same duration) with frequency hopping enabled.**
- **For a long PUCCH with duration <=X, the DMRS location within the long PUCCH with frequency hopping disabled is located in (near) the middle of the long PUCCH.**
  - **FFS exact locations**
- **For a long PUCCH with frequency hopping enabled,**
  - **If there is 1 DMRS symbol in a hop, the DMRS symbol is located in (near) the middle of the hop.**
    - **FFS exact locations**
  - **If there is 2 DMRS symbols in a hop, the first DMRS is in the second symbol of the hop and the second DMRS symbol is in the penultimate symbol of the hop**

Agreements:

- **For long PUCCH for UCI of more than 2 bits with enabled frequency hopping,**
  - **the number of DMRS symbols per hop is 1 for long PUCCH with duration of at least one hop <= X symbols**
  - **the number of DMRS symbols (between 1-2 symbol) per hop for long PUCCH with duration of both hops > X symbols is configurable by RRC UE-specific signaling**
    - **Down select between X=4 and 5**

[90b-NR-27] – Hua (Huawei)
WF on pi/2 BPSK based long PUCCH carrying more than 2 UCI bits
For long duration PUCCH carrying more than 2 bits:

- Use pi/2 BPSK modulation, spectrum shaping can be used similar to pi/2 BPSK PUSCH

Email discussion/approval of the above till 10/27
Done: As per RAN1 chair's decision posted on Nov 1st, the following is agreed:

Agreements:

- **For long PUCCH for UCI of more than 2 bits**
  - **Confirm the 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**
  - **Pi/2 BPSK can be supported in addition to QPSK as a user-specific configurable modulation scheme for UCI**
    - **FFS whether other factors need to be considered in applying Pi/2 BPSK in addition to the configuration**

[90b-NR-28] – Yi (Qualcomm)
Proposal: Down-select from the following 2 alternatives

- Alternative 1: different RE mapping rule between ACK puncture and rate-match PUSCH
  - When HARQ-ACK puncture PUSCH, map HARQ-ACK to REs across as many symbols (excluding DMRS symbol) in both freq hops if applicable. HARQ-ACK puncture should avoid puncture PT-RS.

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- When HARQ-ACK rate-matching PUSCH, map HARQ-ACK to localized REs around DMRS in time domain in both freq hops if applicable. HARQ-ACK should rate-match around PT-RS
  - When there is additional DMRS other than front loaded DMRS, map HARQ-ACK around all DMRS symbols.

- Alternative 2: The same mapping rule is applied regardless of HARQ-ACK puncture or rate match PUSCH
  - Map HARQ-ACK to REs across as many symbols (excluding DMRS symbol)

Email discussion/approval till 10/27

Done: As per RAN1 chair's decision posted on Nov 1st, the following is agreed:

Agreements:

- **When HARQ-ACK piggyback on PUSCH, the same rule is applied to map encoded HARQ-ACK bits to HARQ-ACK REs, regardless of HARQ-ACK puncture or rate match PUSCH.**
  - **HARQ-ACK avoids puncturing PT-RS.**
  - **Down select to one from the following two alternatives**
    - **MAP HARQ-ACK to REs around DMRS symbol(s)**
    - **Map HARQ-ACK to REs across as many symbols within PUSCH (excluding DMRS symbol) as possible in both frequency hops if applicable.**

[90b-NR-29] – Jia (OPPO)

Email discussion/approval on how UE selects one PUCCH resource set from multiple configured PUCCH resource sets till 10/27

Done: As per RAN1 chair's decision posted on Nov 2nd, as no consensus could be achieved and the issue will be discussed further in RAN1#91.

[90b-NR-30] – Jia (OPPO)

Email discussion/approval of the following table 10/27

Done: As per RAN1 chair's decision posted on Nov 3rd, the following is agreed:

Agreements:

Table 1 contains the parameters configured in PUCCH resource sets. That means: For each parameter in the in the following table, a set of values can be configured respectively for a set of PUCCH resources. And a value among them can be determined when DCI indicates the index of the corresponding PUCCH resource. Alternatively, the values for some parameters can also be implicitly derived, if implicit resource indication mechanism is used. An entry in the PUCCH resource set corresponds to one column in the table 1. This resource is defined by some parameters which are the rows of the table

- **Note 1: RAN1 needs to further study if the resources of some formats in Table 1 are jointly configured in a resource set.**
- **Note 2: In Table 1, a parameter with "FFS: special values for implicit derivation" or "FFS if implicit derivation is also used" implies that Ran 1 needs further discussion to determine if implicit and/or explicit methods are used to determine the particular parameter in the entry of PUCCH resource. If an implicit mechanism is used, the corresponding value range may shrink and/or a special value outside the value range may be added for indicating "implicit derivation", or the configurability may be completely disabled..**
- **Note 3: RAN1 needs to further study if same or different sets of PUCCH resources in Table 1 are configured for PDSCH mapping type A (slot-based transmission) and type B (non-slot-based transmission).**

Table 2 contains the semi-statically configured parameters. That means: A value would be configured for each parameter in the following table.

Table 1: Parameters configured in PUCCH resource sets and their value ranges

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		PUCCH Format 0	PUCCH Format 1	PUCCH Format 2	PUCCH Format 3	PUCCH Format 4
FFS: Starting slot	Configurability	FFS	FFS	FFS	FFS	FFS
	Value range	0 - [x]	0 - [x]	0 - [x]	0 - [x]	0 - [x]
Starting symbol	Configurability	√	√	√	√	√
	Value range	- 12 and 13; - 0 – 11 (FFS whether or not such a configuration is conditioned on non-slot based operation)	0 – 10 (FFS: special values for implicit derivation)	- 12 and 13; - 0 – 11 (FFS whether or not such a configuration is conditioned on non-slot based operation)	0 – 10 (FFS: special values for implicit derivation)	0 – 10 (FFS: special values for implicit derivation)
Number of symbols in a slot	Configurability	√	√	√	√	√
	Value range	1, 2	4 – 14 (FFS: special values for implicit derivation)	1, 2	4 – 14 (FFS: special values for implicit derivation)	4 – 14 (FFS: special values for implicit derivation)
Index for identifying starting PRB	Configurability	√ (FFS if implicit derivation is also used)	√ (FFS if implicit derivation is also used)	√	√	√
	Value range	0 - [274] (FFS: special values for implicit derivation)	0 - [274] (FFS: special values for implicit derivation)	0 - [274]	0 - [274]	0 - [274]
Number of PRBs	Configurability	N.A.	N.A.	√	√	N.A.
	Value range	N.A. (Default is 1)	N.A. (Default is 1)	1 – [16]	1 - 6, 8 - 10, 12, 15, 16	N.A. (Default is 1)
Enabling a frequency hopping	Configurability	√	√	√	√	√
	Value range	On/Off (only for 2 symbol)	On/Off	On/Off (only for 2 symbol)	On/Off	On/Off
FFS: Frequency resource of 2nd hop if frequency Hopping is enabled	Configurability	FFS	FFS	FFS	FFS	FFS
	Value range	FFS	FFS	FFS	FFS	FFS

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Index of initial cyclic shift	Configurability	√ (FFS if implicit derivation is also used)	√ (FFS if implicit derivation is also used)	N.A.	FFS (for DMRS)	FFS (for DMRS)
	Value range	0 – 11	0 – 11	N.A.	0 – 11	0 – 11
Index of time-domain OCC	Configurability	N.A.	√ (FFS if implicit derivation is also used)	N.A.	N.A.	N.A.
	Value range	N.A.	0 - 6	N.A.	N.A.	N.A.
Length of Pre-DFT OCC	Configurability	N.A.	N.A.	N.A.	N.A.	√
	Value range	N.A.	N.A.	N.A.	N.A.	2, 4
Index of Pre-DFT OCC	Configurability	N.A.	N.A.	N.A.	N.A.	√
	Value range	N.A.	N.A.	N.A.	N.A.	0, 1, 2, 3

Table 2: Semi-statically-configured parameters and their value ranges

		PUCCH Format 0	PUCCH Format 1	PUCCH Format 2	PUCCH Format 3	PUCCH Format 4
Number of slots	Configurability	N.A.	Configured	N.A.	Configured	Configured
	Value range	N.A.	1, y1, y2, y3	N.A.	1, y1, y2, y3	1, y1, y2, y3

[90b-NR-31] – Stefan (Ericsson)
Discuss further offline on how to perform frequency hopping based resource allocation, and whether or not to support frequency-distributed resource allocation (e.g. using VRB, etc.) especially w.r.t. whether or not RRC signalling is involved or not – Email discussion/approval till 10/27.
Done: As per RAN1 chair's decision posted on Nov 3rd, the following is agreed:
Agreements:

- **The notion of VRB is included in the specifications.**
- **A non-transparent VRB-to-PRB mapping (i.e. PRB_i=VRB_j where j=f(i)) is supported**
  - **At least for resource allocation type 1**
  - **Discuss further whether to support it also for resource allocation type 0**
- **At least a block-interleaver is used for VRB-to-PRB mapping**
  - **FFS the details**
- **A single bit in the DCI indicates localized or distributed VRB-to-PRB mapping.**

[90b-NR-32] – Sukchel (LGE)

- Discuss further DCI composition for supporting CBG based retransmission in terms of CBGTI, CBGFI, and NDI
  - No RRC impact is expected
- Email discuss/approval of the above issue until 11/3

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Done: As per RAN1 chair's decision posted on Nov 3rd, the following is agreed:
Agreements:

- **In case configured with CBG based retransmission, CBGTI, CBGFI, and NDI are separately indicated in the same DCI.**
- **In case with CBG based retransmission and multiple CW configuration, single CBGFI is indicated in DCI and commonly applied for both two TBs.**
- **Discuss further on the detailed DCI composition for CBG based retransmission such as reinterpretation of MCS/TBS field to CBGTI.**
- **Discuss further on the detailed HARQ-ACK feedback with CBG in terms of TB level HARQ-ACK, HARQ-ACK bundling, HARQ-ACK composition, with consideration of overall HARQ-ACK codebook design.**
- **Compressed CBG level HARQ-ACK feedback scheme except for HARQ-ACK bundling is not supported in Rel-15.**
- **No additional CB grouping method is introduced in Rel-15.**

[90b-NR-33] – Lihui (NTT DOCOMO)
Proposals:

- Frequency hopping is supported for CP-OFDM based NR-PUSCH transmission with contiguous RB allocation
  - At least intra-slot frequency hopping is supported for 14 symbol slot case
- For UL transmission with grant, intra-slot FH hopping can be enabled/disabled by UL grant.
- For PUSCH with grant, at least following are supported and configured by OSI:
  - Inter-slot FH without intra-slot FH.
  - Inter-slot FH + intra-slot FH.
- Email discussion/approval till 10/27

Done: As per RAN1 chair's decision posted on Nov 2nd, the following is agreed:
Agreements:

- **Support PUSCH frequency-hopping for DFT-s-OFDM and CP-OFDM waveform with RA Type 1.**
  - **At least support intra-slot FH for Msg.3.**
    - **FFS: details including hopping pattern/configurations, signaling designs, etc.**
    - **FFS whether applicable to all PUSCH durations within a slot**
    - **FFS: whether to support repetition of Msg.3**
- **Support UE-specific RRC configuration of the following:**
  - **Mode 1: intra-slot FH only**
    - **FFS whether applicable to all PUSCH durations within a slot**
    - **Note: Mode 1 is applicable to single slot and repetition case**
  - **Mode 2: inter-slot only**
    - **Note: Mode 2 is applicable to repetition case**
  - **FH across mini-slots for repetitions**
    - **FFS: whether it can be enabled by which mode and details, including alignment with slot boundary, pattern etc. Target to have a common FH design between slot and mini-slot.**
  - **FFS: details including the number of configurations, hopping pattern/configurations, signaling designs, etc.**
- **Support RAR/UL grant indication for PUSCH frequency-hopping**
  - **FFS: details including how to indicate enable/disable and pattern/mode of FH.**

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[90b-NR-34] – Lihui (NTT DOCOMO)
Proposals:

- For UL transmission without grant, for a TB transmission with K repetitions
  - The repetitions follow an RV sequence
  - RV sequences for both CC and IR should be supported, i.e., the pattern with the same RV value is a special case of RV sequence
  - The RV sequence is configured by RRC at least for Type 1.
- For UL transmission without UL grant, for each configuration
  - The number of HARQ processes is explicitly configured by RRC
  - Each configuration can have multiple HARQ processes
- Email discussion/approval till 10/27 – including any other potentially missing RRC parameters related issues

Done: As per RAN1 chair's decision posted on Nov 3rd, the following is agreed:

Working assumption:

- **For UL transmission without UL grant, for a TB transmission with K repetitions**
  - **The repetitions follow an RV sequence and it is configured by UE-specific RRC signalling to be one of the following:**
    - **Sequence 1: {0, 2, 3, 1}**
    - **Sequence 2: {0, 3, 0, 3}**
    - **Sequence 3: {0, 0, 0, 0}**

Agreements:

- **For UL transmission without UL grant, for each configuration**
  - **The number of configured HARQ processes is explicitly configured by RRC**
  - **Each configuration can have multiple HARQ processes**
    - **The value range is {1, 2, …, M}, where M value is FFS**

Agreements:

- **For Type 1 and Type 2 UL transmission without grant, RNTI(s) is/are configured by UE-specific RRC signaling.**
  - **Whether the same or different RNTI(s) for Type 1 and Type 2 can be decided by RAN2.**
- **Within each type, an RNTI is configured by UE-specific RRC signaling at least for one resource configuration in a serving cell**

Agreements:

- **For UL transmission without UL grant,**
  - **The HARQ ID for a TB should be the same during the repetitions and retransmissions if any.**
  - **The HARQ ID is at least determined by**
    - **the number of HARQ processes in the configuration**
    - **the time-domain resource for the UL data transmission**
- **FFS: other factors such as frequency-domain resource, DMRS, repetition K dependency on initial transmission.**

[90b-NR-35] – Ajit (Intel)
Email discussion on the issues raised in 9251 till 10/27
Done: As per RAN1 chair's decision posted on Nov 3rd, the following is agreed:

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Agreements:

- **For DL LBRM, R_{LBRM} is changed from 1/2 to 2/3.**
- **For uplink,**
  - **Full buffer rate-matching is supported**
  - **Limited buffer rate-matching is also supported via RRC configuration and, when configured, is applied to all HARQ processes**
    - **§ NR limits UL transmit buffer corresponding to a largest UL TBS coded at rate $R_{LBRM,UL}$**
    - **§ $R_{LBRM, UL}$ = 2/3.**
    - **§ Details FFS**

[90b-NR-36] Peter A. (Qualcomm)
Proposals:

- Option #1
  - NR supports Scell activation via DCI signaling
    - FFS for deactivation
    - FFS interactions between Scell deactivation timer and BWP timer
- Option #2:
  - NR supports Scell activation/deactivation via MAC CE signalling
  - Optionally,
    - BWP switching DCI to switch bandwidth part can be used to activate Scell
      - FFS details
- Option #3:
  - NR supports Scell activation/deactivation via MAC CE signalling only
- Email discussion/approval till 10/27

Done: As per RAN1 chair's decision posted on Nov 1st, as no consensus could be achieved and the issue will be discussed further in RAN1#91.

[90b-NR-37] – Aris (Samsung)
Proposals:

- A configurable max coding rate is used for a UE to determine how to feedback UCI on PUCCH
  - FFS details how to use the configuration. The LTE mechanism is the baseline
- Email discussion/approval till 10/27

Done: As per RAN1 chair's decision posted on Nov 1st, the following is agreed:
Agreements:

- **A configurable max coding rate, per PUCCH format, is used for a UE to determine how to feedback UCI on PUCCH**
  - **FFS details how to use the configuration. The LTE mechanism is the baseline**
  - **Note: This is applicable to PUCCH formats 2/3/4 that support more than 2 UCI bits**

[90b-NR-38] - Karol (Nokia)
Proposals:

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- On the RB-symbol level, for semi-static configuration of a rate-matching resource
  - Configure a first bitmap of RBs
  - Configure a second bitmap of [14, 28 or 56] symbols (i.e. 1 2 4 slot(s)) in time for which the first bitmap applies
  - Configure a third bitmap indicating, in units of second bitmap, the units for which time-frequency units configured by the first and the second bitmaps apply, for the duration of min(40ms,[1, 5, 10, 20 or 40] units)
  - The rate-matching resource set configuration repeats in time.
  - FFS: remaining details of configuration for rate-matching resource sets with and without L1 signalling.

For email approval till 10/27 (including per cell vs. per BWP, max # resource sets, DCI field presence or not and/or by configuration or not)

Done: As per RAN1 chair's decision posted on Nov 3rd, the following is agreed:

Working assumption:

- **On the RB-symbol level, NR supports at least UE specific RRC configuration of at least the following parameters for a rate-matching resource set(s)**
  - **A UE can be RRC configured with one or multiple pairs of bitmap-1 and bitmap-2, each pair determining a time-frequency resource set, i.e. kronecker(transpose(bitmap-1), bitmap-2)**
    - **a bitmap-1 of at least RB granularity (up to 275 bits, one bit corresponding to one RB)**
      - **FFS whether other granularities, e.g. 2,4, 6, 8,16 RBs, maximum number of RBs, are also supported**
    - **a bitmap-2 of 14 symbols (i.e. 1 slot) in time for which the first bitmap applies (one bit per symbol)**
      - **FFS: support of bitmap-2 of size 28 a 56 symbols**
  - **FFS configuration of bitmap-1 and bitmap-2 pairs or other method by RMSI/OSI**

Agreements:

- **On the RB-symbol level, for a rate-matching resource set(s), NR supports at least UE specific RRC configuration of bitmap-3 in addition to bitmap-1 and bitmap-2 pair**
  - **A UE can be RRC configured with one bitmap-3 per each pair of bitmap-1 and bitmap-2**
    - **each bit in bitmap-3 corresponds to a unit equal to a duration of the bitmap-2, and indicates whether the pair is present in the unit or not**
    - **bitmap-3 is composed of {1, 5, 10, 20 or 40 units} but is at most of duration [down-select between 20 or 40 ms]**
      - **The lengh of bitmap-3 for different bitmap-1 and bitmap-2 pairs can be different.**
      - **When bitmap-3 length is 1, bitmap-3 is not explicitly configured.**
    - **the rate-matching configuration repeats in time with periodicity equal to duration of bitmap-3**
  - **A UE rate-matches around union of resources (i.e resrouce sets) where, each resource is expressed by a set of bitmap-1, bitmap-2 and bitmap-3.**
  - **FFS: whether the bitmap-3 is configured or not when the pair of bitmap-1 and bitmap-2 is associated with L1 signalling.**
- **Note: the bitmap-3 can be configured at least for the pair of bitmap-1 and bitmap-2 is not associated with L1 signalling.**
  - **FFS configuration of bitmap-3 or other method by RMSI/OSI**

Agreements:

- **On the RB-symbol-level, the pair(s) of bitmap-1 and bitmap-2 is/are configured:**
  - **UE can be configured with resource set(s)**
    - **Alt1: either only per cell or only per BWP**
    - **Alt2: no restriction**
  - **using common PRB indexing when configured per serving cell**
    - **the resource set is configured with a given numerology. FFS on conversion of the given numerology to numerology of the active BWP.**

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- using UE-specific PRB indexing when configured per BWP
  - the resource set is configured in numerology of a BWP.

[90b-NR-39] – Peter (Qualcomm)
R1-1719194 **WF on UL TDM in single Tx EN-DC** **Qualcomm, Vodafone**
Email discussion/approval till 10/27
Done: As per RAN1 chair's decision posted on Nov 6th, the following is agreed:
Agreements:

- **In Case 1, LTE TDD UL HARQ timing is supported and the UE is allowed to transmit only in the subframes designated as UL in the reference TDD configuration. Additionally, a UE-specific HARQ subframe offset can be configured.**
  - **The offset (HARQ_offset) is in the range [0…9]**
  - **The offset doesn't change any subframe or slot number**
  - **If, before applying the offset, the HARQ feedback for DL SF number m was mapped to UL SF number n, then after the offset, the HARQ feedback for DL SF number (m + HARQ_offset) is mapped to UL SF number (n + HARQ_offset)**
  - **If, before applying the offset, the PUSCH in SF number m was scheduled (by UL grant or PHICH) in SF number n, then after the offset, the PUSCH in SF number (m + HARQ_offset) is scheduled (by UL grant or PHICH) in SF number (n + HARQ_offset)**
  - **If, before applying the offset, the HARQ-ACK (if carried on PHICH) corresponding to PUSCH in SF number m was transmitted in SF number n, then after the offset, the HARQ-ACK (if carried on PHICH) corresponding to PUSCH in SF number (m + HARQ_offset) is transmitted in SF number (n + HARQ_offset)**
  - **SRS and PRACH transmission may only occur in subframes indicated as UL in the reference TDD configuration but shifted by the configured non-zero HARQ_offset**

[90b-NR-40] – Hyunseok (Samsung)
Email discussion on SRS power control framework until Oct 27th.
Done: As per RAN1 chair's decision posted on Nov 7th, the following is agreed:
Agreements: For SRS power control

$$P_{SRS,c}(i) = \{P_{CMAX,c}(i), P_{0\_SRS,c} + 10\log_{10}(M_{SRS,c}) + \alpha_{SRS,c} \cdot PL_c(k1) + h_{SRS,c}(i)\}$$

- **A unified power control equation is defined regardless of whether SRS is intended for DL/UL CSI acquisition or beam management as shown above.**
  - **FFS whether or not to introduce P_SRS_OFFSET,c**
  - **Note: the exact equation including the index of each parameter is up to the editor.**
- **Whether or not SRS power control is tied with corresponding PUSCH power control is based on RRC signaling and the following is down selected.**
  - **Alt.1: explicit configuration**
  - **Alt.2: implicit configuration by gNB implementation**
    - **e.g., gNB configures the same values for some parameters between PUSCH power control and SRS power control or the same association rule among P0_SRS,c, α_SRS,c, PL reference and closed-loop is applied for PUSCH and SRS power control**
    - **In Alt.2, no RRC configuration is needed for signaling the direct linkage between PUSCH and SRS power control**

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- FFS: details on the indication of the linkage via L1 signaling, e.g., using SRI in DCI, or an association rule among P0_SRS,c, α_SRS,c, PL reference and closed-loop applied for PUSCH and SRS power control

- The following are configured by RRC
  - FFS: P_SRS_OFFSET,c
  - P0_SRS,c
  - α_SRS,c
  - 'k1' which indicates DL reference RS(s) for PL estimation
    - FFS if the configuration of 'k1' can be optional.
  - FFS: P0_SRS,c; α _SRS,c; k1; h_SRS,c, P_SRS_OFFSET,c can be configured for each configured SRS resource in the SRS resource set or only per SRS resource set (if P_SRS_OFFSET,c is supported).
    - Configuration should support an option for common values for at least P0_SRS,c; k1; α _SRS,c, P_SRS_OFFSET,c to be applied for all the configured SRS resource(s) in the SRS resource set (if P_SRS_OFFSET,c is supported).
    - Note: it is not precluded that the same parameters are configured for multiple SRS resource sets by gNB configuration.
- For h_SRS,c(i),
  - At least the following can be configured by RRC for serving cell c on which the UE is configured with PUSCH
    - h_SRS,c(i) = fc(i,l) where l = 1, 2
    - FFS on the following
    - If h_SRS,c(i) = 0 is supported.
    - If additional closed loop is supported for SRS power control in case that SRS power control is tied with PUSCH power control.
    - h_SRS,c(i) in case that SRS power control is not tied with PUSCH power control
    - If both accumulative TPC and absolute TPC are supported for SRS power control
  - For serving cell c on which the UE is not configured with PUSCH
    - Closed-loop power control process for SRS is separately configured and not linked to closed-loop power control process for PUSCH of other serving cell(s) on which the UE is configured with PUSCH
- For PL estimation,
  - Each SRS resource set is associated with X1 DL reference signal(s) for PL estimation, FFS on if X1 can be more than 1
  - Maximum number of PL estimates to be maintained by UE is limited to X2, FFS on X2.
  - FFS: PL estimation associated with k1 should be kept unchanged per the configured SRS resource set
- It is assumed here that a UE expects the gNB to configure the same type of time-domain behavior (i.e., periodic, semi-persistent, or aperiodic) for all SRS resources in a SRS resource set.
  - This assumption need to be revisited based on discussion in other AI.
- Definition of M_SRS,c(j) will be discussed in Reno meeting
  - For further discussion, some examples are captured here assuming that M PRBs are allocated for both 15 kHz SCS and 120 kHz SCS
    - Alt.1: expressed in the number of PRBs based on 15 kHz regardless of number of PRBs allocated for SRS transmission
      - For 15 kHz SCS, Msrs,c(j) =M and for 120 kHz SCS, Msrs,c(j) =8M
    - Alt.2: expressed in terms of the number of PRBs allocated for SCS transmission
      - For 15 kHz SCS, Msrs,c(j) =M and for 120 kHz SCS, Msrs,c(j) =M
    - Alt.3: expressed in the number of PRBs based on 15 kHz SCS for sub-6GHz and based on 60 kHz SCS for above 6 GHz

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- **For 15 kHz SCS, Msrs,c(j) =M and for 120 kHz SCS, Msrs,c(j) =2M**

[90b-NR-41] – Yi (Qualcomm)
Email approval on how to configure beta_offset till 10/27
Done: As per RAN1 chair's decision posted on Nov 3rd, the following is agreed:

Agreements:

- **Three Beta_offset values are defined as one set, when HARQ-ACK piggyback on PUSCH.**
- **Three values are corresponding to the following cases:**
  - **The number of HARQ-ACK bits *OACK≤2***
  - **The number of HARQ-ACK bits falls into *[3]≤OACK≤[11]***
  - **The number of HARQ-ACK bits *OACK>[11]***

Agreements:

- **Four Beta_offset values are defined for CSI as one set, when CSI piggyback on PUSCH.**
- **Four values are corresponding to the following cases:**
  - **Regardless CSI type 1 or 2, the number of bits for CSI part 1 *OCSI_part1≤[11]***
  - **Regardless CSI type 1 or 2, the number of bits for CSI part 1 *OCSI_part1*>[11]**
  - **Regardless CSI type 1 or 2, the number of bits for CSI part 2 *OCSI_part2≤[11]***
  - **Regardless CSI type 1 or 2, the number of bits for CSI part 2 *OCSI_part2>[11]***

  Note: According to R1-1715288 and R1-1716901, CSI is always split into CSI part 1 and CSI part 2 when piggyback on PUSCH. (With CSI type 1, CSI part 2 does not exist when there is no PMI and with rank up to 4)

Agreements:

- **Semi-static Beta_offset indication is always applied with fallback DCI for UL assignment.**
  - **The Beta_offset values with semi-static Beta_offset indication could be different from with dynamic Beta_offset indication.**

Agreements:

- **Semi-static Beta-offset indication is the default configuration for non-fall back DCI for UL assignment.**
  - **The same sets of Beta_offset with fallback DCI are reused for HARQ-ACK and CSI respectively.**

Agreements:

- **If the UE is configured with dynamic Beta_offset and with non-fallback DCI for UL assignment, 4 sets of Beta_offset values are configured for HARQ-ACK and CSI respectively.**
  - **FFS: how to select one out of 4 sets of Beta_offset values**
    - **Alt1: 2 bits in the non-fallback DCI to indicate one out of 4 sets of Beta_offset values**
    - **Alt2: Implicit method to select one set of Beta_offset values based on other parameters signaled in DCI, e.g., MCS and/or rank of PUSCH.**

Agreements:

- **One table of Beta_offset values is used for HARQ-ACK in NR. Another table of Beta_offset values is used for both CSI part 1 and CSI part 2 in NR. Both tables contain 32 entries.**
- **For the table of Beta_offset values for HARQ-ACK in NR, reuse the 16 entries from table 8.6.3-1 in 36.213. Other unused entries in this table are marked as reserved.**

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- **For the table of Beta_offset values for both CSI part 1 and CSI part 2 in NR, reuse the 16 entries from table 8.6.3-3 in 36.213. Add the values 8, 10, 12.625, 15.875 and 20 to this table. Other unused entries in this table are marked as reserved.**

[90b-NR-42] – Nazmul (Qualcomm)
Email discussion on whether or not the same TA granularity should be applicable for all cases (based on the working assumption regarding TA for RAR) and if possible, the number of TA bits for MAC CE till 11/1
Done: As per RAN1 chair's decision posted on Nov 3rd, the following is agreed:
Agreements:

- **Maximum size of TA command for MAC-CE is 6 (as a working assumption) bits.**
- **For the timing advance in MAC-CE, its granularity depends on:**
  - **Subcarrier spacing of the UL BWP in the TAG that the TA in MAC-CE applies to, if there is only one configured UL BWP in the TAG, as shown in Table 1.**
  - **Following alternatives for multiple configured UL BWPs in ~~a~~ the TAG:**
    - **Alt 1: Maximum Subcarrier spacing of all semi-statically configured UL within the TAG, e.g., UL BWP, SUL, CC**
    - **Alt 2: Maximum SCS of all activated UL BWPs within the TAG**
    - **Alt 3: TA command or additional field in MAC-CE explicitly indicates the TA granularity used**
    - **Other alternatives are not precluded.**

Table 1: Granularity of 6 bits TA command for the case of single UL BWP

Subcarrier Spacing (kHz) of current UL BWP	Unit
15	16*64 Ts
30	8*64 Ts
60	4*64 Ts
120	2*64 Ts
Note: $T_s = 1/(64 * 30.72 * 10^6)$ *seconds*	

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Annex G: List of participants at RAN1 #90bis

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#91	WG	27 Nov – 01 Dec 2017	Reno	US
3GPPRAN1-AH-1801	AH	22 – 26 Jan 2018	Vancouver	Canada
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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