UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD., SAMSUNG ELECTRONICS AMERICA, INC.,
Petitioner

v.

APEX BEAM TECHNOLOGIES LLC,
Patent Owner.

U.S. Patent No. 10,568,113

Case No. IPR2023-00601

DECLARATION OF FRIEDHELM RODERMUND IN SUPPORT OF A PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 10,568,113

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I, Friedhelm Rodermund, do hereby declare as follows:

I. INTRODUCTION AND ENGAGEMENT

1. I have been retained in this matter by the Petitioner to provide testimony regarding the standard business practices of 3rd Generation Partnership Project ("3GPP") for record keeping and publishing technical specifications, change request proposals, reports, and other documents developed during the course of standards activities carried out by 3GPP and the European Telecommunications Standards Institute ("ETSI").

2. I have been asked to provide my opinions regarding the authenticity and dates of public accessibility of the following 3GPP documents:

- T-doc R1-1710596, which represents a 3GPP document with the title "Discussion of beam recovery procedure" (hereinafter "R1-1710596") (Ex. 1006)
- T-doc R1-1710078, which represents a 3GPP document with the title "Discussion on multi-beam operation for NR-PDCCH" (hereinafter "R1-1710078") (Ex. 1021)
- T-doc R1-1700771, which represents a 3GPP document with the title "On spatial QCL definition" (hereinafter "R1-1700771") (Ex. 1022)

3. As an ETSI Project Manager and Secretary, from June 1998 to December 2004, I have personal knowledge of 3GPP's standard business and records keeping practices. I continued following 3GPP's work ever since. Thus, based on my experience, personal knowledge, and review of 3GPP's business records, I am able to testify regarding the authenticity of certain documents published by 3GPP and the timing of their publication.

4. I am also knowledgeable about document management practices and the usage of email reflectors in 3GPP TSG RAN WG1. This is due to the fact that all 3GPP working groups used the same document repository on ftp.3gpp.org and all working groups use the same email exploder tool. Thus, I'm able to testify regarding the availability and authenticity of any 3GPP documents.

5. I am being compensated for my time spent on this matter at my usual rate of €450 per hour. My fee is not contingent on the outcome of this or any matter, or on the content of any of the testimony I give in this declaration. I have no financial interest in the Petitioner.

6. I have been informed that Apex Beam Technologies, LLC ("Apex Beam Technologies" or "Patent Owner") is the current assignee of U.S. Patent No. 10,568,113 ("the '113 Patent") (Ex. 1001). I have no financial interest in the Patent Owner or the '113 patent.

II. BACKGROUND AND QUALIFICATIONS

7. I have more than 20 years of experience working with standards development organizations including 3GPP, ETSI, and the Open Mobile Alliance ("OMA"). I have particular experience with the development of standards related to cellular telecommunications, including the standards for the Universal Mobile Telecommunications System ("UMTS"), Long Term Evolution ("LTE"), and 5G, which are all standards developed by the 3GPP.

8. I attended the University of Technology Aachen in Aachen, Germany, where I performed graduate studies in Electrical Engineering with a focus on telecommunications technologies ("Dipl.-Ing. TH" degree). I also attended the University of Technology Trondheim in Trondheim, Norway, and completed my Diploma thesis, "Design of a dual processor computer for digital signal processing in power electronics," in 1993.

9. From December 1993 to June 1998, I worked at Mannesmann Mobilfunk as a System Engineer and Project Manager in Quality Assurance and Technical Standards. One of my responsibilities was to ensure by managing and performing related test activities that cellular network equipment was compatible with the Global System for Mobile Communications ("GSM") standard developed by ETSI. During that time, I also started working as a standards delegate. I attended my first ETSI meeting in 1996 (although I was already following ETSI developments from 1992 during my studies).

10. From June 1998 to December 2004, I worked at ETSI as a project manager for various ETSI Special Mobile Group ("SMG") and 3GPP working groups. First, I served as a secretary of SMG4 "Data Services" and SMG8 "Base Stations Testing." Then, as a project manager with the ETSI Mobile Competence Center ("MCC"), I supported establishing 3GPP as the new international standards development organization for cellular telecommunications. One of my roles was acting as Secretary for 3GPP's Technical Specifications Group Terminals, Working Group ("T2"), the group which played a leading role in the creation of standards for Multimedia such as the Multimedia Messaging Service ("MMS").

11. Later, I was a secretary of the highest-level Technical Specifications Group Terminals which was besides other things responsible for the development of test specifications including tests for the radio interface.

12. I edited all technical specifications produced by my working groups and presented results to the parent body for approval. I attended all meetings (apart from some sub-working group meetings) and was also responsible for compiling meeting reports, for handling all the meeting documents, and managing the work plan. It was also my role to guide the groups and to advise the chairmen regarding 3GPP working methods and procedures including document handling, and to make sure delegates were aware of their company's obligations under the 3GPP Intellectual Property Rights policy.

13. As part of my responsibilities at ETSI, I acted as a 3GPP custodian of records by personally managing 3GPP's public File Transfer Protocol (ftp) folders, which I used to make publicly accessible various 3GPP documents, including versions of 3GPP specifications, technical reports, liaison statements, change requests, contributions, agendas, meeting reports, and other 3GPP documents from my working groups. I am also knowledgeable about document management practices used in other working groups and within 3GPP in general with regard to making documents publicly accessible through the same public ftp server of 3GPP.

14. Since I left ETSI as a staff member in 2005, I have been continuously involved in standardization activities, including with OMA, ETSI, and 3GPP. Since 2017, I also have been attending the ETSI Intellectual Property Rights ("IPR") Special Committee, which is responsible for the maintenance of the ETSI IPR Policy.

15. After I left ETSI, I worked from January 2005 to October 2014 at Vodafone, first as a Project Manager for Mobile Broadcast Standards, and then as Vice Chairman of the Device Management working group of the Open Mobile Alliance, and then as a Senior Standards Strategist, all with responsibilities as described on my curriculum vitae. At Vodafone, I was deeply involved in standards work with ETSI and 3GPP and other standards setting organizations, including as a delegate to 3GPP SA1 "Services." As part of my responsibilities, I attended selected

3GPP meetings, submitted documents to 3GPP, used 3GPP resources (including 3GPP's ftp server) extensively, and remained knowledgeable about 3GPP policies and procedures with regard to document management and public accessibility. I was also involved in the creation of patents, defense activities related to patent litigations, and patent evaluation, mostly in the context of standards development.

16. Since leaving Vodafone in 2014, I have performed consulting work regarding Internet of Things (IoT) and Machine to Machine (M2M) technology and standards, first at Friedhelm Rodermund Consulting and then as the Founder and Director of IOTECC GmbH. In connection with my work, I regularly deal with standards such as OMA's Lightweight M2M (LwM2M) and 3GPP's LTE, Narrowband IoT (NB-IoT) and 5G standards. And I have extensively used 3GPP resources and have remained knowledgeable about 3GPP policies and procedures with regard to document management and public accessibility.

17. I also provide consulting services related to patents, in particular around 3GPP Standard Essential Patents ("SEPs"), and I have worked as an expert witness on a number of occasions. I continue to closely follow the maintenance of the ETSI IPR Policy as a delegate to the ETSI IPR Special Committee. Furthermore, I am conducting a seminar on SEPs and the Internet of Things at the Technical University of Ilmenau, Germany.

18. At the time of writing this declaration, I am following – including attending selected meetings – the following standards committees: ETSI oneM2M, ETSI IPR Special Committee, OMA, and 3GPP.

19. A copy of my curriculum vitae, which includes a detailed description of my experience and education, is attached as Appendix A. A list of litigation matters on which I have worked over the last five years is also included in my curriculum vitae.

III. SUMMARY OF MY OPINIONS

20. It is my opinion that R1-1710596 (Ex. 1006) is an authentic 3GPP T-doc and would have been publicly accessible through ftp.3gpp.org no later than June 16, 2017.

21. It is my opinion that R1-1710078 (Ex. 1021) is an authentic 3GPP T-doc and would have been publicly accessible through ftp.3gpp.org no later than June 17, 2017.

22. It is my opinion that R1-1700771 (Ex. 1022) is an authentic 3GPP T-doc and would have been publicly accessible through ftp.3gpp.org no later than January 10, 2017.

IV. PUBLICATION OF 3GPP SPECIFICATIONS AND RELATED DOCUMENTS

A. General Practices

23. Unless otherwise noted, the foregoing and following is an accurate description of 3GPP general practices from 1998 to the present, including in 2017, regardless of whether I use the present or past tense to describe those practices.

24. 3GPP was established in 1998 by a group of telecommunications standard development organizations from Japan, Korea, China, Europe, and the United States to jointly develop worldwide standards for mobile telecommunications. Today, 3GPP consists of seven partners: Association of Radio Industries and Businesses, Japan ("ARIB"), Alliance for Telecommunications Industry Solutions, USA ("ATIS"), China Communications Standards Association ("CCSA"), European Telecommunications Standards Institute ("ETSI"), Telecommunications Standards Development Society, India ("TSDSI"), Telecommunications Technology Association, Korea ("TTA"), and Telecommunication Technology Committee, Japan ("TTC"). In addition to being one of the founding partners, ETSI hosts the Mobile Competence Centre ("MCC"), which provides administrative and technical support for the day-to-day work of 3GPP. Furthermore, ETSI manages 3GPP's IT services such as the 3GPP website, ftp server, and email exploders.

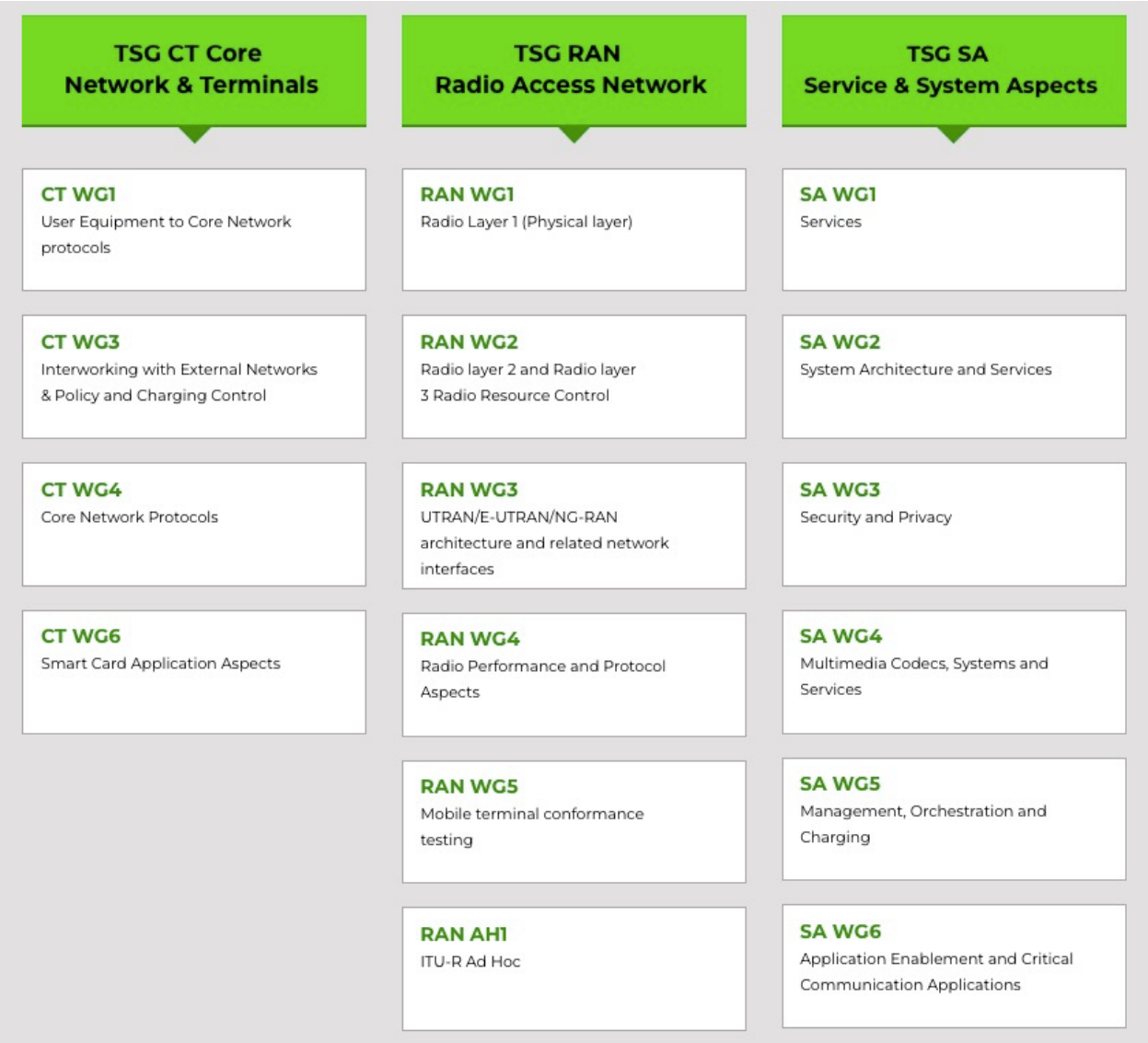
25. 3GPP is the world's leading organization for developing and maintaining cellular telecommunications standards, which it has done since its foundation in 1998. As noted above and in my curriculum vitae, I began working for 3GPP, as part of my work at ETSI, the European-based organizational partner of 3GPP.

26. In the ordinary course of its regularly conducted business activities, and pursuant to its standard business practices, 3GPP publishes technical specifications, proposals, reports, and other documents related to the development of cellular telecommunications standards. Such documents are published for the purposes of discussion and establishment of industry standards for cellular telecommunications. This has been 3GPP's ordinary course of business since when I began working at ETSI in 1998.

27. In the ordinary course of 3GPP's regularly conducted business activities, and pursuant to its standard business practices, all draft technical specifications, proposals, reports, and other temporary documents to be discussed or considered in relation to 3GPP's telecommunications standards activities were, and continue to be, assigned a temporary document number and made publicly available, including on the ftp server associated with the 3GPP website, currently residing at ftp.3gpp.org. Such documents are referred to as "T-docs." Final versions of the

technical specifications also were, and continue to be, publicly available from that same ftp server.

28. The names and the structure of 3GPP working groups, as of today, can be found at https://www.3gpp.org/3gpp-groups (reproduced below):



29. Each Technical Specification Group (TSG) or Working Group adopts a structured numbering system for the documents associated with their meetings,

and those systems typically follow a consistent numbering system as shown in the following example: xminnzzzz. The numbering system normally comprises five logical elements: (1) x: a single letter corresponding to the TSG; wherein in 2007/2008 x was one of R (Radio Access Network), C (Core and Terminals), S (Service and System Aspects), or G (GSM/EDGE Radio Access Network); (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 "-"; (4) nn: the calendar year of the meeting to which the document was submitted; and (5) zzzz: a running number (some working groups use 5 digits).

30. In the ordinary course of 3GPP's regularly conducted business activities, and pursuant to its standard business practices, from December 1998 onwards, 3GPP published all of its T-docs and all final versions of its technical specifications on its ftp server, which has always been easily and publicly accessible from its website and currently resides at ftp.3gpp.org.

31. As early as December 1998, including in 2017, 3GPP's ftp server was freely accessible to the general public with no login, password, or membership requirement.

32. By 1999, at least 100 companies were members of 3GPP (719 companies by December 2020), ranging from Bosch to Ericsson to Nokia to Samsung and generally including those interested in the discussion, creation, and

adoption of cellular telecommunications standards, including UMTS. Each of these companies typically delegated multiple individuals to regularly participate in 3GPP meetings. Further, pursuant to 3GPP's standard business practices, 3GPP working groups sent emails notifying these individuals as soon as new or additional documents had been uploaded to 3GPP's ftp server. Thus, not only did the general public have access to the documents on the ftp server, but some of the most interested members of the public—those working to develop standards for cellular telecommunication or working to implement the standards—were personally informed of their availability by email. Based on my experience with 3GPP and the telecommunications industry, I would expect any person implementing a cellular network or device, e.g., an LTE or 5G network, to consult the corresponding specifications on the 3GPP ftp server, as well as other related documents. The whole purpose of 3GPP creating and making these specifications available was so that engineers and other individuals would have ready access to them when developing and implementing cellular networks and devices.

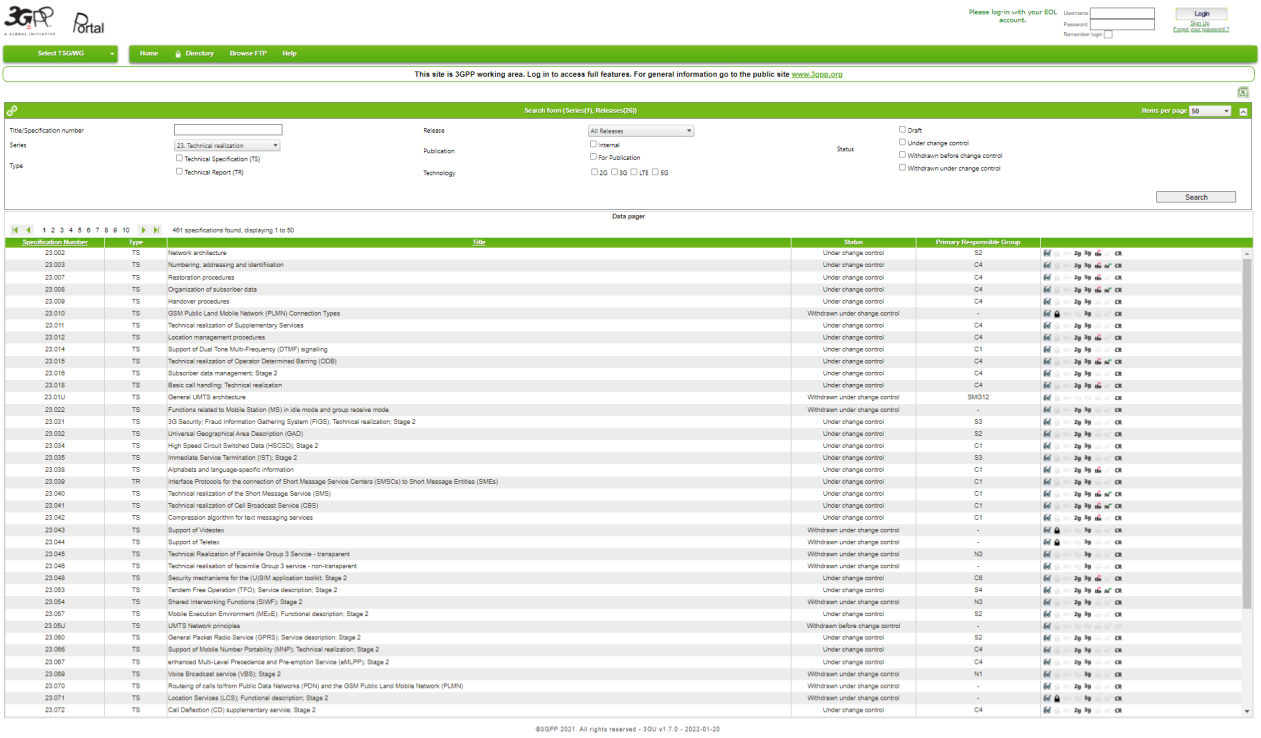
33. By June 1999, 3GPP's ftp server was well-known to persons in the cellular telecommunications industry as a source of public information regarding industry standards and technological advances.

34. 3GPP specifications bear a specification number consisting of four or five digits, e.g., 09.02 or 29.002. The first two digits define the specification series

which are defined to group the different aspects of the 3GPP system into, e.g., requirements, service aspects, radio aspects codecs, security aspects, and test specifications. The series digits are followed by two additional digits for the 01 to 13 series or three further digits for the 21 to 55 series. The subjects of the individual specification series are explained on 3GPP's website at https://www.3gpp.org/specifications-technologies/specifications-by-series, and reproduced below.

Subject of specification series	3G and beyond / GSM (R99 and later)	GSM only (Rel-4 and later)	GSM only (before Rel-4)
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		

35. Following a link for a series (e.g., "23 series" link) leads to a 3GPP web page providing access to all specifications in a series, as shown by the screenshot below:



36. As another example of a series, the LTE radio standard is covered in the "36 series" and is further subdivided into separate sections or specifications. The LTE radio specification series starts at TS 36.101 and ends at TR 36.978. Excluding withdrawn specifications, the LTE standard consists of more than 250 specifications.

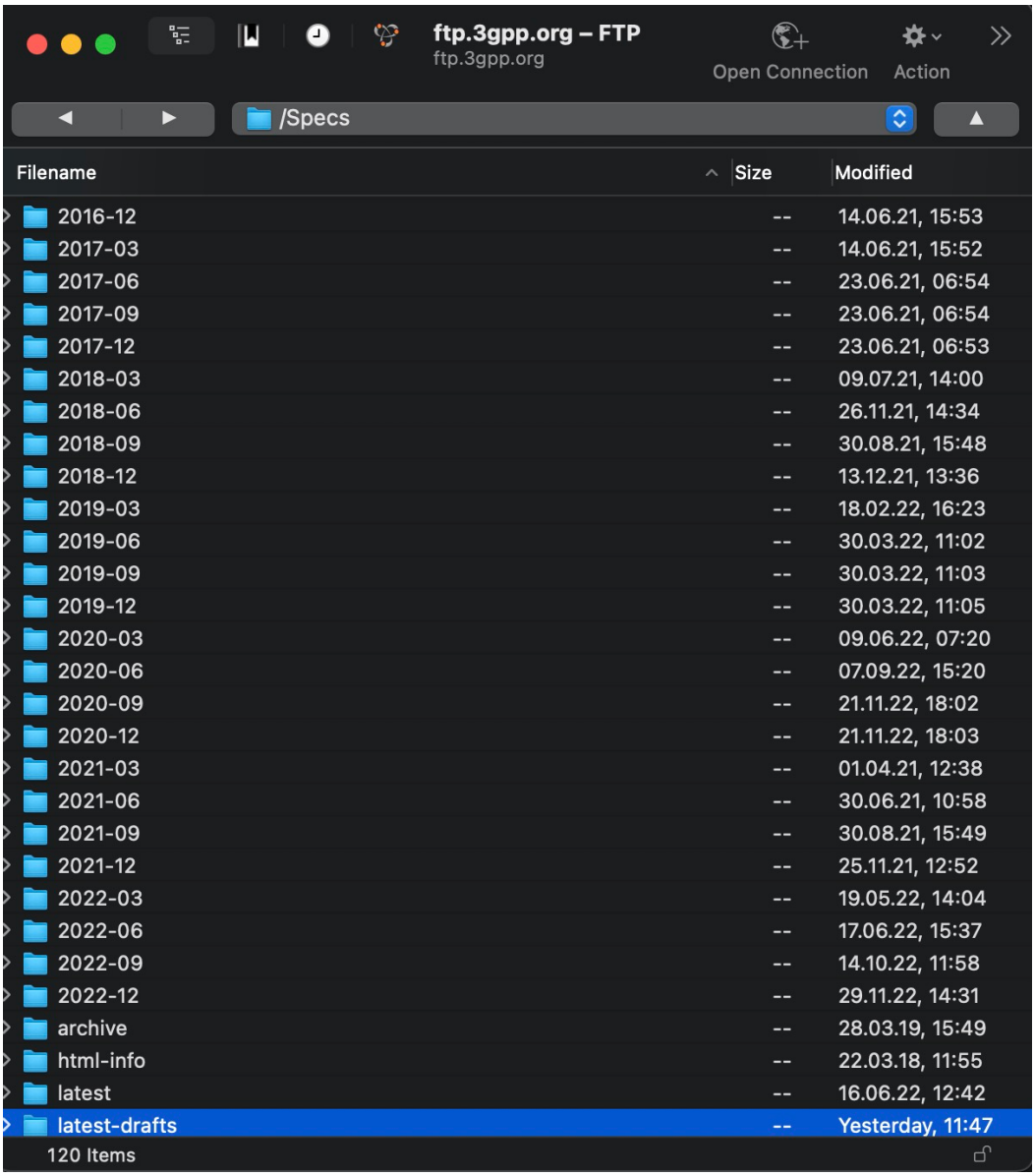
37. As another example of a series, the 5G New Radio (NR) standard is covered in the "38 series" and is further subdivided into separate sections or specifications. Selecting the "38 series" link on website shown in paragraph 33 leads to the 3GPP portal (portal.3gpp.org) page for all of the 38 series technical specifications.[1] These 5G NR specifications start at TS 38.101 and end at TR 38.921. Excluding withdrawn specifications, the 5G NR standard consists of more than 140 specifications. Each specification can span from a few pages to hundreds of pages. One full version of the 5G standard is massive, spanning tens of thousands of pages across the particular series of technical specifications.

38. In the ordinary course of 3GPP's regularly conducted business activities, and pursuant to its standard business practices, T-docs are usually uploaded to 3GPP's ftp server and website before the meeting where they are to be discussed. Documents created or revised during the course of a meeting are normally uploaded at the latest during the week following the meeting (e.g., the meeting report of the meeting is usually published for review during the week following the meeting).

[1] https://portal.3gpp.org/Specifications.aspx?q=1&series=45&releases=all&draft=False&underCC=False&withACC=False&withBCC=False&numberNYA=False

39. In the ordinary course of 3GPP's regularly conducted business activities, and pursuant to its standard business practices, 3GPP maintains archives that include different versions of the specifications, as well as email communications to its membership, including emails announcing the uploading of new or additional documents to 3GPP's ftp server. These archives are created at the time the emails are initially sent.

40. 3GPP specifications almost always are duplicated in at least two and sometime more locations on the ftp server. One location corresponds to a "snapshot" of the specifications corresponding to a particular plenary meeting cycle—for instance, the 2018-12 snapshot contains a snapshot of numerous specifications after the December 2018 3GPP plenary meetings. The second location is an "archive" that contains all versions over time for a given specification. The screenshot below shows an excerpt of the "Spec" folder at ftp.3gpp.org:



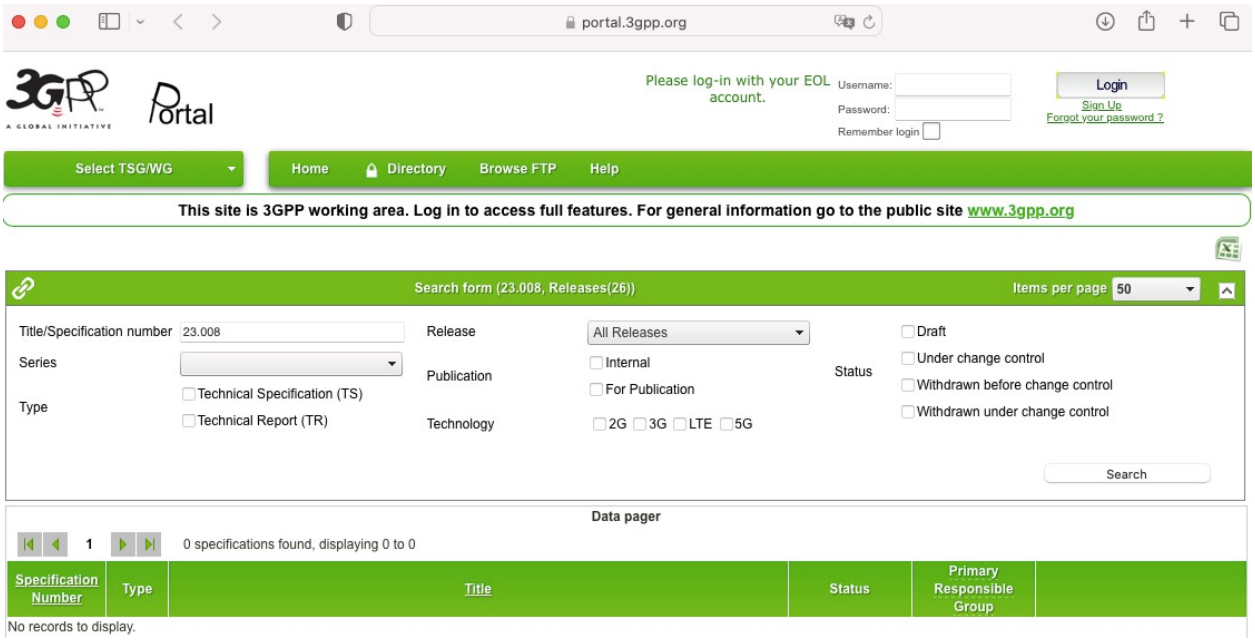
41. While 3GPP aims to upload the updated specifications to both locations at the same time, occasionally there may be a small difference in the upload date, and thus the date stamp, for the same specification uploaded to the two locations. Additionally, specifications which are not yet approved (so called "draft" specifications) are presented as T-docs at working group and at plenary meetings (as

soon as the working group decides to submit the specification to the plenary meeting for information or approval). In many cases, the T-docs are also distributed on the email exploder of the working group prior to the meeting, making the T-docs available to all those subscribed to the email distribution list.

42. The timestamp on 3GPP's ftp server shows the date when the document was uploaded the last time. Thus, the timestamp shows the latest possible date the document became publicly available and accessible on 3GPP's ftp server. The given document might have been available earlier and the original timestamp might have been overwritten because the document was uploaded again. According to my experience, this is something which happened occasionally. Thus, the ftp timestamp is reliable as the latest possible upload date but one cannot determine whether it represents the first upload of a document to the ftp server.

43. An additional means of accessing 3GPP documents including T-docs and specifications is the 3GPP portal. *See* https://portal.3gpp.org/Specifications.aspx. 3GPP preserves the posted document indefinitely on its server for future reference. *Id.* As detailed below, the 3GPP website provides the date that a particular version of a technical specification was uploaded, using the date convention YYYY-MM-DD. The 3GPP portal also provides a login function to unlock full features, however, login is not required for searching and downloading technical specifications. Based on my personal

experience, throughout the 2017 timeframe, anyone interested in a particular 3GPP specification could search the 3GPP portal to find and download the latest version of a technical specification using the 3GPP portal in substantially the same manner as they would today:



https://portal.3gpp.org/Specifications.aspx; *see, e.g.,* 2015 internet archive https://web.archive.org/web/20150924200802/https://portal.3gpp.org/.

44. 3GPP's working practice to store their documents on its ftp server, as described above, has not changed over time. Starting from the first 3GPP meetings in 1998 until present, all WGs and plenary meetings are represented by dedicated meeting folders on the ftp server. These meeting folders include the documents discussed at the meetings. Both the folders and the documents are accessible to the

public. Almost every week, a new meeting folder with the respective documents is added. In addition to the plenary and WG meeting folders, and some other folders, there is also the "Specs" folder, which holds all 3GPP specifications including the aforementioned "snapshot" and archive folders. Since the early days of 3GPP a new folder is added inside the "Specs" folder after each TSG plenary meeting to hold the latest versions of specifications approved at those TSG plenary meetings. This is still 3GPP's working practice today; thus, this practice has not changed over time.

45. 3GPP maintains a set of publicly accessible documents[2] providing further details on its way of working:

- 3GPP Working Procedures
- Vocabulary for 3GPP Specifications 3GPP TR 21.905
- Working Methods 3GPP TR 21.900
- Specification Drafting Rules 3GPP TR 21.801

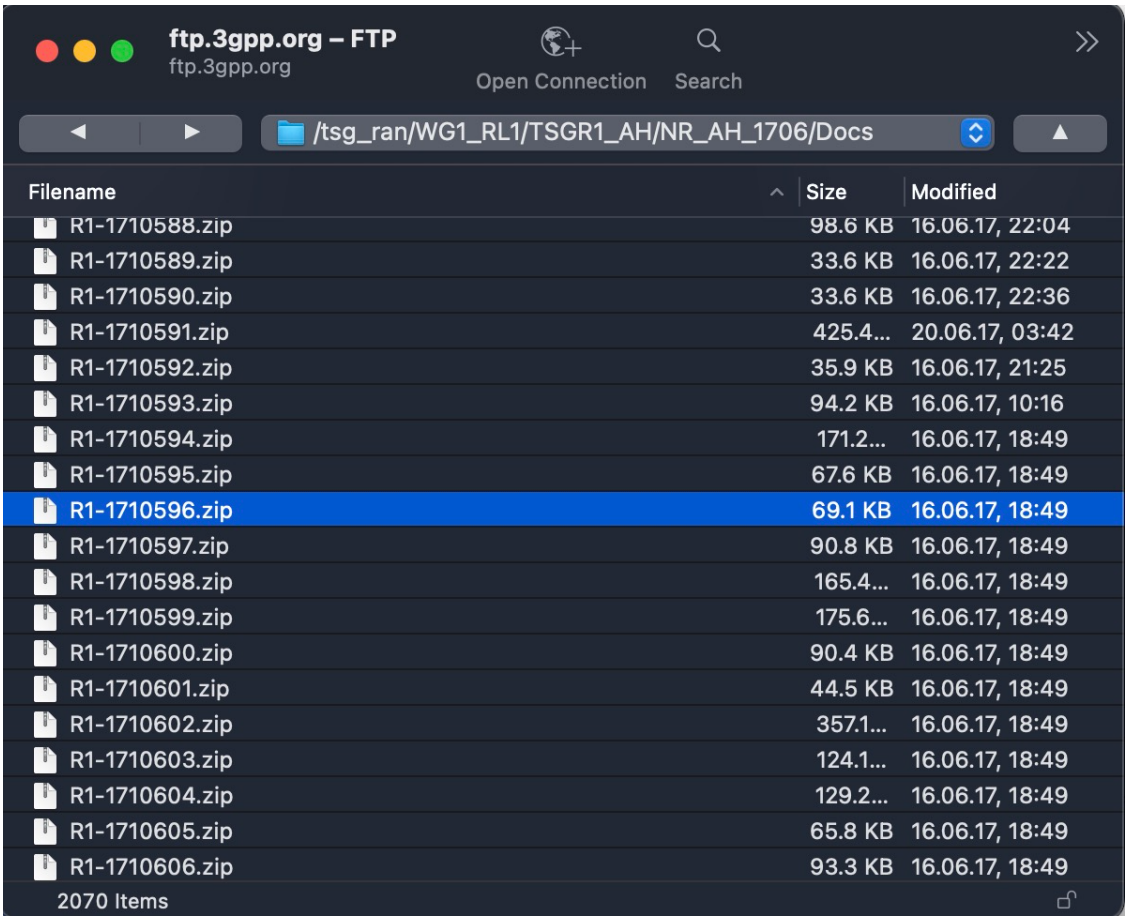
B. Specific Documents

1. T-doc R1-1710596

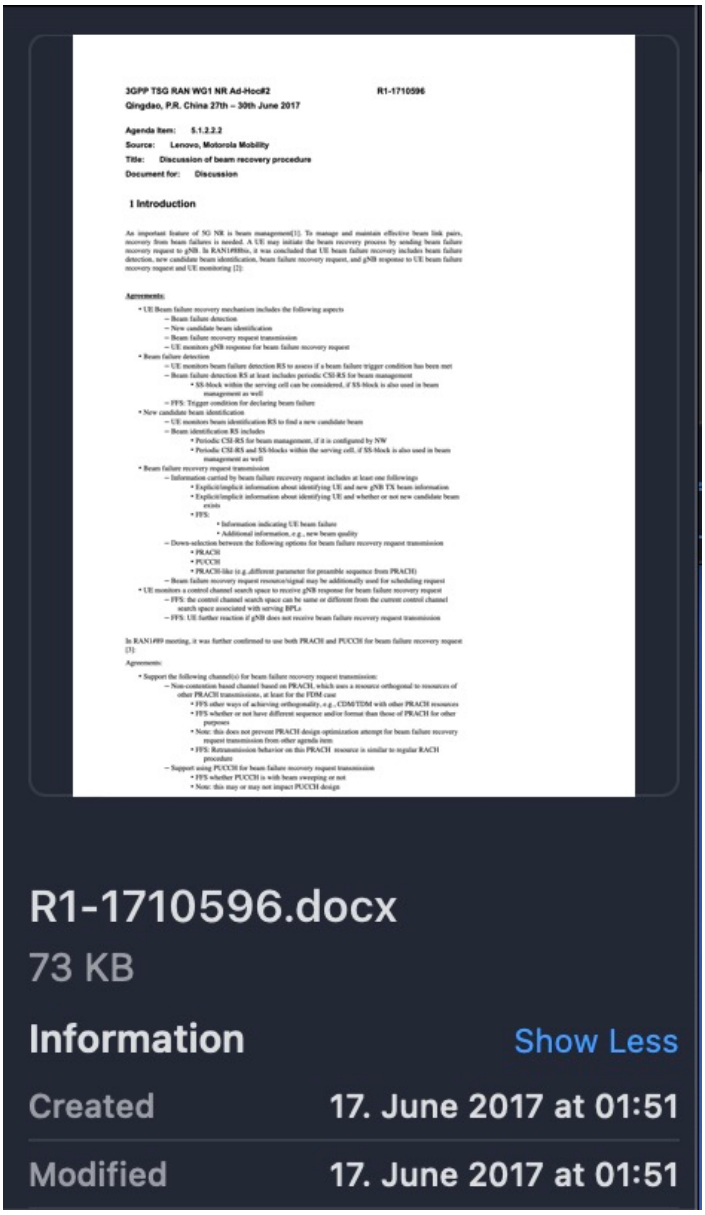
46. Based on my personal knowledge and my review of 3GPP's business records, I recognize Ex. 1006 as a true and correct copy of 3GPP T-doc R1-

[2] All available from https://www.3gpp.org/delegates-corner/3gpp-working-procedures

1710596, which represents a 3GPP document with the title "Discussion of beam recovery procedure." The document was authored by Lenovo and Motorola Mobility and it covered agreements, open issues and proposals related to recovery from beam failure. On its face, R1-1710596 refers to the RAN WG1 NR (New Radio) Ad-Hoc meeting #2 held on June 27-30, 2017, in Qingdao, China. Thus, based on my personal knowledge and experience with ETSI's and 3GPP's standard business practices, this information tells me that R1-1710596 was available either prior to or during that meeting to at least all attending 3GPP members. The public availability of the document is confirmed by the date stamp, June 16, 2017, shown on the historic 3GPP ftp server for the corresponding downloadable file ("R1-1710596.zip"), as maintained by the Internet Archive at https://web.archive.org/web/20170629164646/http://www.3gpp.org:80/ftp/TSG_RAN/WG1_RL1/TSGR1_AH/NR_AH_1706/Docs/. This information is also shown on the date stamp for the present-day listing of the same document on the 3GPP ftp server at https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_AH/NR_AH_1706/Docs/ as shown in the screenshot below:

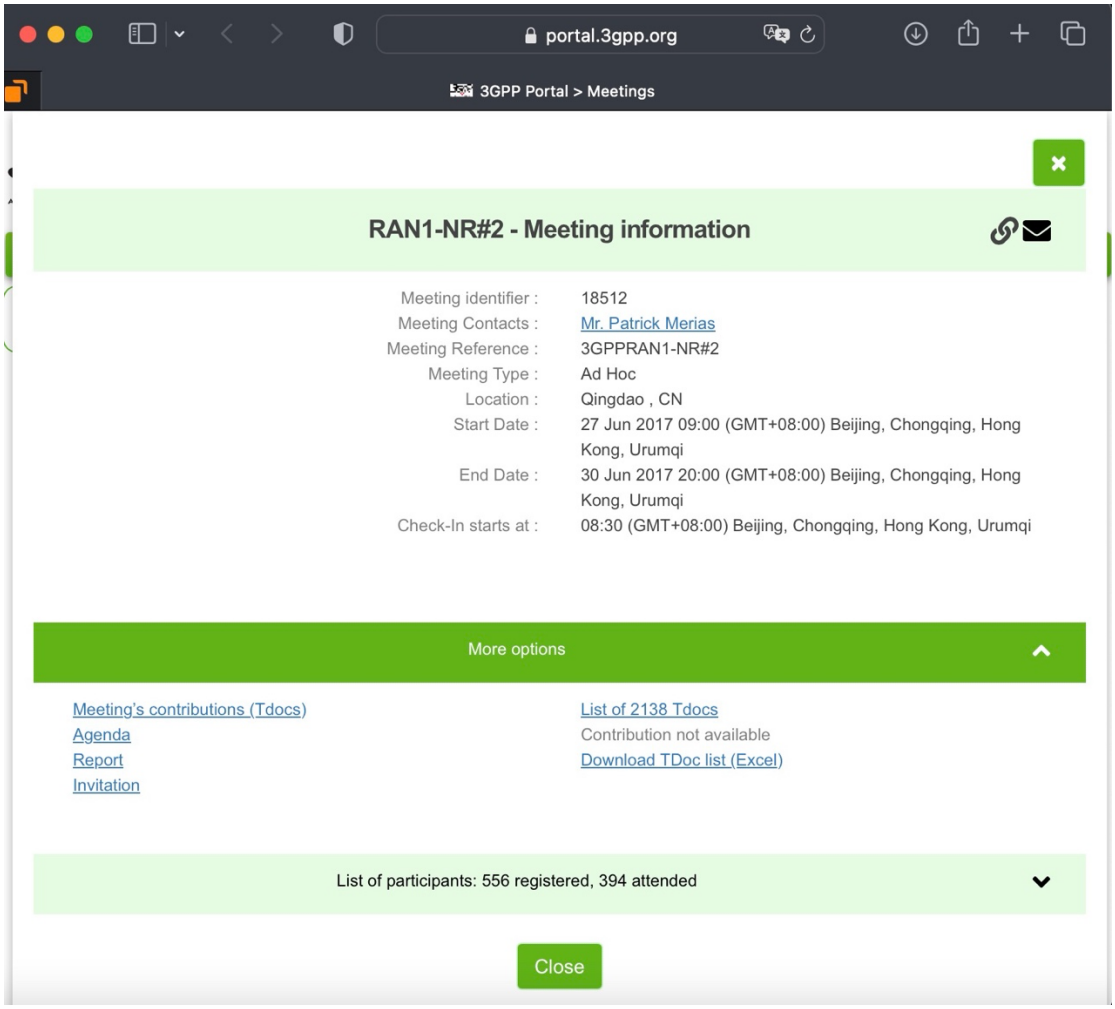


47. In addition, metadata information for the downloaded and extracted T-doc file states a last Modified date of "17. June 2017," as shown in the screenshot below. The reason why the upload seems to have occurred earlier than the last modification is because this happened across different time zones. E.g. modification and upload might have been performed early on June 17 in Asia whereas in Europe (where ETSI's FTP server is located) it was still June 16.



48. The official meeting report of the RAN WG1 NR (New Radio) Ad-Hoc #2 held on June 27-30, 2017, can be found in Appendix B. According to the 3GPP website at https://portal.3gpp.org/Meetings.aspx#/ which is shown by the screenshot

below, that meeting was attended by 394 individuals (out of 556 registered participants):



49. The meeting report includes in the zip file the meeting's document list of which an excerpt can be found in Appendix C[3]. R1-1710596 is listed in row 718 and is tagged as "available" which clearly shows the document was available at the

[3] Given the size of the document list with over 2000 rows (documents) and over 30 columns the Appendix only includes the columns relevant for this declaration: TDoc, Title, Source, TDoc Status, Reservation date, Uploaded.

meeting. Furthermore, the "Upload" date is shown as "2017-06-15" as can be seen by the screenshot below:

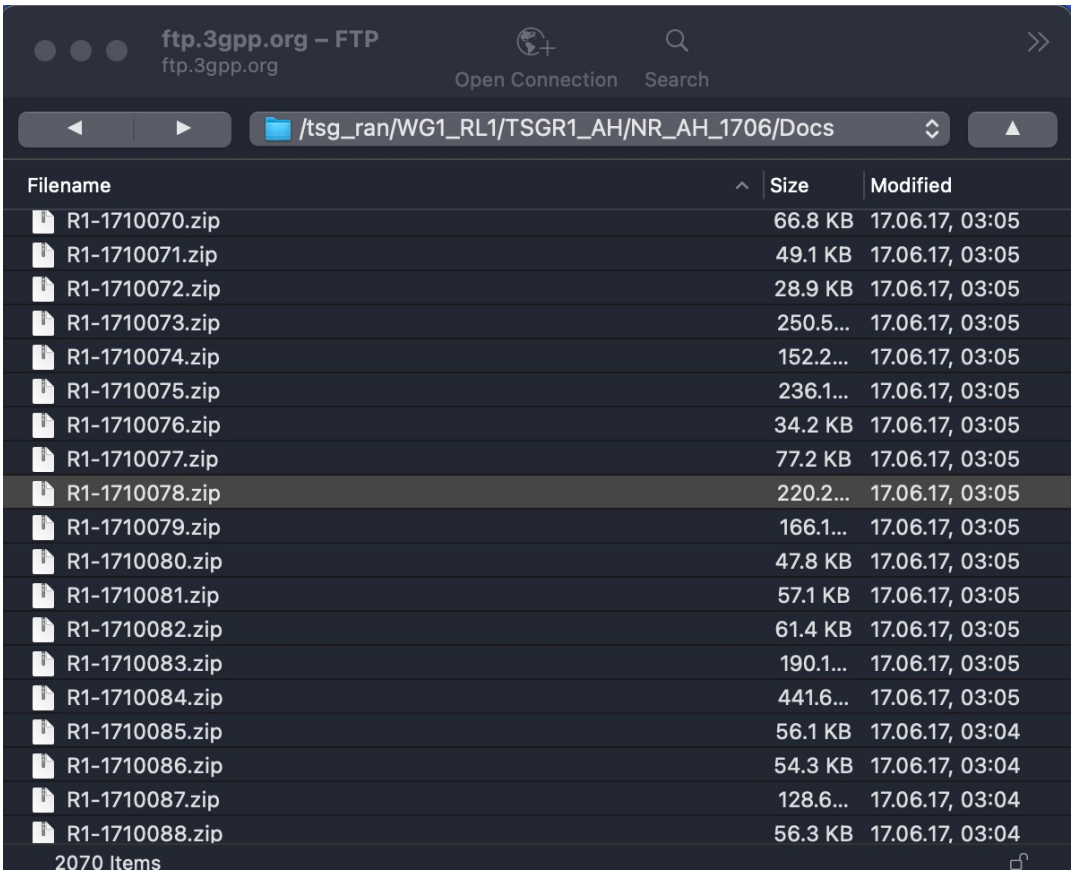
	A	B	N	O	P
1	TDoc	Title	TDoc Status	Reservation date	Uploaded
718	R1-1710596	Discussion of beam recovery procedure	available	2017-06-15 02:53:58	2017-06-16 18:49:37

50. Thus, based on my personal knowledge and experience with ETSI's and 3GPP's standard business practices, this information tells me that this document was available via the public 3GPP ftp server by June 16, 2017, at the latest.

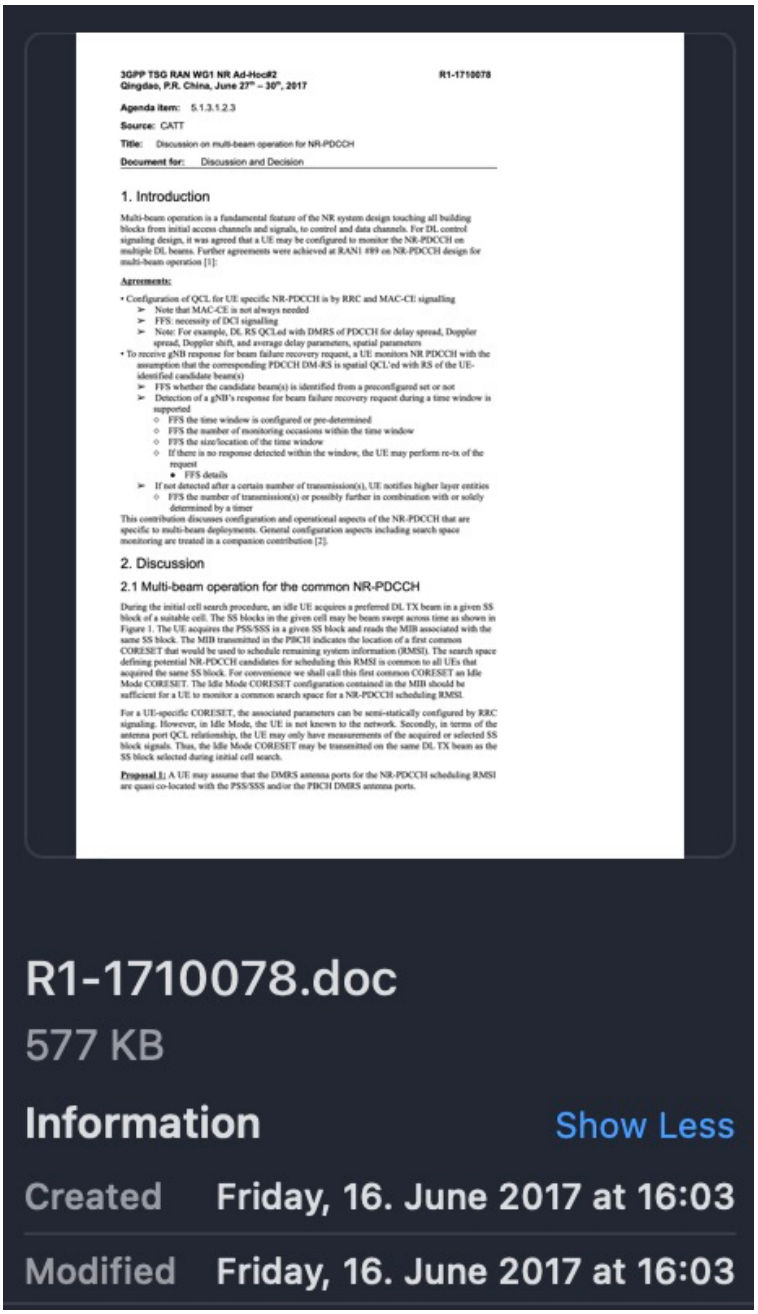
2. T-doc R1-1710078

51. Based on my personal knowledge and my review of 3GPP's business records, I recognize Ex. 1021 as a true and correct copy of 3GPP T-doc R1-1710078, which represents a 3GPP document with the title "Discussion on multi-beam operation for NR-PDCCH." The document was authored by CATT and it covered agreements, open issues for discussion and proposals related to multi-beam operation for NR-PDCCH. On its face, R1-1710078 refers to the RAN WG1 NR (New Radio) Ad-Hoc meeting #2 held on June 27-30, 2017, in Qingdao, China. Thus, based on my personal knowledge and experience with ETSI's and

3GPP's standard business practices, this information tells me that R1-1710596 was available either prior to or during that meeting to at least all attending 3GPP members. The public availability of the document is confirmed by the date stamp, June 17, 2017, shown on the historic 3GPP ftp server for the corresponding downloadable file ("R1-1710078.zip"), as maintained by the Internet Archive at https://web.archive.org/web/20170629164646/http://www.3gpp.org:80/ftp/TSG_RAN/WG1_RL1/TSGR1_AH/NR_AH_1706/Docs/. This information is also shown on the date stamp for the present-day listing of the same document on the 3GPP ftp server at https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_AH/NR_AH_1706/Docs/ as shown in the screenshot below:



52. In addition, metadata information for the downloaded and extracted T-doc file states a last Modified date of "16. June 2017," as shown in the screenshot below:



3GPP TSG RAN WG1 NR Ad-Hoc#2 R1-1710078
Qingdao, P.R. China, June 27th – 30th, 2017

Agenda item: 5.1.3.1.2.3
Source: CATT
Title: Discussion on multi-beam operation for NR-PDCCH
Document for: Discussion and Decision

1. Introduction

Multi-beam operation is a fundamental feature of the NR system design touching all building blocks from initial access channels and signals, to control and data channels. For DL control signaling design, it was agreed that a UE may be configured to monitor the NR-PDCCH on multiple DL beams. Further agreements were achieved at RAN1 #89 on NR-PDCCH design for multi-beam operation [1]:

Agreements:

- Configuration of QCL for UE specific NR-PDCCH is by RRC and MAC-CE signalling
  - Note that MAC-CE is not always needed
  - FFS: necessity of DCI signalling
  - Note: For example, DL RS QCLed with DMRS of PDCCH for delay spread, Doppler spread, Doppler shift, and average delay parameters, spatial parameters
- To receive gNB response for beam failure recovery request, a UE monitors NR PDCCH with the assumption that the corresponding PDCCH DM-RS is spatial QCL'ed with RS of the UE-identified candidate beam(s)
  - FFS whether the candidate beam(s) is identified from a preconfigured set or not
  - Detection of a gNB's response for beam failure recovery request during a time window is supported
    - FFS the time window is configured or pre-determined
    - FFS the number of monitoring occasions within the time window
    - FFS the size/location of the time window
    - If there is no response detected within the window, the UE may perform re-tx of the request
      - FFS details
  - If not detected after a certain number of transmission(s), UE notifies higher layer entities
    - FFS the number of transmission(s) or possibly further in combination with or solely determined by a timer

This contribution discusses configuration and operational aspects of the NR-PDCCH that are specific to multi-beam deployments. General configuration aspects including search space monitoring are treated in a companion contribution [2].

2. Discussion

2.1 Multi-beam operation for the common NR-PDCCH

During the initial cell search procedure, an idle UE acquires a preferred DL TX beam in a given SS block of a suitable cell. The SS blocks in the given cell may be beam swept across time as shown in Figure 1. The UE acquires the PSS/SSS in a given SS block and reads the MIB associated with the same SS block. The MIB transmitted in the PBCH indicates the location of a first common CORESET that would be used to schedule remaining system information (RMSI). The search space defining potential NR-PDCCH candidates for scheduling this RMSI is common to all UEs that acquired the same SS block. For convenience we shall call this first common CORESET an Idle Mode CORESET. The Idle Mode CORESET configuration contained in the MIB should be sufficient for a UE to monitor a common search space for a NR-PDCCH scheduling RMSI.

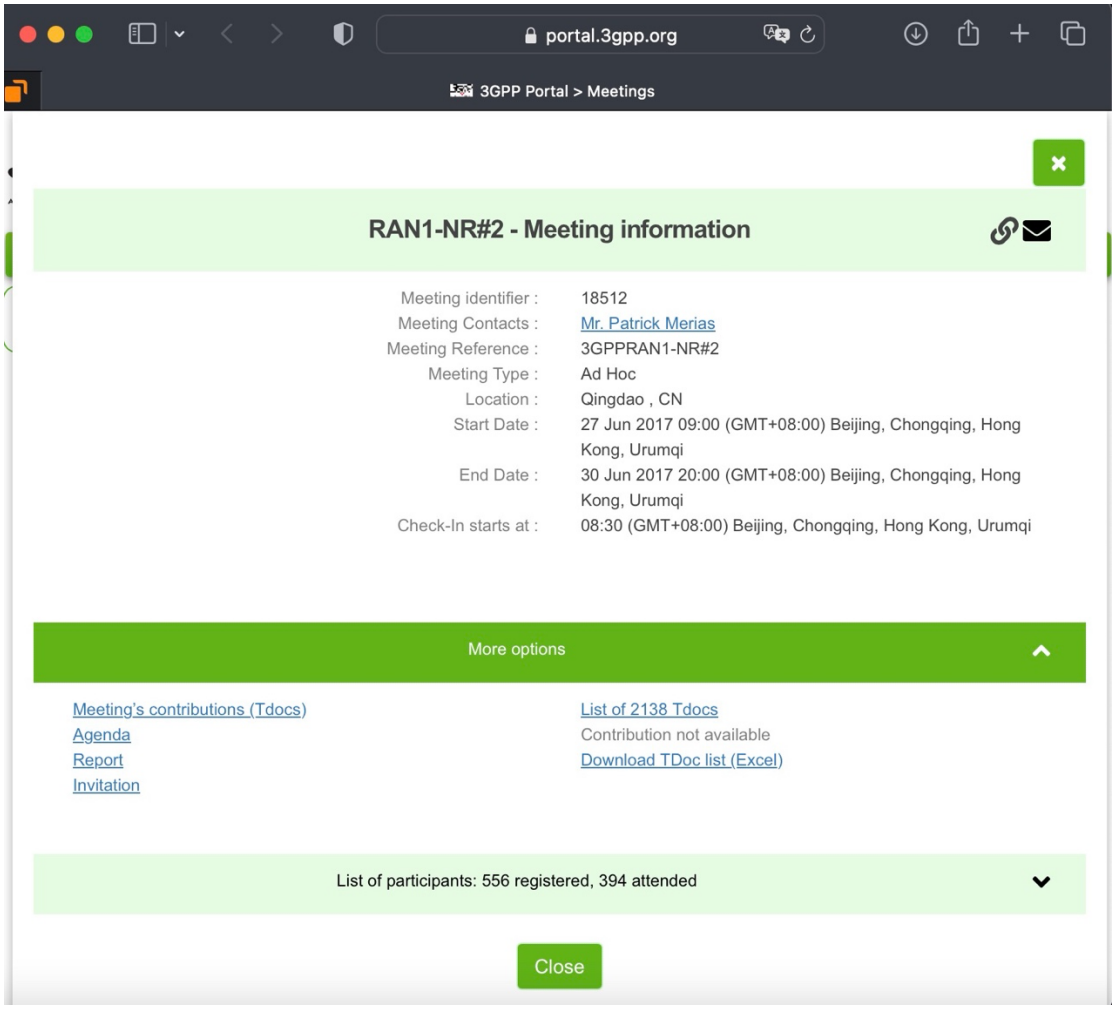
For a UE-specific CORESET, the associated parameters can be semi-statically configured by RRC signaling. However, in Idle Mode, the UE is not known to the network. Secondly, in terms of the antenna port QCL relationship, the UE may only have measurements of the acquired or selected SS block signals. Thus, the Idle Mode CORESET may be transmitted on the same DL TX beam as the SS block selected during initial cell search.

Proposal 1: A UE may assume that the DMRS antenna ports for the NR-PDCCH scheduling RMSI are quasi co-located with the PSS/SSS and/or the PBCH DMRS antenna ports.

R1-1710078.doc
577 KB
Information Show Less
Created Friday, 16. June 2017 at 16:03
Modified Friday, 16. June 2017 at 16:03

53. The official meeting report of the RAN WG1 NR (New Radio) Ad-Hoc #2 held on June 27-30, 2017, can be found in Appendix B. According to the 3GPP website at https://portal.3gpp.org/Meetings.aspx#/ which is shown by the

screenshot below, that meeting was attended by 394 individuals (out of 556 registered participants):



54. The meeting report includes in the zip file the meeting's document list of which an excerpt can be found in Appendix C[4]. R1-1710078 is listed in row 200 and is tagged as "available" which clearly shows the document was available at the

[4] Given the size of the document list with over 2000 rows (documents) and over 30 columns the Appendix only includes the columns relevant for this declaration: TDoc, Title, Source, TDoc Status, Reservation date, Uploaded.

meeting. Furthermore, the "Upload" date is shown as "2017-06-17" as can be seen by the screenshot below:



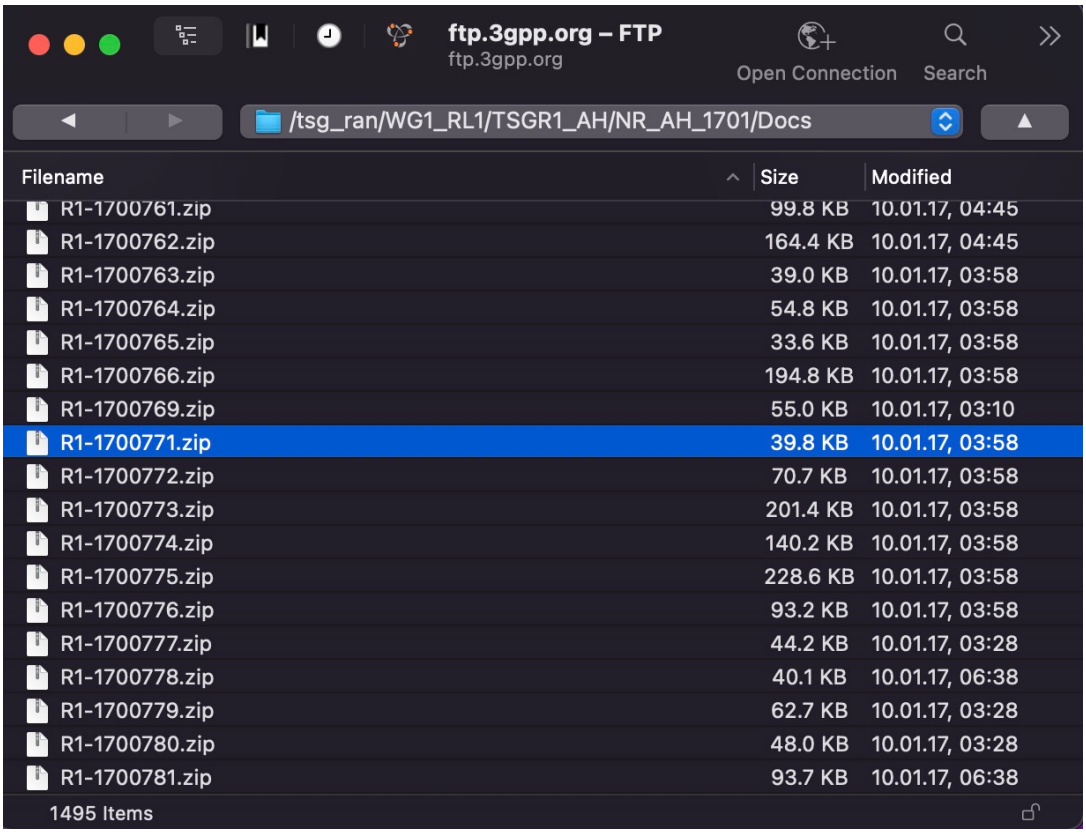
	A	B	N	O	P
1	TDoc	Title	TDoc Status	Reservation date	Uploaded
200	R1-1710078	Discussion on multi-beam operation for NR-PDCCH	available	2017-06-09 04:09:16	2017-06-17 03:10:44

55. Thus, based on my personal knowledge and experience with ETSI's and 3GPP's standard business practices, this information tells me that R1-1710078 was available via the public 3GPP ftp server by June 17, 2017, at the latest.

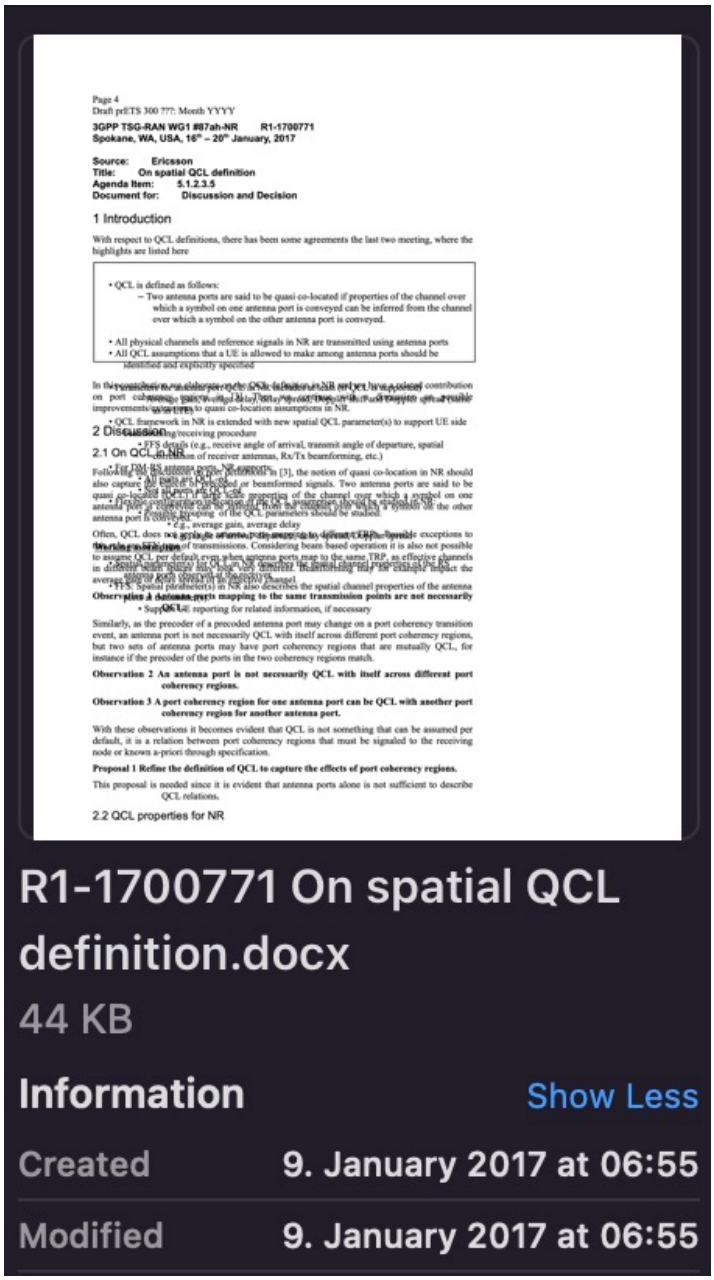
3. T-doc R1-1700771

56. Based on my personal knowledge and my review of 3GPP's business records, I recognize Ex. 1022 as a true and correct copy of 3GPP T-doc R1-1700771, which represents a 3GPP document with the title "On spatial QCL definition." The document was authored by Ericsson and it elaborated on the QCL (quasi co-located) definition for 5G New Radio. On its face, R1-1700771 refers to the RAN WG1 "ah-NR" (Ad Hoc–New Radio) meeting held on January 16-20, 2017, in Spokane, USA. Thus, based on my personal knowledge and experience

with ETSI's and 3GPP's standard business practices, this information tells me that R1-1700771 was available either prior to or during that meeting to at least all attending 3GPP members. The public availability of the document is confirmed by the date stamp, January 10, 2017, shown on the historic 3GPP ftp server for the corresponding downloadable file ("R1-1700771.zip"), as maintained by the Internet Archive at https://web.archive.org/web/20170217064446/http://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_AH/NR_AH_1701/Docs. This information is also shown on the date stamp for the present-day listing of the same document on the 3GPP ftp server at https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_AH/NR_AH_1701/Docs as shown in the screenshot below:



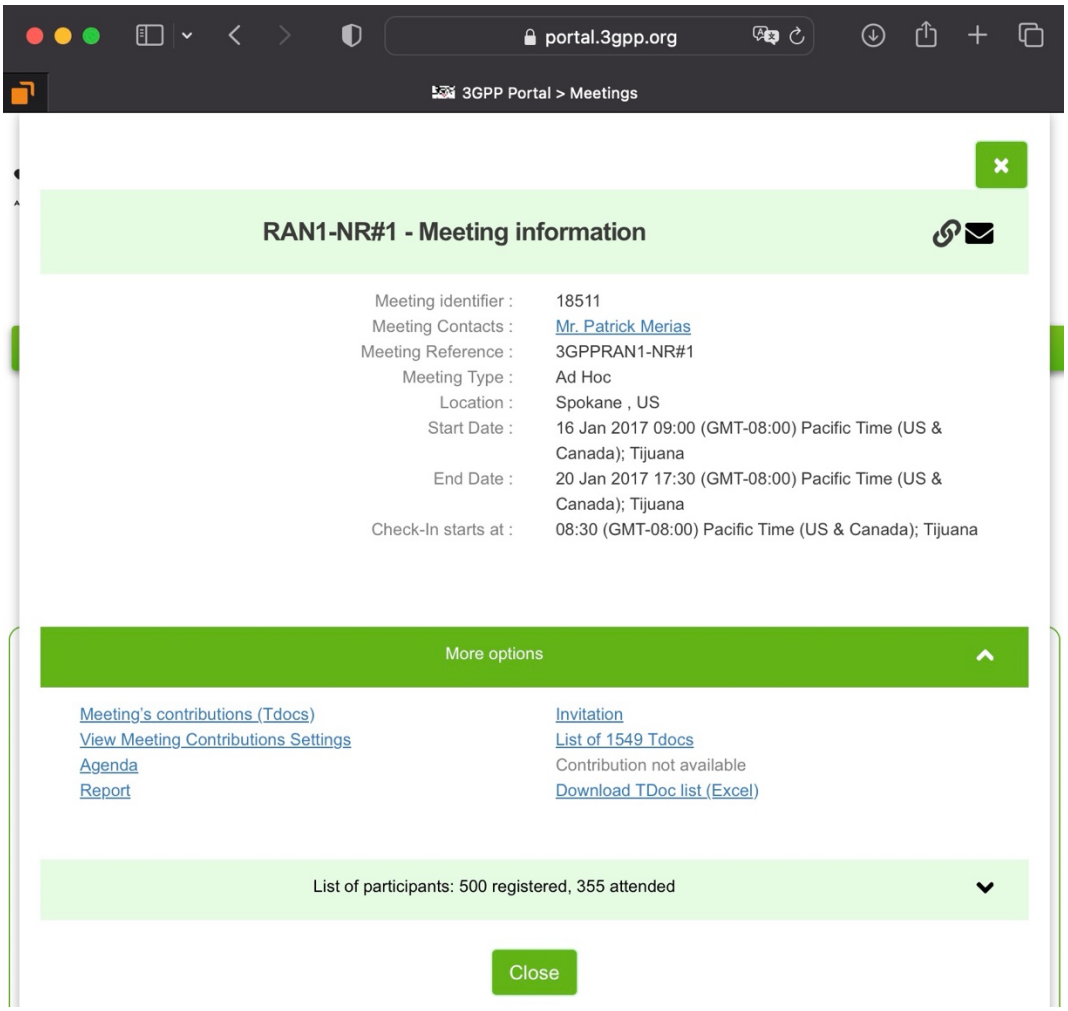
57. In addition, metadata information for the downloaded and extracted T-doc file states a last Modified date of "9. January 2017," as shown in the screenshot below:



58. The official meeting report of the RAN WG1 #AH1_NR[5] meeting held on January 16-20, 2017, can be found in Appendix D According to the 3GPP

[5] This is the official name of the meeting. The header of T-doc R1-1700771 shows a slightly different writing of the meeting name but refers nevertheless to the same

website at https://portal.3gpp.org/Meetings.aspx#/ which is shown by the screenshot below, that meeting was attended by 355 individuals (out of 500 registered participants):



meeting. This becomes clear by looking at the document list of the RAN WG1 #AH1_NR meeting which includes R1-1700771 as shown in paragraph 63.

The meeting report includes in the zip file the meeting's document list of which an excerpt can be found in Appendix E[6]. R1-1700771 is listed in row 772 and is tagged as "available" which clearly shows the document was available at the meeting. Furthermore, the "Uploaded" date is shown as "2017-01-10" as can be seen by the screenshot below:

	A	B	O	P	Q
1	TDoc #	Title	TDoc Status	Reservation date	Uploaded
772	R1-1700771	On spatial QCL definition	available	2017-01-07 07:55:29	2017-01-10 03:58:17

59. Thus, based on my personal knowledge and experience with ETSI's and 3GPP's standard business practices, this information tells me that R1-1700771 was available via the public 3GPP ftp server by January 10, 2017, at the latest.

V. AVAILABILITY FOR CROSS-EXAMINATION

60. In signing this declaration, I recognize that the declaration may be filed as evidence in a contested case before the Patent Trial and Appeal Board of the United States Patent and Trademark Office. I also recognize that I may be subject to

[6] Given the size of the document list with around 1500 rows (documents) and over 30 columns the Appendix only includes the columns relevant for this declaration: TDoc, Title, Source, TDoc Status, Reservation date, Uploaded.

cross examination in the case and that cross examination will take place within the United States. If cross examination is required of me, I will cooperate to the best of my ability to appear for cross examination within the United States during the time allotted for cross examination.

A. Right To Supplement

61. I reserve the right to supplement my opinions in the future to respond to any arguments that the Patent Owner raises and to take into account new information as it becomes available to me.

B. Signature

62. I 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 willful 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.

63. I declare under penalty of perjury that the foregoing is true and correct.

Dated: February 28, 2023

Friedhelm Rodermund

Appendix A

CURRICULUM VITAE

I. PERSONAL DATA

Name: **Friedhelm RODERMUND**

Mailing address: Am Steiner Graben 18
56077 Koblenz, Germany

Phone: +49 172 2606489

Email: fred@iotecc.com

II. PROFESSIONAL EXPERIENCE

Summary

Senior expert in telecommunications and Internet of Things (IoT) technology. 25 years of experience within the mobile communications industry, and several years in the IoT domain in various roles such as project management, technology innovation and evolution, standards development, technology strategy, patent creation and patent litigations, and development/introduction of new services.

Recognized standards expert who was actively involved in leading roles in the development of key standards for mobile telephony/data and service anablers across standards development organizations such as 3GPP, ETSI, GSMA, IETF, OMA, and oneM2M. Currently focussing on standards for the Internet of Things.

Founder and director of IOTECC GmbH which provides consulting services around technologies and standards enabling the Internet of Things, and consulting and expert services related to patents for mobile telcommunications and IoT.

01/2015 – present **IOTECC GmbH** **Koblenz, Germany**

Founder and CEO

- Mobile telecommunications, Internet of Things (IoT) technology and standards consulting
- Telecommunications and IoT patent consulting
  - Consulting services around telecommunications and IoT patents in particular related to 3GPP, ETSI and OMA standards
  - State of the art/prior art research services related to patent creation e.g. for new 5G patents
  - Prior art research, essentiality assessment, patent infringement analysis related to litigations and validity actions
  - Advising on IP strategy
  - Advising on Standards Development Organisations (SDO) working processes and IPR policy
  - Experienced expert witness (please see section III for a list of supported actions)

11/2014 – 12/2014 **Friedhelm Rodermund Consulting** **Koblenz, Germany**

Internet of Things (IoT) Consultant

- IoT standards development and introduction of new IoT services

01/2011 – 10/2014 **Vodafone Germany / Vodafone Group R&D** **Düsseldorf, Germany**

Senior Standards Strategist
- Representing Vodafone in various standardisation bodies
- Creating technical standards for the Internet of Things
- Work item lead, technical editor and key contributor of Open Mobile Alliance (OMA) "Lightweight M2M (LwM2M)" – the new standard for the Internet of Things
- Advising and supporting various IoT/M2M projects related to e.g. automotive, smart metering, health, industry
- Advising on the introduction of new IoT/M2M technologies and services
- Leading Proof of Concepts of emerging technologies
- Involved in innovation projects
- Supporting the creation and protection of Intellectual Property

01/2009 – 12/2010 **Vodafone Germany** **Düsseldorf, Germany**

Vice Chairman Open Mobile Alliance (OMA) Device Management (DM)
- Responsible for Vodafone's Device Management standardisation
- As OMA DM Vice Chairman, co-leading the group, chairing committee meetings and web conferences, steering the technical direction, management of the different work items
- Editor of several specifications, rapporteur of various work items
- Support of projects for the introduction of device management
- Delegate to 3GPP SA1 with responsiblity for the introduction of MTC (machine type communications) related service/network requirements

01/2005 – 12/2008 **Vodafone Germany** **Düsseldorf, Germany**

Project Manager Mobile Broadcast Standards
- Responsible for Mobile Broadcast standardisation across different broadcast systems/standards bodies and across all Vodafone local operations
- Responsible for Mobile Broadcast standardisation strategy development and implementation
- Delegation Lead for the Open Mobile Alliance (OMA) BCAST working group
- Initiated and managed the BCAST device profile development in the BMCO Forum
- Leading the "Service Protection" (pay-TV) stream of the German DVB-H Consortium
- Filed several patents
- Supporting patent litigations and patent portfolio evaluation (various technical areas)

04/2003 – 12/2003 **GSM Association** **London, United Kingdom**

Member of the MMS Task Force
- Verification of the MMS operator interworking framework
- Supporting the definition and specification of the MMS functional evolution
- Acting as a "link" between 3GPP and GSMA in the area of MMS

06/1998 – 12/2004 **European Telecommunications Standards Institute (ETSI)**
Sophia Antipolis, France

01/2002 – 12/2004: Secretary 3GPP Technical Specifications Group *"Terminals"* and Terminals Working Group 2 *"Terminal Services and Capabilities"*

01/1999 – 12/2001: Secretary 3GPP Terminals Working Group 2 *"Terminal Services and Capabilities"* and GERAN 3 *"Base Station Testing"*

06/1998 – 03/1999: Secretary ETSI SMG4 *"Data Services"* and SMG8 *"Base Station Testing"*

- Supported the establishment of 3GPP (3rd Generation Partnership Project) as the leading standards organization for mobile telecommunications
- Project manager and secretary of TSG "Terminals" reponsbile for Terminal Conformance Testing, Terminal Services and Capabilities, Universal Subscriber Identity Module (USIM)
- Project manager and secretary of Terminals Working Group 2 "Terminal Services and Capabilities" that was responsible for Terminal Execution Environments, Messaging including Short Message Service (SMS), Cell Broadcast Service (CBS), Enhanced Messaging Service (EMS), Multimedia Messaging Service (MMS), Terminal Interfaces incl. AT-commands, Generic User Profile, Data Synchronization and others
- Establishment and management of the Work Plan and follow-up and report on the progress of the related work items
- Advising the chairmen and the standards groups on technical, procedural and political issues
- Editorship of various GSM and UMTS technical specifications
- Responsible for presenting the technical results of the working groups to the parent body
- Responsible for the communication with other standards bodies inside and outside 3GPP
- PR activities (articles, interviews)

12/1993 – 06/1998 Mannesmann Mobilfunk GmbH Düsseldorf, Germany

System Engineer and Project Manager in Quality Assurance and Technical Standards

- Leadership and management of acceptance test projects in the area of GSM Base Station Controller (BSC) and GSM Base Station (BTS) hardware and software.
- Leading project teams of around 15 people
- Responsible for the clearance of releasing new software/hardware into the network
- Supported Request for Quotations, supplier evaluation and pre-selection, project manager of System Verification as a central part of the supplier selection process.
- Representation of Mannesmann Mobilfunk to the ETSI standardization group "Standardization Technical Committee SMG3 System Architecture"
- Conduction of product and hardware development quality audits
- Representative of Mannesmann Mobilfunk in A-interface interoperability testing activities
- Member of BSS product planning group which was defining operator requirements for future BSS releases
- Development of process improvements for type acceptance

Samsung Exhibit 1016, Page 43 of 399

III. LIST OF SUPPORTED PATENT LITIGATIONS AND VALIDITY ACTIONS

2022

Ericsson v. Apple
Certain Mobile Telephones, Tablet Computers With Cellular Connectivity, And Smart Watches With Cellular Connectivity, Components Thereof, And Products Containing Same, Inv. No. 337-TA-1299 (U.S.I.T.C.)
On behalf of Apple
Counsel: WilmerHale
Role: Expert and consulting services

2022

Ericsson v. Apple
Civil Action No. 2:21-cv-376 (E.D. Tex.)
On behalf of Apple
Counsel: WilmerHale
Role: Expert and consulting services

2022

Intellectual Ventures II LLC v. Toyota Motor Cooperation.
Inter Partes Review matters
On behalf of Toyota
Counsel: Finnegan, Henderson, Farabow, Garrett & Dunner, L.L.P.
Role: Expert witness and consulting services

2022

Ericsson v. Apple
2nd Business Court, Rio de Janeiro, Brazil
On behalf of Apple
Counsel: WilmerHale
Role: Expert and consulting services

2022

Ericsson v. Apple
Civil Court, Bogotá, Columbia
On behalf of Apple
Counsel: WilmerHale
Role: Expert and consulting services

2022

Proven Networks LLC. v. NetApp Inc.
Inter Partes Review matters
On behalf of NetApp
Counsel: Finnegan, Henderson, Farabow, Garrett & Dunner, L.L.P., Ropes & Gray LLP
Role: Expert witness and consulting services

2022

Ericsson v. Apple
Inter Partes Review matters
On behalf of Apple
Counsel: Fish&Richardson, Erise IP
Role: Expert witness and consulting services

2021

AEGIS 11 LLC v. Hisense Company, Ltd. and Hisense USA Corporation
Inter Partes Review matters
On behalf of Hisense

Counsel: Orrik Herrington & Sutcliffe LLP
Role: Expert witness and consulting services

2021

Nokia v. Lenovo
Certain Electronic Devices, Including Computers, Tablet Computers, and Components and Modules Thereof, Inv. No. 337-TA-1208 (U.S.I.T.C.)
On behalf of Lenovo
Counsel: WilmerHale
Role: Expert witness and consulting services

2021

Optis Cellular Technology LLC et al. v. Apple
Claim No. HP-2019-000006 (High Court of Justice, Business and Property Courts of England and Wales)
On behalf of Apple
Counsel: WilmerHale
Role: Expert witness and consulting services

2021

Ericsson v. Samsung
Inter Partes Review matters
On behalf of Samsung
Counsel: Kirkland&Ellis LLP, Fish&Richardson
Role: Expert witness and consulting services

2020

Panoptis Patent Management LLC et al. v. Apple Inc.
Civil Action No. 2:19-cv-66 (E.D. Tex.)
On behalf of Apple
Counsel: WilmerHale
Role: Expert witness at bench trial

2020

Sol IP, LLC v. AT&T Mobility, LLC et al.
Civil Action No. 2:18-cv-526 (E.D. Tex.)
On behalf of AT&T, Verizon, Sprint
Counsel: Gibson Dunn
Role: Expert witness and consulting services

2020

Bell Northern Research LLC v. LG Electronics Inc. et al.
Civil Action No. 18-CV-2864-CAB-BLM (S.D. Cal.)
On behalf of LG Electronics Inc.
Counsel: Fish&Richardson
Role: Expert witness and consulting services

2019

Conversant Wireless Licensing S.a.r.l. v. LG Electronics Deutschland GmbH
Civil Action No. 7 O 3277/18 (Landgericht Munich, Germany)
On behalf of LG Electronics Deutschland GmbH
Counsel: Wildanger Kehrwald Graf von Schwerin & Partner mbB
Role: Expert witness and consulting services

2019

Bell Northern Research, LLC v. Huawei Device Co., Ltd, et al.
Civil Action No. 3:18-cv-01784-CAB-BLM
On behalf of Huawei
Counsel: Fish&Richardson
Role: Expert witness and consulting services

2019

Uniloc USA, Inc., et al. v. Samsung Electronics America, Inc. and Samsung Electronics Co. Ltd.
Civil Action Nos. 2:18-cv-00040-JRG, 2:18-cv-00041-JRG, 2:18-cv-00042-JRG and 2:18-cv-00044-JRG (United States District Court for the Eastern District of Texas)
On behalf of Samsung
Counsel: Greenberg Traurig
Role: Expert witness and consulting services

2019

Uniloc USA, Inc., et al. v. Huawei Device USA, Inc. et al.
Civil Action No. 2:18-cv- 00072-JRG-RSP (E.D. Tex.)
On behalf of Huawei
Counsel: McGuireWoods
Role: Expert witness and consulting services

2019

Microsoft Corporation v. Uniloc 2017 LLC
Inter Partes Review of U.S. Pat. No. 7,167,487
Inter Partes Review of U.S. Pat. No. 7,075,917
On behalf of Microsoft and on behalf of Apple as joinder petitioner
Counsel: Klarquist Sparkman (Microsoft), Erise IP (Apple)
Role: Expert witness and consulting services

2019

Qualcomm v. KFTC
South Korean Case, Seoul High Court
On behalf of intervenor Apple supporting the KFTC
Counsel: Boies Schiller Flexner
Role: Expert witness

2018/19

Evolved Wireless, LLC v. Apple, Inc.
Civil Action No. 1:15-cv-00542-JFB-SRF
On behalf of Apple
Counsel: DLA Piper
Role: Expert witness and consulting services

2018/19

Cisco Systems Inc. v. Traxcell Technologies
Inter Partes Review of Traxcell Technologies patents
On behalf of Cisco
Counsel: King&Spalding
Role: Expert witness and consulting services

2018/19

Qualcomm Inc. v. Apple Inc.
Civil Action No. 3:17- cv-02398-DMS-MDD (United States District Court for the Southern District of California)
Civil Action No. 3:17-cv-02402-WQH-MDD
Certain Mobile Electronic Devices and Radio Frequency and Processing Components Thereof (II), Inv. No. 337-TA-1093
Inter Partes Review of U.S. PATENT NO. 9,154,356
Cases IPR2019-00047, IPR2019-00048, IPR2019-00049, IPR2019-00128, IPR2019-00129
On behalf of Apple and Intel
Counsel: WilmerHale
Role: Expert witness and consulting services

2018/19

Apple Inc. v. Qualcomm Inc.
Civil Action No. 3:17-CV-00108-GPC-MDD (United States District Court for the Southern District of California)
On behalf of Apple

Counsel: Fish&Richardson, Boies Schiller Flexner
Role: Expert witness and consulting services

2018

3G Licensing, S.A. et al. v. LG Electronics Inc. et al
Inter Partes Review of U.S. Patent No. 7,995,091
On behalf of LG Electronics
Counsel: Fish&Richardson
Role: Expert witness

2017

Huawei Technologies Co. LTD. v. T-Mobile US, Inc. & T-Mobile USA, Inc.
E.D. Tex. Case Nos. 2:16-cv-00052-JRG-RSP; 2:16-cv-00055-JRG-RSP; 2:16-cv-00056-JRG-RSP; and 2:16-cv-00057-JRG-RSP
On behalf of T-Mobile
Counsel: Gibson Dunn
Role: Expert witness and consulting services

2016

Koninklijke KPN N.V. v. Samsung Electronics America, Inc. et al.
Civil Action No. 14-cv-1165
On behalf of Samsung Electronics
Counsel: Baker Botts
Role: Expert witness and consulting services

2016

SSH v. Sony
OLG Düsseldorf, Germany
On behalf of SSH
Counsel: Cohausz&Florack
Role: Technical expert support

2015/16

LG Electronics v. Core Wireless Licensing S.A.R.L.
Inter Parles Review of U.S. Patent No. 8,165,049
On behalf of LG Electronics
Counsel: Greenberg Traurig
Role: Expert witness

2015/16

Core Wireless Licensing S.A.R.L. v. LG Electronics Inc. and LG Electronics MobileComm U.S.A., Inc
Civil Action No. 2:14-cv-911 (lead case) and Civil Action No. 2:14-cv-912 (consolidated)
On behalf of LG Electronics
Counsel: Greenberg Traurig, Sidley Austin
Role: Expert witness

2015

Intellectual Ventures I LLC v. T-Mobile USA, Inc. & T-Mobile US, Inc.
D. Del. Case No. 1:13-cv-01632
Intellectual Ventures II LLC v. T-Mobile USA, Inc. & T-Mobile US, Inc.
D. Del. Case No. 1:13-cv-01633
On behalf of T-Mobile
Counsel: Gibson Dunn
Role: Technical expert support

IV. EDUCATION

10/1984 – 10/1993 University of Technology Aachen Aachen, Germany

Graduate of Electrical Engineering with a focus on telecommunications technologies (Dipl.-Ing. TH)

10/1992 – 04/1993 **University of Technology Trondheim** **Trondheim, Norway**
Diploma Thesis "Design of a dual processor computer for digital signal processing in power electronics"

V. LANGUAGES

German, English, French

VI. RECENT PUBLICATIONS

- ”Unlocking the internet of things and driving the need for interoperability”, Global Telecoms Business, December 2013
- “The need for standardisation in the M2M services layer”, Global Telecoms Business, February 2014
- Co-authored white paper “Lightweight M2M: Enabling device management and applications for the internet of things”, Open Mobile Alliance, March 2014
- “Objects are a new way to create M2M applications”, Global Telecoms Business, April 2014
- “The need for standardisation in the M2M services layer”, M2M Now, July 2015

Appendix B

3GPP TSG RAN WG1 Meeting #90 **R1-1712032**
Prague, Czech Rep, 21st – 25th August 2017

2

Source: **MCC Support**

Title: **Final Report of 3GPP TSG RAN WG1 #AH_NR2 v1.0.0 (Qingdao, China, 27th – 30th June 2017)**

Document for: **Approval**



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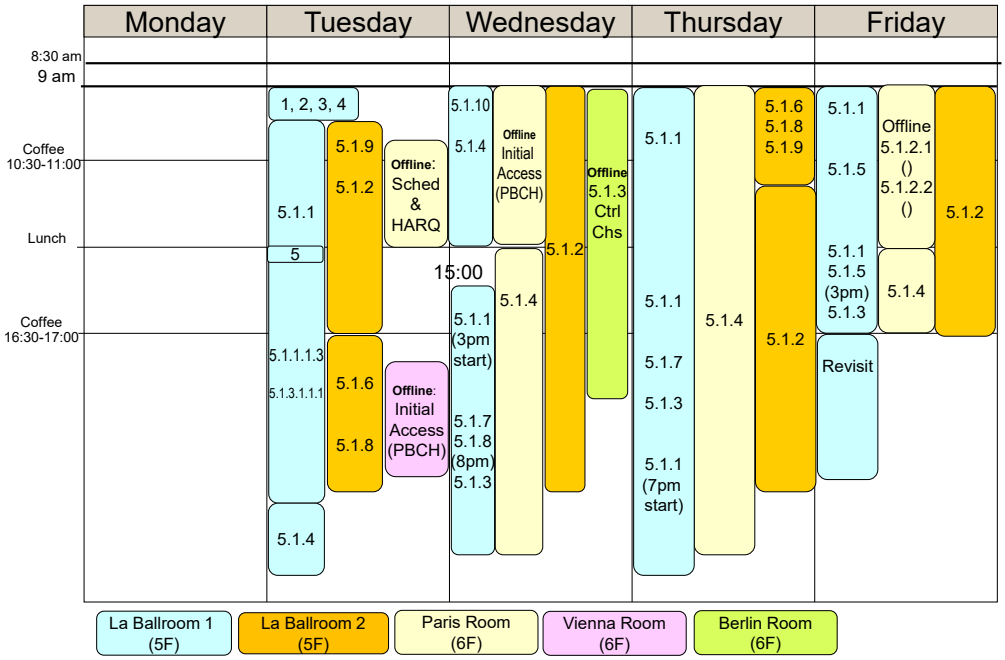
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3GPP TSG RAN WG1 Meeting #90 **R1-1712032**
Prague, Czech Rep, 21st – 25th August 2017

Main facts summary

The second 3GPP TSG WG RAN1 ad-hoc meeting on NR, hosted by ZTE Corporation, was held at the Meridien Qingdao, China.
The meeting started at 9:00 on Tuesday 27th June and finished at 20:15 on Friday 30th June 2017.
The number of attending delegates, having confirmed their participation through the electronic check-in application, was **394.**
Note that the number of registered was 557.

The schedule of the week was as follows:



Note: The empty slots are devoted to offline sessions.

The list of action points that required RAN1 close follow-up is listed in Annex F (end of document).

The number of contributions for this meeting was 2067.

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 Matthew Baker (Vice Chairman) welcomed the participants of the RAN WG1 ad-hoc meeting and opened the meeting at 09:00.
Mr Xinhui Wang on behalf of ZTE welcomed the delegates, and detailed the domestic arrangements for the full week.

1.1 Call for IPR

The attention of the members of this Technical Specification Group was drawn to the fact ***that 3GPP Individual Members have the obligation*** *under the IPR Policies of their respective Organizational Partners to* ***inform their respective*** *Organizational Partners* ***of Essential IPRs they become aware of****.*
The members take note that they are hereby invited:

- *to investigate whether their organization or any other organization owns IPRs which were, or were likely to become Essential in respect of the work of 3GPP.*
- *to notify their respective Organizational Partners of all potential IPRs, e.g., for ETSI, by means of the IPR Information Statement and the Licensing declaration forms (e.g. see the ETSI IPR forms http://webapp.etsi.org/Ipr/).*

1.2 Competition law statement

The Chairman also drew Member's attention to the fact that 3GPP activities are subject to antitrust and competition laws and that compliance with said laws is therefore required of any participant of this WG meeting including the Chairman and Vice Chairmen. In case of question, please contact your legal counsel.
The present meeting will be conducted with strict impartiality and in the interests of 3GPP.
Furthermore, the Chairman reminded Members that timely submission of work items/contributions in advance of WG meetings is important to allow for full and fair consideration of such matters.

1.3 Network usage conditions

The PCG has laid down the following network usage conditions:

Users shall not use the network to engage in illegal activities. This includes activities such as copyright violation, hacking, espionage or any other activity that may be prohibited by local laws.

Users shall not engage in non-work related activities that consume excessive bandwidth or cause significant degradation of the performance of the network.
Since the **network is a shared resource**, users should exercise some basic etiquette when using the 3GPP network at a meeting. It is understood that high bandwidth applications such as downloading large files or video streaming might be required for business purposes, but delegates should be strongly discouraged in performing these activities for personal use. Downloading a movie or doing something in an interactive environment for personal use essentially wastes bandwidth that others need to make the meeting effective. The meeting chairman should remind end users that the network is a shared resource; the more one user grabs, the less there is for another. Email and its attachments already take up significant bandwidth (certain email programs are not very bandwidth efficient). In case of need the chair can ask the delegates to restrict IT usage to things that are essential for the meeting itself.

1. DON'T place your WiFi device in ad-hoc mode
2. DON'T set up a personal hotspot in the meeting room
3. DO try 802.11a if your WiFi device supports it
4. DON'T manually allocate an IP address
5. DON'T be a bandwidth hog by streaming video, playing online games, or downloading huge files
6. DON'T use packet probing software which clogs the local network (e.g., packet sniffers or port scanners)

2 Approval of Agenda

R1-1711601 **Draft Agenda of RAN1#AH_NR2 meetingRAN1 Chair**
Matthew Baker (Vice Chairman) proposed the agenda for the meeting, as well the schedule of the week.
Decision: The agenda is approved.

3 Approval of Minutes from previous meetings

R1-1709881 Report of RAN1#89 meeting ETSI
The document was presented by Patrick Merias from MCC (ETSI Mobile Competence Center) and provides a draft of the report from last RAN1#89 meeting in Hangzhou.
Discussion: MCC recalled that the report is a draft for information, with focus on the NR part – final report will be presented for approval at the next ordinary meeting (RAN1#90).
Decision: The document is approved.

R1-1711586 Selected highlights from RAN#76 of relevance to RAN1 RAN1 Chair
The document (slide 3 relevant to NR) was presented by Matthew Baker (Vice Chairman) on behalf of RAN1 Chair and provides highlights relevant to RAN1 from the last plenary.
Discussion: Confirmation of one additional ad-hoc meeting in January 2018.
Panasonic understanding is that RAN1 works for eMBB low latency (December 2017), no need to work the solution satisfying URLLC at this meeting
Ericsson: the low latency part should be specified until December, independently of use cases (eMMB or URLLC). No need to limit our work to eMBB use case only for December. If clarification needed, should be a RAN discussion/decision
Decision: The document is noted.

4 Incoming Liaison Statements

NR Rel-15
R1-1710211 LS on SR design principles in NR RAN2, Samsung
The document was presented by … from Samsung and informs RAN1 of RAN2 most recent agreements on SR design principles for NR. RAN2 would like to inform RAN1 that it does not see the need for multi-bit SR support and ask RAN1 to take all this information into account in its own work on SR design.
Decision: The document is noted.

R1-1710212 LS on UE measurement capabilities across LTE and NR RAN2, NTT DOCOMO
The document was presented by Hiroki Harada from NTT DOCOMO and asks RAN4 to investigate the UE measurement capabilities and answer the 5 questions listed in the LS.
Discussion: No action to RAN1.
Decision: The document is noted.

R1-1710215 Response LS on reading time index indication for RRM measurements RAN2, Intel
The document was presented by Daewon Lee from Intel and is a reply to R1-1706707:

- From RAN2 point of view, the UE should be able to perform beam/cell measurement and identification quickly and reliably with minimal need for measurement gaps. Therefore, if there is considerable delay due to reading the time index from PBCH, RAN2 observes that this may impact handover performance and UE power consumption. RAN2 would like to ask RAN1 to consider the above information in RAN1 design.
- In addition, RAN2 would like to ask RAN1 if the time index indication needs to be acquired by the UE for every measurement sample and if the UE also need to acquire the time index indication in the idle/inactive mode.

Discussion: Suggested reply in R1-1710500.
Decision: The document is noted.

R1-1710500 Draft Reply LS on reading time index indication for RRM measurements Intel Corporation
The document was presented by Daewon Lee from Intel and is a reply to R2-1706160 (R1-1710215).

- For UEs in CONNECTED mode, UE may be able to infer the SS block time index indication for detected NR PSS/SSS of neighbour cell, if the UE has successfully retrieve the SS block time index of any SS block from the neighbour cell. However, depending of network deployment scenario, configured SS burst set periodicity, and mobility situation of the UE, the UE may need to re-retrieve the SS block time index of neighbour cells time to time and possibly in every few measurement samples when SS burst set periodicity is configured to be very long (e.g. 160 msec). The frequency and instances in which the UE is required to read the SS block time index of the detected SS block is implementation specific. In case of inter-frequency RRM measurements, UE may be required to read the SS block time index within the measurement gap at least once.
- For UEs in IDLE/INACTIVE mode, UEs may not necessarily need the SS block time index for the cell re-selection process. UEs will be able to uniquely identify whether two SS blocks from a cell are from the same beam or not by interval between the two SS blocks. If the SS blocks are separately by integer multiple of the configured SS burst set periodicity, the two SS blocks are from the same beam. Otherwise, they are from different beam. Given that the UE is able to uniquely identify SS blocks (although it may not have the SS block time index information), it can perform per beam filtering of the measurements and ultimately derive the cell level quality. It should be noted that when the UE needs to camp on a cell, it will be required to successfully read the SS block time index information (as well as SFN in NR PBCH) to derive the slot and radio frame boundaries.

Decision: The document is noted. To be treated under 5.1.1.1.3 for the preparation of the final answer.
Friday:
R1-1711907 [DRAFT] Reply LS response on reading time index indication for RRM measurements Intel
Decision: The document is noted and final LS is approved in R1-1711966.

R1-1710216 LS on Emergency Support in NR SA2, Nokia
The document was presented by Karri Ranta-aho from Nokia and asks RAN to clarify and confirm the support for emergency services including regulatory requirements in NR for Rel-15.
Discussion: No action to RAN1.
Decision: The document is noted.

R1-1710220 Reply LS on Emergency Support in NR RAN, T-Mobile
The document was presented by Scott Migaldi from T-Mobile and is the reply to R1-1710216.

- RAN confirms that support for Emergency Services and the corresponding support for Location Services is included in the scope for release 15 work. Support for Emergency Services and the corresponding support for Location Services will be specified by June 2018, and will be applicable for both a non-standalone NR UE that is supported with a LTE PCell and for a standalone NR UE. This work will not delay the previously approved December 2017 completion goal deadline for non-standalone NR.
- The regulatory performance targets in any radio access technology are specified in the US by the FCC as shown below:

FCC BENCHMARK	ACCURACY REQUIREMENT
APRIL 2017	40% of all 911 Calls <= 50m
APRIL 2018	50% of all 911 Calls <= 50m
APRIL 2020	70% of all 911 Calls <= 50m
APRIL 2021	80% of all 911 Calls <= 50m

Decision: The document is noted.

R1-1710217 LS on Support for fake gNB detection mechanisms SA3, Nokia
The document was presented by Karri Ranta-aho from Nokia.
Discussion: .Nokia suggested RAN1 looking at questions 4 and 5.
T-Mobile → make sure our reply won't have impact to roaming
Decision: The document is noted. Draft a reply in R1-1711657 – (Nokia)
Friday:
R1-1711657 [DRAFT] Response LS on Support for fake gNB detection mechanisms Nokia
Decision: The document is noted and final LS is approved in R1-1711997.

R1-1710213 LS on UE categories for NR and LTE-NR Dual Connectivity RAN2, NTT DOCOMO
The document was presented by Fred Takeda from NTT DOCOMO and asks RAN1 to provide input for Layer 1 parameter set today associated with UE category for LTE-NR DC and the NR standalone operation.
Decision: The document is noted.

R1-1710221 Reply LS on UE categories for NR and LTE-NR Dual Connectivity RAN, NTT DOCOMO
The document was presented by Fred Takeda from NTT DOCOMO and is a preliminary reply to R1-1710213.
Regrarding item 1) The necessity of UE categories for UE in the LTE-NR DC (Opt. 3/4/7) as well as the NR standalone (Opt. 2)
RAN foresees industrial demand that LTE-NR DC (Option 3/4/7 series) enables operators to provide a certain peak data rate, as well as the NR standalone (Option 2). RAN would like to let RAN WGs to decide how the target peak data rate can be supported for LTE-NR DC and NR standalone in the specifications, e.g. whether the existing concept of UE category is inherited or a new concept in defining the target peak data rate is introduced. RAN sees that it is important that practical UE constraints are also taken into account in the UE capabilities and categories e.g. UE constraints due to hardware sharing during LTE – NR DC operations. It is also up to RAN WGs how the UE categories and capabilities are defined for LTE-NR DC as well as NR standalone.

Regarding item 2) The target peak data rate in DL and UL to be supported for Option 3 until December 2017 and item 3) The target peak data rate in DL and UL to be supported for the other options until June 2018.
RAN will discuss these items by email until TSG-RAN #77 and aim to decide the target value(s) at the #77 meeting.
Decision: The document is noted.

R1-1710214 LS reply to SA2 on maximum data rate RAN2, MediaTek
The document was presented by … from MediaTek and inform RAN1 of RAN2's conclusion that Options 3 also targets the same maximum data rate as NR SA, i.e. 20Gbps for downlink and 10Gbps for uplink per UE.
Decision: The document is noted.

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R1-1711055 Initial views on UE category NTT DOCOMO, INC.
The document was presented by Fred Takeda from NTT DOCOMO.
Proposal 1: Define UE category based on the maximum number of DL/UL-SCH transport block bits transmitted/received within a fixed/reference time duration (e.g., 1ms).
- Difference in subcarrier-spacing is not visible in the UE category.
- FFS: different capabilities of MIMO/MCS results in different UE categories or in the same UE category with different values on some parameters.

One list of UE category is used for the use-cases of eMBB, URLLC, and mMTC.
Proposal 2: Identify soft-buffer definition for the LTE-NR dual connectivity, and inform RAN1's understanding to RAN2.
- Option 1: Soft-buffer sizes are defined for LTE operation and NR operation, respectively.
- Option 2: Soft-buffer size is defined as the sum of LTE and NR, and the soft-buffer is shared by LTE and NR in semi-static or dynamic manner.

Discussion: Panasonic → hard to downselect between option 1 & 2 in a timely manner (likely not before Dec 17).
Qualcomm → RAN1 should not worry too much at this meeting, mainly RAN2 issues.
Ericsson → no sure whether different UE categories are needed for eMBB, URLLC, and mMTC
Decision: The document is noted.

R1-1711476 On UE Categories/Capabilities Ericsson
The document was presented by Daniel Larsson from Ericsson.
- Proposal 1: In NR, the number of supported MIMO layers is signalled as explicit capability (possibly per band) and not part of a UE category.
- Proposal 2: In NR, the modulation schemes is signalled as explicit UE capability and not part of a UE category.
- Proposal 3: Discuss whether NR capability signalling should allow the UE to indicate a peak data rate being lower than the peak L1 data rate derived from the supported scheduling bandwidth and modulation and MIMO schemes.
- Proposal 4: If it is agreed that UEs should be able to indicate a baseband processing restriction (see Proposal 2), the UEs indicate the total number of supported code blocks separately for UL and DL instead of a L1-bit-rate.
- Proposal 5: If Proposal 3 is agreed, the NW derives the UE's amount of supported soft buffer from the total number of supported code blocks in DL (hence, there is no need to specify and signal the soft-buffer size explicitly).
- Proposal 6: NR UEs should be able to advertise also a maximum scheduling bandwidth. The details need to be further studied
- Proposal 7: Discuss whether the total number of code block does not need to be signalled and this property can be derived from the maximum scheduling BW in addition to the other throughput affecting capabilities that the UE indicates

Decision: The document is noted.

LSs received during the meeting from other WGs
R1-1711892 Reply LS on PBCH content RAN2, Huawei
Decision: The document is noted.

R1-1711940 LS to RAN1 on NR basic handover RAN2, Ericsson
Decision: The document is noted. Prepare draft LS to RAN2 in R1-1711968 – Dhiraj (Samsung)
R1-1711968 [DRAFT] Reply LS response on NR basic handover Samsung
Decision: The document is noted and final LS is approved in R1-1711987 with the addition of the following sentence in Section 1
RAN1 will inform RAN2 when more details on RACH resources and the corresponding associations are available.

R1-1711950 LS to RAN1 on Random Access RAN2, Samsung
Decision: The document is noted.

Not treated.
R1-1711949 Reply LS to RAN1 on UL data transmission without UL grant for NR RAN2, Huawei

5 NR

5.1 New Radio Access Technology - WID in RP-171485

R1-1711642 NR topics requiring coordination between RAN1 and RAN2 RAN2 Chair
The document was presented by RAN1 Vice Chair on behalf of RAN2.
1. Beam management / recovery procedures: RAN2 assume that RAN1 is leading this topic and RAN2 will wait for RAN1 to make progress before discussing in detail. Once RAN1 has started to make progress then RAN2 will look at implications to RAN2 specifications. Input from RAN1 before the August WG meeting is preferable.
2. Beam aspects of random access procedures: Input from RAN1 before the August WG meeting is preferable.
3. UL/DL HARQ: RAN2 would like to receive input on e.g. the impact due to multiple numerologies, HARQ retransmission across numerologies, any other differences compared to LTE, etc. Initial input from RAN1 before the August WG meeting is preferable

4. UL grant free transmission and relation to UL SPS: Based on LS R1-1709805, RAN2 understands that discussion in RAN1 is still ongoing and expects to receive further information from a future meeting about any differences between UL SPS and grant free. Until such information is received RAN2 will continue to progress on RAN2 aspects of UL SPS, agreed to be as LTE as baseline. Additionally RAN2 will discuss some aspects of UL grant free and SPS, e.g. if any difference between them from RAN2 point of view, and will aim to provide input to RAN1 this meeting. Input from RAN1 before the August WG meeting is preferable
5. Impact of PDCCH design (e.g. 'core set') on PDCCH monitoring and DRX: RAN2 would like to receive input on e.g. the impact of the 'core set', beam related aspects, etc. Input from RAN1 before the August WG meeting is preferable.
6. PHR: RAN2 assume that RAN1 is leading this topic and we will implement any MAC signalling aspects as required (i.e. similar working arrangement as for LTE). Input from RAN1 before the October WG meeting is preferable.
7. UL power sharing between LTE/NR: RAN2 will need to be informed regarding the conclusions of RAN1 discussions on UL power sharing between LTE and NR.
8. Transport block sizes: RAN2 assume that RAN1 is leading this topic but that some coordination will be needed between RAN1 and RAN2.
9. L1 parameters to be configured by RRC: Initial input from RAN1 in advance of October WG meeting is preferable (in advance means enough time to enable the parameters to be analysed and contributions to be submitted to the October WG meeting). This implies the initial input should be available at the end of the September RAN1 ad hoc. It is acceptable if there is some degree of revision to the parameter set after the October WG meeting.
10. UE capabilities: RAN2 assume that we will lead the discussion of the UE category question delegated from RAN plenary (i.e. " RAN WGs to decide how the target peak data rate can be supported for LTE-NR DC and NR standalone in the specifications, e.g. whether the existing concept of UE category is inherited or a new concept in defining the target peak data rate is introduced" from LS RP-171480). RAN2 also has ongoing discussion on capability sharing and coordination between LTE and NR, where the exact capabilities for will require coordination with RAN1 and RAN4. RAN1 can begin discussions of the L1 capability parameters in parallel.

Discussion: Suggestion by VC to provide a reply per point (through an LS – at least for some of the bullets)
Ericsson: Make sure RAN1 is not starting email discussions during the upcoming summer period.
CATT: concern regarding RAN2's intention on point 4 (expecting info from RAN1, but has already decided to progress further).
CATT: also has concern of the impact to RAN2 if RAN1 cannot draw a clear answer to each of RAN2's questioning.
Huawei: let's continue RAN1 discussion on UL grant free transmission/UL SPS and later in the week liaise to RAN2.
Decision: The document is noted.

Coordinators for drafting reply LSs to RAN2 (review status on Friday):

1. Beam management: Sundar (Qualcomm) R1-1711683
2. Beam aspects of Random Access: Teck Hu (Huawei) R1-1711684
3. UL/DL HARQ: Karri Ranta-aho (Nokia) R1-1711685
4. UL SPS / grant free: Fred (NTT DOCOMO) R1-1711686
5. PDCCH monitoring and DRX: Tony (CATT) R1-1711687 - see 5.1.3.1

Friday

R1-1711879 **[Draft] LS on Beam Aspects of NR RACH** **Huawei**
Decision: The document is noted and final LS is approved in R1-1711880 with following updates
NR RACH procedures support ~~multiple beams~~ using a PRACH preamble format (Option 1) whereby the CP is inserted at the beginning of the single or consecutive multiple/repeated RACH sequences, the CP/GT between RACH sequences is omitted and the GT is reserved at the end of the single or consecutive multiple/repeated RACH sequences e.g. potentially used for gNB R~~r~~x beam sweeping.~~.~~

A~~n~~ 4-step RACH procedure is supported in NR and~~,~~ a RACH transmission occasion is defined as the time-frequency resource on which a PRACH message 1 is transmitted using the configured PRACH preamble format with a single particular tx beam. The random access configuration is included in the remaining minimum SI. In NR, the RACH configuration provides at least the RACH time/freq. information and the RACH preamble format. gNB can configure an association between one or multiple occasion for SS Block and a subset of RACH resources and/or a subset of preamble indices. Tx Beam for Msg 1 and Msg 3 transmissions (for UE in IDLE mode) is selected by the UE and downlink Tx beam for Msg 2 can be obtained by the detected preamble and/or the RACH resource.

Email approval of the LS on beam management until July 10th – Qualcomm
Email approval of the LS on UL/DL HARQ until July 6th – Nokia

R1-1711318 Discussion on the options in NR design Panasonic
R1-1711366 "TS38.211 v0.0.1 NR; Physical channels and modulation" Ericsson LM
R1-1711886 **"TS38.211 v0.0.2 NR; Physical channels and modulation"** **Ericsson LM**

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Discussion: Panasonic → as already commented earlier in the week, RAN1 should strive to endorse specs on day one of a meeting as the review of the specs during the meeting is very challenging and difficult.
Decision: The document is endorsed as v0.1.0 in R1-1712004 as basis for further updates.

Email discussion until August meeting about all specs
- 1st step: All spec editors will provide new draft specs (including all agreements and WA) until July 14th
- 2nd step: All spec editors will provide further updated specs (including all agreements and WA) until August 4th
- All companies are recommended checking these specs and comment via the reflector
- All spec editors will update specs via the reflector and submit them to the August meeting (RAN1#90)
- Objective is to get the updated specs endorsed on Monday on Monday (day 1 of RAN1#90)

Email discussion until the August meeting w.r.t the RRC parameters list for NR
- Daniel (Ericsson) will provide an initial RRC parameters list until August 9th
- All companies are recommended checking it and comment via the reflector
- Daniel (Ericsson) will update it via the reflector and submit it to the August meeting (RAN1#90)
- Objective is to get the (updated) RRC parameters list agreed on Monday (day 1 of RAN1#90)

5.1.1 Initial access and mobility

Refer to R1-1709821 for work plan.

Friday
R1-1711984 **[Draft] LS on NR initial access and mobility** **NTT DOCOMO**
Decision: The document is noted and final LS to RAN2 is approved in R1-1712001.

R1-1711985 **[Draft] LS on NR initial access and mobility** **NTT DOCOMO**
Decision: The document is noted and final LS to RAN4 is approved in R1-1712002 with following updates
Confirm Working Assumption for NR-SSS design from RAN1#89, with following updates~~except for~~:
- Ordering of initial state:
  - NR-SSS, initial value x(0) = 1, x(1) = 0, x(2) = 0, x(3) = 0, x(4) = 0, x(5) = 0, x(6) = 0

5.1.1.1 Synchronization signal and initial access procedure

5.1.1.1.1 Remaining details on SS sequence design

Include confirmation of WA of NR-SSS, and other details on NR-SSS such as sequence to RE mapping
Note that NR-PSS and NR-SSS sequence design and RE mapping need to be finalized in this meeting

R1-1710501 **NR PSS and SSS design** **Intel Corporation**
- Proposal 1: Confirm the WA on NR-SSS made in RAN1#89 meeting.
- Proposal 2: Capture in the specification the text proposed in Section 3.

Decision: The document is noted.

R1-1710807 **On the Robustness of NR SSS in Frequency Offset** **MediaTek Inc.**
- Observation 1: Due to the selection of m_0, current NR-SSS design is quite vulnerable to frequency offset.
- Proposal 1: NR-SSS should adopt the following m_0 and m_1 mapping:

$$m_0 = \left(3\left\lfloor \frac{N_{ID}^{(1)}}{112} \right\rfloor + N_{ID}^{(2)}\right) \times 5; \quad m_1 = \left(N_{ID}^{(1)} \mod 112\right) + 1$$

Discussion: Huawei → no evaluations have motivated this proposal
Decision: The document is noted.

~~Agreement~~: Confirm Working Assumption for NR-SSS design from RAN1#89, except for:
- Ordering of initial state:
  - NR-SSS, initial value x(0) = 1, x(1) = 0, x(2) = 0, x(3) = 0, x(4) = 0, x(5) = 0, x(6) = 0
- Cyclic shift values m0 and m1:
  - FFS between formulae in the RAN1#89 working assumption and the following formulae, to be evaluated during this week and confirmed by Friday:

$$m_0 = \left(3\left\lfloor \frac{N_{ID}^{(1)}}{112} \right\rfloor + N_{ID}^{(2)}\right) \times 5; \quad m_1 = \left(N_{ID}^{(1)} \mod 112\right)$$

Thursday
Above agreement is modified as follows:

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Agreement: Confirm Working Assumption for NR-SSS design from RAN1#89, with the following updates:

- Ordering of initial state:
  - NR-SSS, initial value x(0) = 1, x(1) = 0, x(2) = 0, x(3) = 0, x(4) = 0, x(5) = 0, x(6) = 0
- Cyclic shift values m0 and m1 (as defined in R1-1711888)

R1-1711810 **Analysis of SSS Proposals** **Intel Corporation**
Decision: The document is noted.
R1-1711860 **Evaluation of NR-SS** **Huawei, HiSilicon**
Decision: The document is noted.
R1-1711888 **WF on m_0 and m_1 for NR-SSS** **NTT DOCOMO, ITL, Intel, Samsung, InterDigital, Motorola Mobility, Lenovo**

- The cyclic shift values m_0 and m_1 are jointly determined by the cell IDs carried by NR PSS (i.e., $N_{\mathrm{ID}}^{(2)} = 0,\ 1,\ 2$) and NR SSS (i.e., $N_{\mathrm{ID}}^{(1)} = 0,\ 1,\ \ldots,\ 335$)), where the cell ID is given by $N_{\mathrm{ID}}^{\mathrm{cell}} = 3N_{\mathrm{ID}}^{(1)} + N_{\mathrm{ID}}^{(2)}$
  - $m_0 = \left(3\left\lfloor \frac{N_{\mathrm{ID}}^{(1)}}{112} \right\rfloor + N_{\mathrm{ID}}^{(2)}\right) 5$
  - $m_1 = \left(N_{ID}^{(1)} \mod 112\right)$

Discussion: Also supported by Mediatek, LGE, ZTE.
Decision: The document is agreed.

Agreement: For NR-PSS:

- initial value x(0) = 0, x(1) = 1, x(2) = 1, x(3) = 0, x(4) = 1, x(5) = 1, x(6) = 1

R1-1711654 **WF on NR-SS sequence design** **NTT DOCOMO, ZTE, InterDigital**

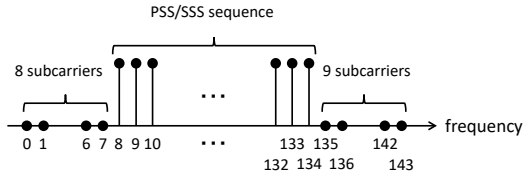
- Update agreements on NR-PSS with following change
  - Number of PSS sequences: 3
    - PSS sequence details:
      - Frequency domain-based pure BPSK M sequence (fixing the time/freq. offset ambiguity)
        - 1 polynomial: Decimal 145 (i.e. g(x) = x7 + x4 + 1)
        - In freq. domain 3 cyclic shifts (0, 43, 86) to get the 3 PSS signals
        - Initial poly shift register value: x(0) = 0, x(1) = 1, x(2) = 1, x(3) = 0, x(4) = 1, x(5) = 1, x(6) = 1
- Confirm working assumptions on NR-SSS with following changes
  - NR-SSS sequence design is 1 polynomial with 127 cyclic shifts, and 1 another polynomial with 9 cyclic shifts
    - Two generator polynomials will be defined for m-sequences, and cyclic shift according to NR-cell ID is applied to each m-sequence
    - Two polynomials are generated by g0(x) = x7 + x4 + 1 and g1(x) = x7 + x + 1
      - Initial poly shift register value: x(0) = 1, x(1) = 0, x(2) = 0, x(3) = 0, x(4) = 0, x(5) = 0, x(6) = 0
      - The cyclic shift values m_0 and m_1 are jointly determined by the cell IDs carried by NR PSS (i.e., $N_{\mathrm{ID}}^{(2)} = 0,\ 1,\ 2$) and NR SSS (i.e., $N_{\mathrm{ID}}^{(1)} = 0,\ 1,\ \ldots,\ 335$)), where the cell ID is given by $N_{\mathrm{ID}}^{\mathrm{cell}} = 3N_{\mathrm{ID}}^{(1)} + N_{\mathrm{ID}}^{(2)}$
        - Option 1
          - $m_0 = 3\left\lfloor \frac{N_{ID}^{(1)}}{112} \right\rfloor + N_{ID}^{(2)}$
          - $m_1 = \left(N_{ID}^{(1)} \mod 112\right) + m_0 + 1$
        - Option 2
          - $m_0 = \left(3\left\lfloor \frac{N_{\mathrm{ID}}^{(1)}}{112} \right\rfloor + N_{\mathrm{ID}}^{(2)}\right) K$, where K > 1 (e.g., 5)
          - $m_1 = \left(N_{ID}^{(1)} \mod 112\right)$
        - Down-selection of above options will be done within this meeting
- NR-SSS sequence is mapped to consecutive 127 subcarriers as well as NR-PSS
- Frequency center of NR-PSS/SSS is aligned with frequency center of NR-PBCH
- Update agreements on number of NR-SSS signals with following change
  - Number of SSS signals: 1008 post-scrambling
    - Note that number of NR physical cell IDs is 1008

Decision: The document is noted.

Agreements:

- NR-SSS sequence is mapped to consecutive 127 subcarriers as well as NR-PSS as follows:

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- Centre frequency of NR-PSS/SSS is aligned with centre frequency of NR-PBCH
  - i.e. mapped on the 7th to 18th PRBs of the 24 PRBs used for the SS block
- Update agreements on number of NR-SSS signals with following change
  - Number of SSS signals: 1008 post-scrambling
- The number of NR physical cell IDs is 1008

Not treated.

R1-1709884 NR-SS sequence design ZTE
R1-1709911 Finalization of the NR-SSS Huawei, HiSilicon
R1-1710022 Remaining detail of NR-PSS and NR-SSS Sequence Design and RE mapping CATT
R1-1710258 Remaining issue on SS Sequence Design LG Electronics
R1-1710623 Remaining details on SS sequence design Samsung
R1-1710913 On Design of Synchronization Signal Sequences in NR InterDigital, Inc.
R1-1710975 Considerations and Evaluation on SS Sequence Design for New Radio ITRI
R1-1711056 Discussion on remaining details on SS sequence design for NR NTT DOCOMO, INC.
R1-1711135 Synchronization signal sequence design Qualcomm Incorporated
R1-1711260 Remaining open issues on NR Synchronisation signal design Nokia, Alcatel-Lucent Shanghai Bell
R1-1711275 Discussion on NR-SSS working assumption Motorola Mobility, Lenovo
R1-1711371 Remaining details on NR-SS sequence design Ericsson

5.1.1.1.2 SS burst set composition

Include candidate locations of SS block within a slot

R1-1711372 SS burst set composition Ericsson

- Proposal 1: The network decides whether a SS block position should be allocated or not.
- Proposal 2: For compositions with two SS blocks per a slot, for 15, 30 and 120 kHz, the SS blocks start at the 3rd and 9th symbols.
- Proposal 3: For 15 kHz subcarrier spacing and below 3 GHz carrier frequency, an SS block may be initiated at the 3rd symbol in a 14 symbol slot. SS blocks are transmitted in consecutive slots.
- Proposal 4: For 15 kHz subcarrier spacing and between 3 and 6 GHz carrier frequency, an SS block may be initiated at the 3rd and 9th symbols per 14 symbol slot.
- Proposal 5: For 30 kHz subcarrier spacing, an SS block may be initiated at the 3rd and 9th symbols in a 14 symbol slot. SS blocks are transmitted in every 2nd slot.
- Proposal 6: For 120 kHz, an SS burst is composed by up to 8 SS blocks.
- Proposal 7: For 120 kHz, the SS burst set is composed by up to 8 SS bursts with 1 DL/UL slot in-between SS bursts.
- Proposal 8: For 240 kHz, an SS slot pair is composed by SS blocks every 5th symbol, starting at the 5th symbol.
- Proposal 9: For 240 kHz, an SS burst is composed by up to 16 SS blocks (4 SS slot pairs).
- Proposal 10: For 240 kHz, the SS burst set is composed by up to 4 SS bursts with 8 DL/UL slots in-between bursts.

Decision: The document is noted.

R1-1710412 NR SS block and burst set composition AT&T

- Proposal 1: For 15kHz, 30kHz, and 120kHz SS Block SCS, the two candidate SS Block positions within a 14 symbol slot are symbols 4-7 and 8-11.
- Proposal 2: For 240kHz SS Block SCS, the four candidate SS Block positions within two consecutive slots of 14 symbols are symbols 4-7 and 8-11 of the first slot, and symbols 2-5 and 6-9 of the second slot.
- Proposal 3: NR should support dedicated signalling for UE-specific indication of valid SS block time locations within a given SS burst set which accommodate different SS burst set periodicities.

Decision: The document is noted.

R1-1711580 SS burst set composition Samsung (Revision of R1-1710624)

- Proposal 1: For each frequency band, the NR-SS block mapping pattern is fixed/predefined.
- Proposal 2: For below 6GHz NR, the SS block mapping patterns shown in FIGURE 1 should be considered for SS burst set composition.

- Proposal3: For above 6GHz NR, the SS block mapping patterns shown in FIGURE 3 should be considered for SS burst set composition.
- Proposal 4: SS blocks comprising an SS burst set shall be mapped in max 2~4ms duration, starting from a beginning of a frame or a half-frame.

Decision: The document is noted.

R1-1711645 **SS burst set composition consideration** **Qualcomm Incorporated** (Revision of R1-1711136)

- Proposal 1: For burst-set with $L = 4$ SS blocks, the blocks start in OFDM symbols {2,8,17,21}. Burst-set pattern with $L \in \{8, 64\}$ SS blocks is obtained by further tiling the burst-set pattern for $L = 4$.
- Observation 1: For burst-set with $L = 4$ blocks, each pair of blocks has a unique inter-block distance. These 4-choose-2 unique distances are $\{4, 6, 9, 13, 15, 19\}$.
- Observation 2: In burst-set pattern with $L \leq 8$ blocks, for any two pairs of blocks $\{l_1, l_2\}$ and $\{l_3, l_4\}$ such that $\Delta(\{l_1, l_2\}) = \Delta(\{l_3, l_4\})$, we have that $l_1 + l_2 = l_3 + l_4$ and thus $\delta(\{l_1, l_2\}) = \delta(\{l_3, l_4\})$. In words, all blocks pairs with the same inter-block distance have the same bit-difference between their indices (and thus the same bit-difference between their PBCH payloads.)
- Proposal 2: When UE assumes SS burst set periodicity of x ms (e.g. x = 20ms), UE assumes the same set of SS blocks within SS burst set are transmitted with periodicity of x ms
- Proposal 3: When UE assumes SS burst set periodicity of x ms (e.g. x = 20ms), if NW transmits the SS burst set with a smaller periodicity y ms (y < x, e.g. y=10ms), UE can assume that the same set of SS blocks within SS burst set are transmitted with periodicity of y ms
- Proposal 4: UE assumes that the transmitted SS blocks in a SS burst set are always logically consecutive, i.e. between any two transmitted SS blocks in a SS burst set, there are no gaps of non-transmitted SS block(s)

Decision: The document is noted.

- FFS offline (Jorma Kaikkonen, Nokia):
  a. 7 symbol slot is only considered for 15 kHz subcarrier spacing?
  b. 1 or 2 SS blocks within a 14 symbol slot?
  c. If 2 SS blocks, is there a need for gaps between SS blocks in a 14 symbol slot?
  d. Which are the starting symbols for SS blocks for each subcarrier spacing?

Revisit on Wednesday afternoon - R1-1711678

Thursday

R1-1711678 **Way forward on the mapping of SS blocks** **Nokia**
R1-1711899 **Way forward on the mapping of SS blocks** **Nokia**

Agreements:

- Agree on pages 5, 7, 8 (30 kHz subcarrier spacing case) in R1-1711899
- Working assumption on pages 9, 10 (120, 240 kHz subcarrier spacing cases) in R1-1711899
  - Working assumption can be revisited if there are serious implications to UE AGC operation.

Agreements:

- For 15 kHz subcarrier spacing case,
  - Map two SS blocks candidate locations to the slot of 14 symbols as follows
    - First candidate location is at symbols 2-5
    - Second candidate location is at symbols 8-11

R1-1711939 **Way forward on the mapping of SS blocks with 30kHz SCS** **Huawei, HiSilicon, CATT, CATR, OPPO, MediaTek, Vivo**

Possible agreements:

- For 30 kHz subcarrier spacing case, try to agree on Option 1 or Option 3 until Friday, but if not, RAN1 will conclude that no consensus in RAN1 about the second SS block mapping pattern

– Option 1:
  – Map two SS blocks candidate locations to the slot of 14 symbols as follows
    - First candidate location is at symbols 2-5
    - Second candidate location is at symbols 8-11
  – Supported by Intel, LGE, Qualcomm, DOCOMO, ETRI, Samsung, ZTE, Ericsson, ITL (9)
– Option 3:
  - For slot of 14 symbols, two SS blocks are mapped within 14 symbols
    – First candidate SS block location is at symbols 1-4
    – Second candidate SS block location is at symbols 8-11
  - For slot of 7 symbols, one SS block is mapped within 7 symbols

- Candidate SS block location is at symbols 1-4
- Supported by Huawei, HiSilicon, CATT, CATR, OPPO, MediaTek, vivo (7)

Friday

R1-1711939 Way forward on the mapping of SS blocks with 30kHz SCS Huawei, HiSilicon, CATT, CATR, OPPO, MediaTek, Vivo

Agreements:

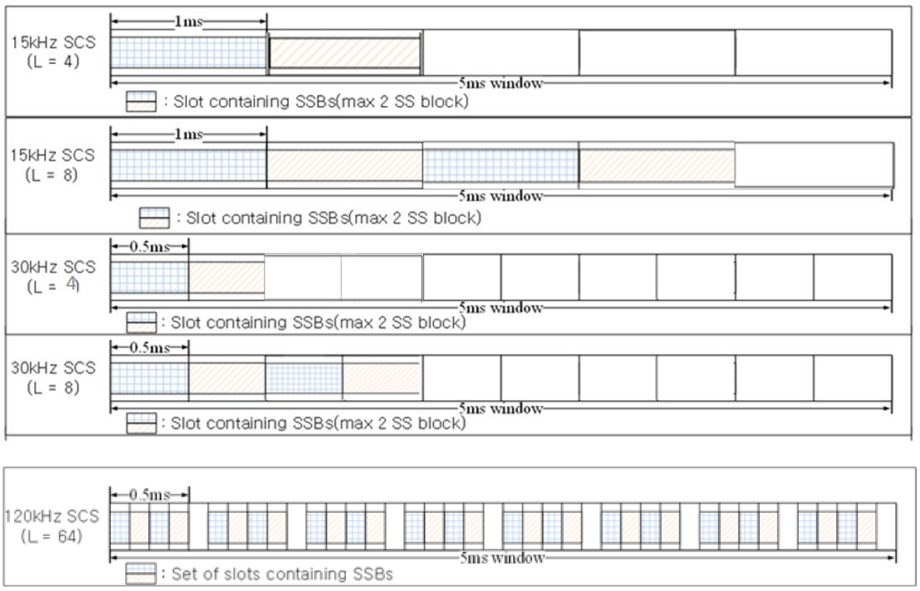
- For 30 kHz subcarrier spacing case, the second SS block mapping pattern is
  - Map two SS blocks candidate locations to the slot of 14 symbols as follows
    - First candidate location is at symbols 2-5
    - Second candidate location is at symbols 8-11
- Note: In the case of NR-LTE coexistence, the first SS block mapping pattern (i.e., page 7 in R1-1711899) can be used
- Note: It is up to RAN4 to decide the SS block mapping pattern for each frequency band

R1-1711854 SS burst set composition LG Electronics, Nokia

Updated in R1-1711906 WF on SS Burst set Composition LG Electronics, Nokia, InterDigital, British Telecom

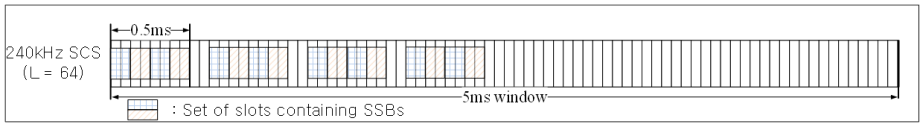
Agreements:

- For 15k Hz, 30 kHz, and 120 kHz subcarrier spacing, the following mapping to slots in a half radio frame is agreed
  - Note: For NR and LTE coexistence, duplex direction alignment can be achieved by subframe offset



Agreement:

- For 240 kHz subcarrier spacing, the following mapping slot in a half radio frame is agreed



Not treated.

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R1-1709885	The composition of SS burst sets	ZTE
R1-1709912	SS Burst Set and Block Composition	Huawei, HiSilicon
R1-1710023	SS Burst Set Composition and SS Block Configuration	CATT
R1-1710131	Discussion on design of SS block	Guangdong OPPO Mobile Telecom.
R1-1710259	Discussion on SS burst set composition	LG Electronics
R1-1710371	Remaining issues on the subcarrier spacing of SS block	Spreadtrum Communications
R1-1710372	Remaining issues on SS block and SS burst set composition	vivo
R1-1710502	SS Burst Set Composition	Intel Corporation
R1-1710798	Discussion on SS burst set composition	MediaTek Inc.
R1-1710914	On SS Burst Set Composition and Multiplexing	InterDigital, Inc.
R1-1711057	Discussion on SS burst set composition for NR	NTT DOCOMO, INC.
R1-1711232	Indication of actually transmitted SS blocks	Sharp
R1-1711261	On SS Burst Set Composition	Nokia, Alcatel-Lucent Shanghai Bell
R1-1711394	Discussion on SS Burst Set Design	Convida Wireless LLC

5.1.1.1.3 Timing indication based on SS block

Include discussion and evaluation based on email discussion [89-15] such as SS block time index indication mechanism, identification of radio frame boundary and identification of SFN
Note that SS block time index indication mechanism needs to be finalized in this meeting

R1-1711646 Timing indication based on SS block consideration Qualcomm Incorporated (Revision of R1-1711137)

- Proposal 1: PBCH payload carries the synchronization signal block index and 5ms timing boundary.
- Proposal 2: For 10-bit SFN $(s_9, s_8, \dots, s_2, s_1, s_0)$, all bits except (s_2, s_1) are sent in PBCH payload. Furthermore, two bits (s_2, s_1) are signalled in PBCH scrambling or in SSS/DMRS.
- Observation 1: Multi-cell interference should be considered in deriving the number of bits that can be carried over PBCH DMRS, as cross-correlation between DMRS sequences across cells significantly impacts DMRS detection performance.
- Observation 2: For single-shot DMRS detection at -6dB SINR, only 2 bits are reliably delivered with 1/3 DMRS while less than 2 bits are reliably delivered with 1/4 DMRS for any PCI combinations.
- Observation 3: The capability of carrying information in DMRS reduces significantly if a high DMRS detection requirement is required e.g., 0.1% DMRS detection error.

Decision: The document is noted.

R1-1711589 Timing indication based on SS block Samsung (Revision of R1-1710625)

Proposal 1: 7-bit MSB of SFN explicitly indicated in MIB and 3-bit LSB of SFN implicitly indicated by using scrambling.
Proposal 2: Multiple NR-DMRS sequences are introduced to indicate the SS block index within an SS burst set.
- 1st preference: DMRS to indicate SS block indices in order to avoid additional latency and power consumption of reading PBCH payload.
- 2nd preference: DMRS to indicate partial SS block indices and offload remaining SS block indices in explicit bits of PBCH payload, if this design can satisfy the reliability and latency issues addressed by LS R2-1706160.

Observations:
- NR-DMRS sequence detection for NR-SS block index identification is much more robust than PBCH explicit indication, even more robust against interference in multi-cell scenarios.
- NR-DMRS sequence detection has no impact on the channel estimation for NR-PBCH detection.
- NR-DMRS uneven RE mapping cannot improve PBCH detection but only results in DMRS performance loss, compared with even mapping assuming similar DMRS overhead.

Proposal 3: NR-DMRS with even RE mapping is preferred for SS block index indication.

Decision: The document is noted.

R1-1710905 Signaling of SS block index Apple Inc.

- Proposal 1: SS block should avoid the 1st symbol of every 0.5ms, which has longer duration compared to other OFDM symbols, to avoid ambiguity in UE detection.
- Proposal 2: nominal SS blocks are partitioned into SS bursts (or groups). Which SS blocks/bursts are actually transmitted can be configured by the network, although the indexing is based on the nominal SS blocks.
- Proposal 3: SS burst index is included in information bits of PBCH, while SS block index within a SS burst is signaled through PBCH implicitly, e.g., with different scrambling codes.
- Proposal 4: SS blocks within each SS burst can be combined to improve PBCH decoding reliability.
- Proposal 5: the set of K different scrambling codes can be selected from existing class of LFSR based sequences, such as M-sequence, Gold sequence, etc.
- Proposal 6: the number of SS blocks per SS burst (or group) K should be pre-determined, and can be band dependent.
- Observation 1: gNB beam mapping to SS blocks is transparent to UEs, regardless of the selection of Kand M

Decision: The document is noted.

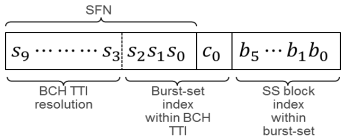
R1-1711373 **Timing indication based on SS block** **Ericsson**

- Proposal 1: The timing indication includes half-frame indication, slot/slot pair indication within a half-frame and the SS block indication within a slot/slot pair.
- Proposal 2: The slot group with consecutive or nonconsecutive slots to cover four possible SS block locations is proposed to unify the time indication design for all frequency ranges.
- Proposal 3: The half-frame specific scramble sequence is applied on the coded bits of NR-PBCH payload to indicate the half frame number $n_{\text{half sfn}} = \{0, \ldots, 15\}$.
- Proposal 4: The explicit bits attached with the NR-PBCH MIB are used to indicate the slot group location.
- Proposal 5: The cover sequence can be used to implicitly indicate the four possible SS block positions within a slot group.

Decision: The document is noted.

Proposal:

- The timing information to be carried is as follows:



- This information is carried at least partly explicitly on the PBCH
- Options for a hybrid solution:
  - SS block index within burst set is carried by DMRS
    - 2 bits below 3 GHz, 3 bits for 3-6 GHz, 6 bits above 6 GHz
      - Achieves latency gain by enabling reception without decoding
      - Concerns on ability to carry so many bits on DMRS, and would require the DMRS to be invariant
  - SS block index (2/3 bits) within burst is carried by DMRS
    - 4/3 bits to indicate the burst in the burst set are carried in NR-PBCH payload
    - Can achieve latency gain below 3/6 GHz
    - Can enable the UE to obtain the beam index for inclusion in SS block measurement reporting without NR-PBCH decoding
    - But would still require the DMRS to be invariant
  - 2 bits of SFN carried by DMRS
    - Achieves complexity gain but not latency gain
  - SS block index (2 bits) within burst is carried by scrambling of both NR-PBCH and DMRS
    - 4 bits to indicate the burst in the burst set are carried in NR-PBCH payload
    - Achieves latency gain below 3 GHz
  - 3 bits of SFN carried by NR-PBCH payload scrambling

~~Agreement:~~

- One of the following two alternatives will be adopted (It is not precluded to adopt a different one of these alternatives below and above 6 GHz):
  - Alt1: 3 bits of SS block index are carried by changing the DMRS sequence within each 5ms period
    - It can be further considered to limit the number of bits carried in this way to 2 if carrying 3 bits is shown to cause problems
  - Alt2: 2 bits of SFN are carried by changing the DMRS sequence every 20ms
  - Check on Friday whether a decision can already be made between Alt 1 and Alt 2
- It can be further considered whether, in addition to the above, 3 bits of the SFN can be carried by scrambling of the PBCH
- Remaining bits of the timing indication are carried explicitly in the NR-PBCH payload
- Note that it is suggested that the above 2 bullets are actually equivalent.

Thursday

Alt.1 supported by ZTE, Samsung, NTT DOCOMO, Intel, vivo, Fujitsu, Nokia, InterDigital, Sharp, LGE, Sony

- Objected by Motorola mobility, Mediatek, Qualcomm, Huawei, HiSilicon, OPPO, Lenovo

Alt.2 supported by Qualcomm, MotM, CATT, Huawei, HiSilicon, Ericsson, Lenovo, OPPO

- Objected by Samsung, LGE, NTT DOCOMO, vivo, Fujitsu, Interdigital, ZTE, Nokia

Conclusion: RAN1 will definitely select either Alt. 1 or Alt. 2 until Friday (11am), and all proponents are recommended to have following additional evaluations

- Individual pair of cell ID with the condition of worst case
- Random cell ID association with the separation of worst case DMRS pairs to different frequency shift position

Continue discussions until Friday – Samsung (Le)/Qualcomm (Peter)

Friday
Situation unchanged

Ericsson: Ok with either way – everyone should compromise, do not understandand the companies objecting to these proposals
Qualcomm: decision should not be taken on counting the number of supporting companies and would like to see evaluation (asynchronous networks) and performance results of alternative 1. Suggested that the synchronization indication is included in the system information and RRM configuration.
Ericsson: could RAN1 decide first on synch indication and then make the choice between Alt 1 & 2?

Agreements:

- An indication related to the synchronization information is provided to the UE
  - When there is the indication for a carrier, UE can utilize serving cell timing to derive the index of SS block transmitted by neighbour cell (e.g., radio frame or SFN or symbol level synchronization)
  - Note that it is up to RAN2 how to provide this indication
  - Note that it is up to RAN4 about the feasibility of synchronization and its requirement

Chair : new round of show of hands
Alt.1 supported by ITL, vivo, Sony, Samsung, ZTE, DOCOMO, LGE, Sharp, ETRI, Fujitsu, Interdigital, Nokia, Intel (13)

- Objected by Qualcomm, Apple, Motorola Mobility (3)

Alt.2 supported by Qualcomm, Mediatek, OPPO, Huawei, HiSilicon, Xiaomi, Sequans, Motorola mobility, Lenovo, Apple, CATT (11)

- Objected by LGE, Samsung (2)

Qualcomm: still objecting to Alt.1 – has not got a technical answer showing the benefit of Alt 1 vs Alt 2
Samsung: RAN1 agreed synch indication, Alt 1 should be agreeable - very disappointed by Qualcomm
Let's revisit in the afternoon.

For sake of making progress, MotM and Apple withdrew their objection to Alt.1
Qualcomm could agree to take it as a working assumption

Agreements:

- Working assumption: 3 bits of SS block index are carried by changing the DMRS sequence within each 5ms period
  - It can be further considered to limit the number of bits carried in this way to 2 if carrying 3 bits is shown to cause problems
- FFS: details of scrambling of the PBCH which may or may not carry a part of timing information
- FFS: 5 ms half radio frame interval indication
- Remaining bits of the timing information are carried explicitly in the NR-PBCH payload

R1-1711868 **WF on DMRS indication Samsung**
R1-1711946 **WF on DMRS indication Samsung**
R1-1711967 **Timing information indicated by DMRS ZTE**
R1-1711952 **Performance evaluation of interference randomization Qualcomm Incorporated**

Not treated.

R1-1709886	Timing indication based on SS blocks	ZTE
R1-1709901	Scrambling pattern for timing indication over PBCH	Sequans Communications
R1-1709913	Time Index Indication	Huawei, HiSilicon
R1-1710024	SS-block time index indication	CATT
R1-1710132	Discussion on the timing indication of SS block	Guangdong OPPO Mobile Telecom.
R1-1710223	Discussion on timing indication based on SS block	Beijing Xinwei Telecom Techn.
R1-1710231	Consideration on timing indication based on SS block	Fujitsu
R1-1710260	Discussion on SS block time index indication	LG Electronics
R1-1710370	Discussion on time index indication	Spreadtrum Communications
R1-1710373	Discussion on SS block time index indication	vivo
R1-1710419	SS block time index indication	AT&T

R1-1710799 Further discussion on SS block index indication MediaTek Inc.
R1-1710915 On SS Block Based Timing Indication in NR InterDigital, Inc.
R1-1711058 Discussion on timing indication based on SS block for NR NTT DOCOMO, INC.
R1-1711262 SS block time index indication Nokia, Alcatel-Lucent Shanghai Bell
R1-1711274 Discussion on location and timing indication of SS block Xiaomi Technology
R1-1711276 Indication of SS block timing information Motorola Mobility, Lenovo
R1-1711351 On timing indication for NR ITL
R1-1711647 Time Index Signaling for SS Blocks Intel Corporation
R1-1711659 Discussion on SS block time index indication Sony

5.1.1.1.4 Remaining details on multiple SS block transmissions in wideband CC

Include number of SS blocks in wideband CC, RRM measurement with multiple SS blocks in wideband CC, and how to inform UE about presence/parameters of SS block(s)

R1-1709887 Multiple SS blocks in wideband CC ZTE
R1-1709973 On initial access for wideband carrier Huawei, HiSilicon
R1-1710025 Multiple SS block Transmission in wideband CATT
R1-1710133 Remaining details on multiple SS block transmissions in wideband CC Guangdong OPPO Mobile Telecom.
R1-1710261 Remaining issues on Multiple SS block transmissions in wideband CC LG Electronics
R1-1710374 SS block transmissions and RRM measurement in wideband CC vivo
R1-1710420 SS block transmissions in a wideband CC AT&T
R1-1710504 SS Block(s) in Wideband Operation Intel Corporation
R1-1710626 Remaining details on mulitple SS block transmissions in wideband CC Samsung
R1-1710882 Multiple SS Blocks in wideband carrier Ericsson AB
R1-1711059 Discussion on remaining details on multiple SS block transmissions in wideband CC for NR NTT DOCOMO, INC.
R1-1711138 Multiple SS block transmissions design in wideband CC Qualcomm Incorporated
R1-1711263 SS-block transmission in multi CC deployments Nokia, Alcatel-Lucent Shanghai Bell
R1-1711352 Multiple SS block indication in wideband CC ITL
R1-1711364 Multiple SS block transmissions in a wideband CC ASUSTEK COMPUTER (SHANGHAI)

5.1.1.2 Broadcast signal/channel

5.1.1.2.1 NR-PBCH contents and payload size

Include NR-PBCH contents, required number of bits for each content and corresponding payload size

R1-1709888 NR-PBCH contents ZTE
R1-1709914 NR-PBCH contents and payload size Huawei, HiSilicon
R1-1710026 NR PBCH Contents and Payload Size CATT
R1-1710262 Consideration on NR-PBCH contents and payload size LG Electronics
R1-1710375 Views on NR-PBCH contents and payload size vivo
R1-1710421 Details of NR-PBCH contents AT&T
R1-1710505 NR PBCH Design Intel Corporation
R1-1710627 NR-PBCH contents and payload size Samsung
R1-1710797 Discussion on PBCH Contents MediaTek Inc.
R1-1710916 On Physical Broadcast Channel in NR InterDigital, Inc.
R1-1711060 Discussion on NR-PBCH contents and payload size NTT DOCOMO, INC.
R1-1711139 PBCH contents and payload size consideration Qualcomm Incorporated
R1-1711277 Discussion on NR-PBCH contents Motorola Mobility, Lenovo
R1-1711374 NR-PBCH Content and payload size Ericsson
R1-1711650 NR-PBCH content Nokia, Alcatel-Lucent Shanghai Bell (Revision of R1-1711264)

5.1.1.2.2 NR-PBCH RE mapping and SS block composition

Include discussion and evaluation based on email discussion [89-15] such as SS block composition, NR-PBCH RE mapping, etc. Note that SS block composition needs to be finalized in this meeting

From Wednesday morning offline

R1-1711140 SS bock composition and PBCH RE mapping design Qualcomm Incorporated
R1-1710376 NR-PBCH RE mapping and evaluation vivo
R1-1710628 NR-PBCH RE mapping and SS block composition Samsung
R1-1710800 Performance evaluation for RE mapping and SS block composition MediaTek Inc.
R1-1710917 On NR-PBCH RE Mapping and SS Block Composition InterDigital, Inc.

R1-1710369 **NR-PBCH RE mapping and SS block composition Spreadtrum Communications**
R1-1711648 SS Block Composition Intel Corporation (rev of **R1-1710506**)

Agreements:
- For the case of 2 PBCH symbols within the SS block: PSS-PBCH-SSS-PBCH
- PBCH RE mapping: Alt. 1, NR-PBCH coded bits of the NR-PBCH code block(s) are mapped across REs in N PBCH symbols, where N is the number of PBCH symbols in a NR-SS block

Not treated.
R1-1709889 NR-PBCH RE mapping and SS block composition ZTE
R1-1710006 Discussion and evaluation on NR-PBCH design Huawei, HiSilicon
R1-1710027 NR PBCH RE mapping in SS Block CATT
R1-1710224 Discussion and evaluation on SS block composition Beijing Xinwei Telecom Techn.
R1-1710263 Discussion on NR-PBCH RE mapping and SS block composition LG Electronics
R1-1711265 SS block composition Nokia, Alcatel-Lucent Shanghai Bell
R1-1711278 NR-PBCH RE mapping Motorola Mobility, Lenovo
R1-1711375 NR-PBCH RE mapping and SS block composition Ericsson
R1-1711622 Discussion on NR-PBCH design and SS block composition NTT DOCOMO, INC.
R1-1711658 Considerations on SS block compositions Sony

5.1.1.2.3 Sequence design of DMRS for NR-PBCH

Include DMRS sequence generation, sequence to RE mapping, etc.
Note that DMRS sequence design and RE mapping need to be finalized in this meeting

From Wednesday morning offline

Proposed working assumption (from Wednesday morning offline):
- Sequence type: Gold sequence
  - If cross correlation issues are found, other sequences can be considered
- Sequence initialization from cell ID, and 2 or 3 bits from time identification
- Different sequences in the N NR-PBCH symbols
  - Using longer sequence, different mapping, different initialization etc.

Working assumption:
- Sequence type: Gold sequence
  - If cross correlation issues are found, other sequences can be considered
- Sequence initialization from cell ID, and 2 or 3 bits from time identification
- Different sequences in the N NR-PBCH symbols
  - FFS: Using longer sequence, different mapping, different initialization etc.

Conclusion: Discuss further until Thursday and downselect from:
- Alt 1: Equal DMRS density across NR-PBCH with 3 RE/PRB/Symbol
  - Supported by NTT DOCOMO, Huawei, HiSilicon, vivo, ITL, LGE, OPPO, Intel, Mediatek, Ericsson, Fujitsu, ETRI, Samsung
- Alt 2: Equal DMRS density across NR-PBCH with 4 RE/PRB/Symbol
  - Supported by Samsung, ZTE, CATT, LGE
- Alt 3: Unequal DMRS density with 4 RE/PRB/Symbol outside the NR-PSS/SSS bandwidth and 2 RE/PRB/symbol inside the NR-PSS/SSS bandwidth
  - Supported by Qualcomm, Sony, Interdigital, Sierra

Thursday
CATT, ZTE (for compromise) also support Alt.1
Nokia can also go to Alt.1 although no evaluations have been performed (only Alt.2 and 3 were evaluated)

Agreement: Equal DMRS density across NR-PBCH with 3 RE/PRB/Symbol

Agreement: DMRS have the same RE position in all NR-PBCH symbols

Continue discussion on further details (Daewon, Intel)

Friday
R1-1711943 **Discussion on DMRS sequence for NR PBCH** **Intel**

Conclusions:

- Companies are encouraged to provide the following information on NR PBCH DMRS sequence until 28th July in order to finalize the design – Daewon (Intel)
  - Sequence generation related parameters
    - Gold Code LFSR size
    - Gold Code Polynomials
    - initial state configuration
    - output shift offset (e.g. Nc in LTE)
  - Sequence Modulation
  - Sequence mapping to NR PBCH DMRS RE positions
  - Exact NR PBCH DMRS RE positions within the NR PBCH resource
  - Some examples of the information are shown in R1-1711943

Not treated.

R1-1709890	NR-PBCH DMRS design	ZTE
R1-1710007	DMRS for NR-PBCH	Huawei, HiSilicon
R1-1710028	NR PBCH DM RS sequence design and RE mapping	CATT
R1-1710225	Discussion and evaluation on DMRS design for NR-PBCH	Beijing Xinwei Telecom Techn.
R1-1710232	Discussion on DMRS for NR-PBCH	Fujitsu
R1-1710264	Discussion on DMRS design for NR-PBCH	LG Electronics
R1-1710507	DMRS Sequence for NR PBCH	Intel Corporation
R1-1710629	Sequence design of DMRS for NR-PBCH	Samsung
R1-1710918	On DMRS Designs for NR-PBCH	InterDigital, Inc.
R1-1711062	Discussion on sequence design of DMRS for NR-PBCH	NTT DOCOMO, INC.
R1-1711141	DMRS design for NR-PBCH	Qualcomm Incorporated
R1-1711266	NR-PBCH DMRS design	Nokia, Alcatel-Lucent Shanghai Bell
R1-1711353	DMRS sequence design for NR-PBCH	ITL
R1-1711376	NR-PBCH DMRS design	Ericsson

5.1.1.2.4 Remaining minimum system information delivery

Include numerology used for RMSI delivery

R1-1709891	RMSI delivery	ZTE
R1-1709915	Discussion on NR RMSI delivery	Huawei, HiSilicon
R1-1710029	RMSI Delivery	CATT
R1-1710134	Discussion on the numerology of the RMSI	Guangdong OPPO Mobile Telecom.
R1-1710233	Discussion on the CORESET for RMSI delivery	Fujitsu
R1-1710244	PRB indexing for RMSI in NR	NEC
R1-1710265	Remaining minimum system information delivery	LG Electronics
R1-1710508	RMSI Delivery Mechanisms	Intel Corporation
R1-1710608	Delivery of remaining minimum system information	ETRI
R1-1710630	Remaining minimum system information delivery	Samsung
R1-1710773	CORESET configuration for RMSI scheduling	CMCC
R1-1710801	Further discussion on Remaining minimum system information delivery	MediaTek Inc.
R1-1710841	Discussion on remaining system information delivery	Beijing Xinwei Telecom Techn.
R1-1710919	On Minimum System Information Delivery	InterDigital, Inc.
R1-1711063	Discussion on remaining minimum system information delivery for NR	NTT DOCOMO, INC.
R1-1711142	Remaining system information delivery consideration	Qualcomm Incorporated
R1-1711267	On Remaining System Information Delivery	Nokia, Alcatel-Lucent Shanghai Bell
R1-1711319	Relation among NR-PBCH, SIBs and subcells	Panasonic
R1-1711377	NR delivery of remaining minimum system information	Ericsson

5.1.1.2.5 Other system information delivery

Include how to deliver other system information

R1-1709892	Other SI delivery	ZTE
R1-1710030	Delivery of Other System Information	CATT
R1-1710135	Discussion on the on-demand SI	Guangdong OPPO Mobile Telecom.
R1-1710379	Identification NSA mode during initial access	vivo

R1-1710477	Discussion on other system information delivery	Huawei, HiSilicon
R1-1710609	Delivery of other system information	ETRI
R1-1710631	Other system information delivery	Samsung
R1-1710802	Further discussion on OSI delivery	MediaTek Inc.
R1-1711143	Other system information delivery consideration	Qualcomm Incorporated
R1-1711378	NR delivery of other system information	Ericsson
R1-1711391	On Other System Information Delivery	Nokia, Alcatel-Lucent Shanghai Bell

5.1.1.3 Paging design

Include PO/PF definition, whether/how to multiplex paging DCI and/or message with other signal/channel, spatial QCL assumption with other signal/channel, and paging indication mechanism

R1-1709893	Paging design in NR	ZTE
R1-1709916	Multi-beam Paging for NR	Huawei, HiSilicon
R1-1710031	NR Paging Channel	CATT
R1-1710136	On NR paging design and transmission	Guangdong OPPO Mobile Telecom.
R1-1710267	Paging design in NR	LG Electronics
R1-1710509	NR Paging Design	Intel Corporation
R1-1710632	Paging design	Samsung
R1-1710803	Further discussion on paging design	MediaTek Inc.
R1-1711064	Discussion on paging design for NR	NTT DOCOMO, INC.
R1-1711144	Paging design consideration	Qualcomm Incorporated
R1-1711254	Discussion on Paging Design	III
R1-1711271	Paging in NR	Nokia, Alcatel-Lucent Shanghai Bell
R1-1711379	On NR paging design	Ericsson

5.1.1.4 Physical random access channel and random access procedure

5.1.1.4.1 PRACH preamble format details for long/short sequence length

Include discussion and evaluation based on email discussion [89-16], whether/how to support restricted set, etc.

From Wednesday morning offline

Agreements:

- Confirm the working assumption on supporting format 3
- For formats with L=839
  - Unrestricted sets are supported
  - For restricted sets
    - 1.25 kHz: Restricted set A supported, Restricted set B is FFS
    - 5 kHz: Restricted set is supported with FFS if Restricted set A, B or both are supported
- For L=127/139 with option 1, formats with 1,2,4,6, and 12 OFDM symbols are supported
  - Discuss further until Friday actual format definitions with CP and GP (LGE)
    - Number of symbols can be adjusted if problems are identified

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Thursday

R1-1711875 WF on PRACH Preamble Format for Short sequence with Option 1 LG Electronics, NTT DOCOMO

Also supported by ZTE, Ericsson

Possible agreements:

- For 15kHz subcarrier spacing,
  - Agree at least followings

Preamble format		# of Sequence	TCP	TSEQ	TGP	Path profile (Ts)	Path profile (us)	Maximum Cell radius (meter)	Use case
A	0	1	144	2048	0	48	1.56	[469]	TA is already known or Very small cell
	1	2	288	4096	0	96	3.13	[469]	Small cell
	2	4	576	8192	0	144	4.69	[1,055]	Normal cell
	3	6	864	12288	0	144	4.69	[1,758]	Normal cell
B	4	12	936	24576	792	144	4.69	[3,867]	Normal cell

  - Note 1: Unit is Ts, where Ts = 1/30.72MHz
  - Note 2: PRACH preamble are aligned with OFDM symbol boundary for data with same numerology

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- Note 3: Additional 16Ts for every 0.5ms should be included in T_{CP} when RACH preamble is transmitted across 0.5ms boundary or from 0.5ms boundary
- Note 4: Note that cell radius can be changed later
- Note 5: For format A, GP can be defined within the last RACH preamble among consecutively transmitted RACH preambles

Continue offline discussions until Friday – Hyunsoo (LGE)

Friday

Agreements:

- For 15 kHz subcarrier spacing,
  - Agree on following preamble formats A2, A3, B4
  - **Working assumption** on following preamble formats A0, A1, B0, B1, B2, B3, C0, C1

Preamble format		# of Sequence	TCP	TSEQ	TGP	Path profile (Ts)	Path profile (us)	Maximum Cell radius (meter)	Use case
A	0	1	144	2048	0	48	1.56	469	TA is already known or Very small cell
	1	2	288	4096	0	96	3.13	938	Small cell
	2	4	576	8192	0	144	4.69	2,109	Normal cell
	3	6	864	12288	0	144	4.69	3,516	Normal cell
B	0	1	144	2048	0	48	1.56	469	TA is already known or Very small cell
	1	2	192	4096	96	96	3.13	469	Small cell
	2	4	360	8192	216	144	4.69	1,055	Normal cell
	3	6	504	12288	360	144	4.69	1,758	Normal cell
	4	12	936	24576	792	144	4.69	3,867	Normal cell
C	0	1	1240	2048	0	144	4.69	5300	Normal cell
	1	2	1384	4096	0	144	4.69	6000	Normal cell

  - Note 1: Unit is Ts, where Ts = 1/30.72MHz
  - Note 2: PRACH preamble are aligned with OFDM symbol boundary for data with same numerology
  - Note 3: Additional 16Ts for every 0.5ms should be included in TCP when RACH preamble is transmitted across 0.5ms boundary or from 0.5ms boundary
  - Note 4: For format A, GP can be defined within the last RACH preamble among consecutively transmitted RACH preambles
- For 30/60/120 kHz subcarrier spacing, preamble format can be scaled according to subcarrier spacing.
  - Ts =1/(2*30720) ms for 30 kHz subcarrier spacing
  - Ts =1/(4*30720) ms for 60 kHz subcarrier spacing
  - Ts =1/(8*30720) ms for 120 kHz subcarrier spacing
  - Note that some of the formats may not be applicable to all subcarrier spacings

Not treated.

R1-1709894 NR-PRACH formats for long/short sequences ZTE
R1-1710008 PRACH preamble format details for long/short sequence length Huawei, HiSilicon
R1-1710032 NR RACH Long and Short Preamble Sequence Length CATT
R1-1710268 Discussion on PRACH preamble format details LG Electronics
R1-1710510 NR PRACH Preamble design Intel Corporation
R1-1710633 PRACH preamble format details for long/short sequence length Samsung
R1-1710889 NR Physical Random Access Channel Nokia, Alcatel-Lucent Shanghai Bell
R1-1711065 Discussion on PRACH preamble format details for long/short sequence length for NR NTT DOCOMO, INC.
R1-1711145 PRACH preamble format design for long/short sequence length Qualcomm Incorporated
R1-1711270 [89-16] Email discussion on NR-PRACH preamble formats based on short sequence length ZTE Corporation
R1-1711380 NR-RACH preamble format details Ericsson
R1-1711527 PRACH Preamble Format Design Cohere Technologies
R1-1711547 Discussion on PRACH designs for short sequence Sequans Communications
R1-1711970 WF on RACH preamble format for short sequence with 1 and 2 OFDM symbols Nokia, Alcatel-Lucent Shanghai Bell

5.1.1.4.2 PRACH preamble format details for capacity enhancement and beam management

Include necessity and detailed solution for PRACH capacity enhancement, and PRACH design for beam management/recovery

R1-1711865 Multiple/Repeated PRACH Preamble Transmission with OCC across Preambles Qualcomm, Interdigital, Samsung, AT&T, Verizon
R1-1711827 WF on Capacity Enhancement for option 1 of PRACH preamble LGE, ITL

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R1-1711849 **WF on Preamble sequence for capacity enhancement** **Huawei, HiSilicon**

Possible agreements:

- NR should support PRACH preambles with ZC sequences of length L=127
- NR should support at least 64 PRACH preamble sequences per cell constructed from a single-root ZC sequence with m-sequence cover sequences.
  - The m-sequence cover sequences have length L=127 and are obtained by cyclic-shifts of a single m-sequence generated from the generator polynomial $g(D) = D^7 + D^3 + 1$.

Friday

R1-1711870 **WF on NR PRACH capacity enhancement** **CATT, Huawei, TCL**

- *Support RACH format design for Option 4.*

Discussion: Also supported by Nokia.
Decision: The document is noted.

R1-1710890 **NR Physical Random Access Channel Capacity** **Nokia, Alcatel-Lucent Shanghai Bell**

- Proposal 1: RACH sequence capacity should consider the on-demand SI RACH requests.
- Proposal 2: Use the same PRACH preamble format for FDM multiplexed PRACH resources for initial access and PRACH resources for beam recovery requests.
- Proposal 3: In multiplexing resources for beam recovery requests in TDM manner with RACH slots, support SR like resource of PUCCH for beam recovery requests.
- Proposal 4: As capacity need to due handovers depend on network load and deployment, the NR should support flexible PRACH resource allocation both in time and frequency domain.
- Proposal 5: NR to consider dedicated PRACH preamble sequences for paging driven response.
- Proposal 6: RACH sequence capacity should consider paging indicator response.
- Proposal 7: Support 139 sequence length for short PRACH preamble sequence.
- Proposal 8: Consider preamble format 4 as a method to increase the PRACH preamble sequence capacity.
- Proposal 9: RACH configuration supports both option 1 and option 4.

Decision: The document is noted.

R1-1711600 **PRACH preamble sequences and formats for capacity enhancement and beam management** **Huawei, HiSilicon** (Revision of R1-1709917)

- Proposal 1: NR should support PRACH preambles with ZC sequences of length L=127.
- Proposal 2: NR should support at least 64 PRACH preamble sequences per cell constructed from a single-root ZC sequence with m-sequence cover sequences.
  - The m-sequence cover sequences have length L=127 and are obtained by cyclic-shifts of a single m-sequence generated from the generator polynomial $g(D) = D^7 + D^3 + 1$.
- Proposal 3: 2-stage PRACH with proper UE grouping should be supported as an option to reduce detection complexity for the much higher PRACH spectral efficiency in NR.
- Proposal 4: NR supports option 4 for gNB sweeping.

Decision: The document is noted.

Not treated.

R1-1709895 NR-PRACH formats: capacity enhancements and other use cases ZTE
R1-1710269 Discussion on PRACH preamble for capacity enhancement LG Electronics
R1-1710511 Discussions on PRACH Capacity Intel Corporation
R1-1710610 NR-PRACH for various use cases ETRI
R1-1710634 PRACH preamble format details for capacity enhancement and beam management Samsung
R1-1710822 On PRACH design to support uplink requests MediaTek Inc.
R1-1711066 Discussion on PRACH preamble format details for capacity enhancement and beam management for NR NTT DOCOMO, INC.
R1-1711146 PRACH preamble design for capacity enhancement Qualcomm Incorporated
R1-1711381 NR-RACH preamble format details for capacity enhancement and beam management Ericsson
R1-1711569 PRACH Design TCL Communication Ltd.
R1-1711618 NR RACH Preamble Format for capacity enhancement, CATT

5.1.1.4.3 Power ramping and power control during RA procedure

Include remaining details on PRACH power ramping and Msg.3 power control mechanism
Note that all remaining aspects related to power ramping/control during RA procedure need to be finalized in this meeting

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From Wednesday evening offline
Agreements:

- The UE calculates the PRACH transmit power for the retransmission at least based on the most recent estimate pathloss and power ramping
  - The pathloss is measured at least on the SS block associated with the PRACH resources/preamble subset
- UE behavior when reaching the maximum power
  - If the recalculated power is still at or above the Pc,max
    - The UE can transmit at maximum power even if it changes its TX beam

To be discussed further:

- Is the UE required to select the PRACH resources based on the SS block received with the highest SS block RSRP?
- Is the UE is allowed to change SS block used for the pathloss estimate for retransmission?

Thursday: Above questions should not have an impact to RAN4 progress.
Continue discussion until Friday – Nazmul (Qualcomm)
Friday: Continue discussions at the next meeting.

R1-1711861 **WF on RACH Power Control Mechanism for Msg.1 Transmission LGE, NTT DOCOMO**
Also supported by Huawei, HiSilicon

Possible agreements:

- Configure the number of beam switching N for power ramping in Msg.1 (re)transmission, where,
  - when UE conducts beam switching and the number of beam switching is equal to or lower than the number N
    - The counter of power ramping remains unchanged,
  - when UE conducts beam switching and the number of beam switching is N+1
    - If UE doesn't reaches maximum power, the counter of power ramping increases
    - Otherwise, UE reports random access problem to upper layer
  - when the counter of power ramping increases
    - The number of beam switching is reset.
- Configure the maximum count of continuously increasing power ramping in a certain beam, where,
  - when the configured number is exceeded,
    - UE should change its beam for PRACH preamble retransmission.

Not treated.

R1-1709896	Power control during random access procedure	ZTE
R1-1709918	Discussion on power ramping and power control during RA procedure	Huawei, HiSilicon
R1-1710137	Discussion on Power ramping and power control during RA procedure	Guangdong OPPO Mobile Telecom.
R1-1710270	Discussion on Power Control issue for Message 1 and 3	LG Electronics
R1-1710512	PRACH Power ramping procedure	Intel Corporation
R1-1710635	Power ramping and power control during RA procedure	Samsung
R1-1710870	Power ramping for Msg1 preamble re-transmission	InterDigital, Inc.
R1-1710891	Preamble Power Ramping and RACH Message 3 Power Control	Nokia, Alcatel-Lucent Shanghai Bell
R1-1711067	Discussion on power ramping and power control during RA procedure for NR	NTT DOCOMO, INC.
R1-1711147	Power ramping and power control for RA procedure	Qualcomm Incorporated
R1-1711233	Remaining issues on power ramping in NR	Sharp
R1-1711382	Power ramping and power control during RA procedure	Ericsson
R1-1711617	RACH power control and power ramping procedure	CATT
R1-1711625	PRACH Msg1 retransmission	MediaTek Inc.
R1-1711828	WF on RACH power control	LG Electronics, ETRI

5.1.1.4.4 4-step RA procedure

Include Msg.2/3/4 channel design, RACH configuration, non-contention based random access procedure, etc.

R1-1711866 **WF on RACH configuration in RMSI** **Huawei, HiSilicon**

Agreement:

- All random access configuration information is broadcasted in all beams used for RMSI within a cell
  - i.e, RMSI information is common for all beams

R1-1711936 **WF on CSI-RS based RACH Configuration** **Samsung, Ericsson, ZTE, Mediatek Mitsubishi, MTI**
Also supported by Nokia, Huawei, HiSilicon

Agreements:

- At least for handover case, a source cell can indicate in the handover command,
  - Association between RACH resources and CSI-RS configuration(s)
  - Association between RACH resources and SS blocks
  - A set of dedicated RACH resources (FFS: time/frequency/sequence)
  - Note that above CSI-RS configuration is UE-specifically configured

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R1-1711876 WF on multiple Msg.1 transmission for contention free case Samsung, Huawei, Hisilicon, MediaTek, ZTE

Possible agreements:

- For contention free case, a UE can be configured to transmit multiple Msg.1 over multiple RACH transmission occasions before the end of a monitored RAR window

Friday

Agreements:

- For contention free case, a UE can be configured to transmit multiple Msg.1 over dedicated multiple RACH transmission occasions in time domain before the end of a monitored RAR window if the configuration of dedicated multiple RACH transmission occasions in time domain is supported.
  - Note: The time resource used for 'dedicated RACH in time domain' is different from the time resources of contention based random access
  - Note: Multiple Msg1 can be transmitted with same or different UE TX beams

R1-1711799 WF on random access association configuration ZTE

Possible agreements:

- The subsets of PRACH resources/indices are defined using the following parameters
  - W: Number of preamble indices per subset of preamble indices
  - X: Number of preamble subsets per PRACH resource
  - Y: Number of associations per preamble subset per PRACH time instance
- The SS blocks are consecutively associated with the subsets of PRACH resources/indices using the following parameter
  - Z: Association time period
    - The number of PRACH time instances after which an association from an SS block occurs again

Friday

R1-1711945 WF on random access association configuration ZTE

Agreements:

- For contention-based random access, an association between an SS block in the SS burst set and a subset of RACH resources and/or preamble indices is configured by a set of parameters in RMSI.
  - RAN1 strives to use the same set of parameters for different cases, e.g. analog/hybrid/digital beamforming at gNB, level of gNB beam correspondence, number of SS blocks, number of frequency multiplexed PRACH resources, PRACH resource density in time etc.
  - RAN1 strives to minimize the set of parameters.
  - FFS the set of parameters
  - FFS the number of SS blocks (if indicated in RMSI or MIB), e.g. the actually transmitted SS blocks or the maximum number (L).

Not treated.

R1-1709897 4-step random access procedure ZTE
R1-1710035 Further details on NR 4-step RA Procedure CATT
R1-1710138 NR 4-Step Random Access Procedure Guangdong OPPO Mobile Telecom.
R1-1710218 RACH transmission count Mitsubishi Electric Co.
R1-1710234 Discussion on 4-step RA procedure Fujitsu
R1-1710271 RACH Procedure LG Electronics
R1-1710422 DL Tx beam reporting in msg. 3 AT&T
R1-1710478 RACH procedures and resource configuration Huawei, HiSilicon
R1-1710513 4-step PRACH Procedures Intel Corporation
R1-1710636 4-step RACH procedure Samsung
R1-1710774 Discussion on RACH configuration CMCC
R1-1710824 On 4-step RACH procedure MediaTek Inc.
R1-1710860 Considerations on 4-step RA procedure Sony

R1-1710871	Multiple Msg1 transmissions for one monitored RAR window	InterDigital, Inc.
R1-1710892	NR 4-step RACH procedure	Nokia, Alcatel-Lucent Shanghai Bell
R1-1711068	Discussion on 4-step RA procedure for NR	NTT DOCOMO, INC.
R1-1711148	4-step RACH procedure consideration	Qualcomm Incorporated
R1-1711279	RACH configuration and procedure	Motorola Mobility, Lenovo
R1-1711383	4-step random access procedure	Ericsson

5.1.1.5 Mobility procedure

5.1.1.5.1 Measurement based on SS block

Include whether/how to handle power offset between NR-SSS and PBCH-DMRS, one or multiple information on periodicity and timing for RRM measurement per carrier, etc.

R1-1710977 Discussion on RRM measurement on SS blocks CMCC

Alt 1: Network indicates one single shortest periodicity for RRM measurement in the same carrier frequency.
Alt 2: Network indicates one single longest periodicity for RRM measurement in the same carrier frequency.
Alt 3: Network indicates two periodicities, one for the camping cell and the other for the neighboring cells in the same carrier frequency.

- Observation 1: For IDLE mode UE RRM measurement, one single indication of the *longest* SS burst set periodicity of all the cells in the same carrier frequency can work, as long as the SS block timing locations within the SS burst set with longer periodicity is a subset of SS block timing locations within the SS burst set with shorter periodicity, i.e., *subset alignment of all SS blocks in the same carrier frequency*.
- Observation 2: From network operating perspective, subset alignment of SS blocks is necessary since it ensures the simple indication of SSBS periodicity for RRM measurement and that UE can also detect cells that are not configured in the neighbor cell list.
- Observation 3: For IDLE mode UE, both Alt 2 and Alt 3 can work.
- Proposal 1: It is slightly preferred that Alt 2, i.e., one periodicities and one information regarding SS block timing locations is indicated to IDLE mode UE for intra-frequency measurement.
- Proposal 2: For CONNECTED mode UE, two SSBS periodicities and two information regarding SS block timing locations are indicated for intra-frequency measurement.
- Proposal 3: Only one SSBS periodicity regarding inter-frequency measurement is preferred to be indicated.

Decision: The document is noted.

R1-1709919 SS Burst Periodicities and timing for UE RRM measurement Huawei, HiSilicon

- Proposal 1: In addition to NR-SSS, UE may optionally use DMRS for PBCH to derive SS block RSRP as cell level quality for L3 mobility. Whether and how to use DMRS for PBCH is up to UE implementation.
- Proposal 2: NR should support fixed power offset between NR-SSS and PBCH-DMRS to use PBCH-DMRS to derive SS block RSRP for L3 mobility.
- Proposal 3: NR should support to indicate multiple SS burst set periodicities and information regarding measurement timing/duration to connected mode UE.
- Proposal 4: NR should support to indicate one SS burst set periodicity and one information regarding measurement timing/duration for all cells or non-serving cells to idle mode UE.

Decision: The document is noted.

R1-1710637 Measurement based on SS block Samsung

- Proposal 1: A fixed EPRE power ratio shall be adopted between SSS and PBCH DMRS. The fixed ratio shall be 3.5dB.
- Proposal 2: Only a single SS burst set periodicity value shall be configured per carrier

Decision: The document is noted.

R1-1711761 WF on measurement based on SS block NTT DOCOMO, Ericsson, Huawei, HiSilicon, AT&T

- Regarding the measurement timing configuration i.e., SS burst set periodicity/timing/duration information for UE RRM measurement per frequency carrier,
  - Only single measurement timing configuration is configured per frequency carrier to UE for IDLE mode measurement.
  - Multiple measurement timing configurations can be configured to UE in CONNECTED mode.
    - Different measurement timing configurations are applied to different group of cells on the frequency carrier
    - FFS maximum number of measurement timing configurations per frequency carrier

Decision: The document is noted.

Agreements:

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- Regarding the SS block based RRM measurement timing configuration (SMTC) i.e., measurement window periodicity/duration/offset information for UE RRM measurement per frequency carrier,
  - For intra-frequency CONNECTED mode measurement, up to two measurement window periodicities can be configured
    - UE can be informed of which cell(s) is associated with which measurement window periodicity
      - For cell(s) that is not listed, longer measurement window periodicity is used
    - Single measurement window offset and duration are configured per frequency carrier
  - For IDLE mode measurements, only single SMTC is configured per frequency carrier
  - For inter-frequency CONNECTED mode measurements, only single SMTC is configured at least per frequency carrier
  - RAN1 asks RAN4 if there is any concern for inter-frequency measurement based on single SMTC or multiple SMTCs across different frequency carriers

R1-1711801 WF on power offset of NR-PBCH DMRS and NR-SSS MediaTek, Huawei, HiSilicon, NTT DOCOMO

- A fixed power offset defined in the specification shall be adopted between SSS and PBCH DMRS.
  - FFS: 0 dB, 3 dB, or 3.5 dB power offset

Decision: The document is noted and the folowing is agreed:

Agreement: A fixed power offset defined in the specification shall be adopted between SSS and PBCH DMRS per frequency band

Not treated.

R1-1709898 RRM measurements on IDLE mode RS ZTE
R1-1710036 IDLE and CONNECTED mode UE mobility based on SS-block measurements CATT
R1-1710139 On RRM measurement based on SS block Guangdong OPPO Mobile Telecom.
R1-1710272 SS block based RRM Measurement LG Electronics
R1-1710423 Measurement based on SS block AT&T
R1-1710514 SS Block based RRM Measurements Intel Corporation
R1-1710804 Discussion on measurement based on SS block MediaTek Inc.
R1-1711069 Discussion on NR RRM measurement based on SS block NTT DOCOMO, INC.
R1-1711149 Measurement based on SS block consideration Qualcomm Incorporated
R1-1711268 SS block measurements and procedures Nokia, Alcatel-Lucent Shanghai Bell
R1-1711384 Mobility measurements based on SS block Ericsson
R1-1711800 WF on SS block repetition ZTE, Sierra Wireless

5.1.1.5.2 Measurement based on CSI-RS for L3 mobility

Include candidate periodicity values, whether/how transmission and/or measurement bandwidth is indicated, numerology of CSI-RS for L3 mobility, spatial QCL assumption, methods to obtain parameters of CSI-RS for L3 mobility, etc.
Note that CSI-RS configuration parameters for L3 mobility need to be finalized in this meeting

R1-1710273 CSI-RS based RRM Measurement for L3 Mobility LG Electronics

- Proposal 1: Considering the UE behaviour of L3 mobility, CSI-RS for L3 mobility should be transmitted periodically, and the periodicity of CSI-RS is configured to be at least less than 20ms.
- Proposal 2: Transmission bandwidth of CSI-RS is signalled by UE-dedicated RRC message and how much part is used as measurement bandwidth is an implementation issue.
- Proposal 3: Symbol duration of CSI-RS is based on SCS of data channel and it is configured per frequency through UE-dedicated RRC configuration message. IFDMA is proposed for sub-time unit transmission within an OFDM symbol.
- Proposal 4: A part of spatial information can be exploited from a SS block if the beam width of SS block is super set but limited set of the beam width of CSI-RS.
- Proposal 5: When a UE detects SS block of a cell, which is not in the neighbour cell list or whose CSI-RS configuration is not given to the UE, UE may request CSI-RS configuration for that cell using measurement report.

Decision: The document is noted.

R1-1710805 Discussion on CSI-RS for L3 mobility MediaTek Inc.

- Proposal 1: Candidate periodicity values of CSI-RS for L3 mobility is 5, 10, 20, 40, 80, 160 ms.
- Proposal 2: CSI-RS for L3 mobility and SS block burst are transmitted in TDM manner.
- Proposal 3: The CSI-RS for L3 mobility and the measurement gap should be aligned, and the entire CSI-RS for L3 mobility should be contained in the measurement gap.

- Proposal 4: NR supports measurement configuration of CSI-RS for L3 mobility, including
  - measurement bandwidth per carrier frequency
  - numerology
  - QCL assumption
- Observation 1: The numerologies of CSI-RS from different cells could be different, so it is unlikely all configuration parameters are valid for all CSI-RS resources on a carrier frequency (Method 2).
- Proposal 5: As a baseline, configuration parameters of CSI-RS for L3 mobility are valid for one CSI-RS resource. Certain parameters can be cell-specific/frequency-specific, e.g. periodicity.
- Observation 2: If the configuration parameters can be obtained from detected cell-ID (e.g. Method 3 & Method 5), then it is cell-specific configuration, and RAN1 does not see the need to support cell-specific configuration for CSI-RS for RRM measurement.
- Observation 3: Measuring CSI-RS with parameters derived from detected cells will increase UE complexity.

Decision: The document is noted.

R1-1711762 **WF on measurement based on CSI-RS NTT DOCOMO, Ericsson, AT&T**

- Following CSI-RS properties for RRM measurement for L3 mobility are supported in NR
  - Configurable periodicity (as already agreed)
    - {5, 10, 20, 40, [80, 160]} ms are supported
  - Configurable transmission bandwidth (as already agreed)
    - FFS candidate values
  - Configurable measurement bandwidth (as already agreed) and frequency location
    - At least minimum carrier bandwidth for each frequency band/range and at least one additional wider bandwidth for each SCS (e.g., maximum UE bandwidth) are supported
      - FFS other candidate values for wider bandwidth for each SCS
    - Measurement of CSI-RS in subband/bandwidth part which may or may not contain SS Blocks is supported
  - Configurable parameters for sequence generation
  - Configurable numerology
    - For each frequency range, subcarrier spacing values applicable to data, CSI-RS for beam management and SS block in the frequency range are supported
  - FFS: Configurable spatial QCL with SS block
    - It is assumed that property of spatial QCL between SS block and CSI-RS for beam management will be reused
  - Configurable CSI-RS time/frequency resource (as already agreed)
    - CSI-RS design including RE mapping and density for beam management is assumed as baseline

Decision: The document is noted, modified and agreed as follows:

Agreements:

- Following CSI-RS properties for RRM measurement for L3 mobility are supported in NR
  - Configurable periodicity (as already agreed)
    - {5, 10, 20, 40, [80, 160]} ms are supported
    - This does not mean periodicity will be configured per CSI-RS resource
  - Configurable transmission bandwidth (as already agreed)
    - FFS candidate values
  - Configurable measurement bandwidth (as already agreed) and frequency location
    - At least minimum carrier bandwidth for each frequency band/range and at least one additional wider bandwidth for each SCS (e.g., maximum UE bandwidth) are supported
      - FFS other candidate values for wider bandwidth for each SCS
    - Measurement of CSI-RS in subband/bandwidth part which may or may not contain SS Blocks is supported
  - Configurable parameters for sequence generation
  - Configurable numerology
    - For each frequency range, subcarrier spacing values applicable to data, CSI-RS for beam management and SS block in the frequency range are supported
  - Association between CSI-RS for RRM measurement and SS block
    - It is assumed that property of spatial QCL between SS block and CSI-RS for beam management will be reused
  - Configurable CSI-RS time/frequency resource (as already agreed)
    - CSI-RS design including RE mapping and density for beam management is assumed as baseline
  - Note that above properties are relevant for RAN4 RRM measurement evaluations and not intended to be an exhaustive list of properties

R1-1711864 Measurement window periodicity, duration and offset of CSI-RS for L3 mobility Qualcomm

Possible agreements:

- For DRX operation,
  - For the CSI-RS based RRM measurement timing configuration (i.e., measurement window periodicity/duration/offset information), only a single measurement window periodicity, duration and offset for all CSI-RS resources are configured per frequency carrier
    - This applies to both intra-frequency and inter-frequency measurements

Not treated.

R1-1709899 RRM measurements on CSI-RS for L3 mobility ZTE
R1-1709920 CSI-RS configuration parameters for L3 mobility Huawei, HiSilicon
R1-1710378 CSI-RS configuration for L3 mobility vivo
R1-1710424 Measurement based on CSI-RS for L3 mobility AT&T
R1-1710515 CSI-RS based RRM Measurements Intel Corporation
R1-1711070 Discussion on NR RRM measurement based on CSI-RS for L3 mobility NTT DOCOMO, INC.
R1-1711150 Measurement based on CSI-RS for L3 mobility consideration Qualcomm Incorporated
R1-1711385 Measurements based on CSI-RS for L3 mobility Ericsson
R1-1711392 CSI-RS configuration for L3 mobility purposes Nokia, Alcatel-Lucent Shanghai Bell
R1-1711576 L3 Mobility based on CSI-RS based measurments CATT
R1-1711581 Measurement based on CSI-RS for L3 mobility Samsung
R1-1711900 WF on remaining issues on CSI-RS for mobility with RAN4 impact Ericsson
R1-1711902 WF on CSI-RS resources for L3 mobility Ericsson

5.1.1.5.3 Radio link monitoring

Include RS used to derive SINR like metric for RLM
Note that RS used for radio link monitoring needs to be finalized in this meeting

R1-1711151 Radio link monitoring consideration Qualcomm Incorporated

- Proposal 1: In Idle/RRC connected inactive/RRC connected active states, cell detection and measurements are based on cell-specific PSS and SSS for both the serving cell and neighboring cells.
- Proposal 2: Choice of RLM RS should consider the following aspects
  - RLM RS should be QCL with NR-PDCCH to reflect the channel experienced by NR-PDCCH
  - UE should be able to estimate the interference level experienced by NR-PDCCH
  - RLM RS should have guaranteed existence with lower enough periodicity, i.e. 10-20ms or DRX cycle if DRX cycle is longer than 10-200ms
  - Consider reuse RLM RS for other purposes to reduce overhead, i.e. beam management, tracking RS, etc.
- Proposal 3: LTE Radio Link Failure triggering procedure can be a starting pointing for NR radio link monitoring design
- Proposal 4: In addition to RLM based IS/OOS, beam failure recovery procedure can provide periodic/aperiodic IS and OOS indications to upper layers for the RLF procedure.

Decision: The document is noted.

R1-1711763 WF on radio link monitoring NTT DOCOMO, Ericsson, AT&T

- The RS used for RLM should have following properties
  - Periodic transmission with short enough periodicity
  - Wideband transmission relative to bandwidth of active bandwidth part
  - Supporting both single beam and multi-beam operations
  - Representing control channel quality, e.g., by QCL with PDCCH
- CSI-RS can be periodic and can be transmitted in wideband. CSI-RS has enough flexibility not only on periodicity and bandwidth but also on transmission beam/scheme to represent control channel quality and so on. Therefore, at least periodic CSI-RS can be used for RLM. In some case, CSI-RS for RLM and CSI-RS for RRM measurement and/or for beam management may share the same physical resources to reduce RS overhead.
- SS block can be also considered for RLM as SS block is the always-on signal to provide cell coverage. But there may be a case where SS block cannot provide some properties required for RLM, e.g., QCL with PDCCH.

Decision: The document is noted, modified as follows:

Agreements:

- The RS used for RLM should have following properties
  - Periodic transmission with short enough periodicity
  - Wideband transmission relative to bandwidth of active bandwidth part
  - Supporting both single beam and multi-beam operations
  - Representing control channel quality
- Both CSI-RS based RLM and SS block based RLM are supported

- FFS: whether or not only a single type of RS is configured to UE for RLM at a time

R1-1711806 WF on radio link monitoring in NR Huawei, HiSilicon, Qualcomm, ATT

- NR should support aperiodic indication from beam failure recovery to assist RLF procedure.
  - Example 1: aperiodic IS indication(s) from beam failure recovery can stop/reset T310
    - RAN2 can decide specific procedure
  - Example 2: aperiodic OOS indication from failure of beam recovery procedure
    - How to use aperiodic OOS indication can be decided in RAN2

Decision: The document is noted.

Thursday

- NR should strive to provide aperiodic indication based on beam failure recovery procedure to assist RLF procedure if the same RS is used for beam failure recovery and RLM procedure
  - Example 1: aperiodic IS indication(s) from beam failure recovery can stop/reset T310
    - RAN2 can decide specific procedure
  - Example 2: aperiodic OOS indication from failure of beam recovery procedure
    - How to use aperiodic OOS indication can be decided in RAN2

Friday

R1-1711889 WF on Radio Link Monitoring in NR Huawei, HiSilicon, Qualcomm, ATT, NTT DOCOMO, Intel, Vivo, LGE

Agreements:

- NR should strive to provide aperiodic indication(s) based on beam failure recovery procedure to assist radio link failure (RLF) procedure, if same RS is used for beam failure recovery and RLM procedures.
  - Example 1: aperiodic indication(s) based on beam failure recovery procedure can reset/stop T310
    - RAN2 can decide specific procedure
  - Example 2: aperiodic indication(s) based on failure of beam recovery procedure
    - How to use aperiodic indication can be decided in RAN2
  - FFS: aperiodic indication(s) based on beam failure recovery procedure to assist RLF procedure if different RS is used

R1-1711850 WF on RLM CATT

Not treated.

R1-1709900	Radio link monitoring in NR	ZTE
R1-1709921	Discussion on remaining issues of radio link monitoring	Huawei, HiSilicon
R1-1710038	NR Radio Link Monitoring	CATT
R1-1710274	Discussion on Radio Link Monitoring in NR	LG Electronics
R1-1710425	Radio link monitoring	AT&T
R1-1710516	NR Radio Link Monitoring	Intel Corporation
R1-1710639	Radio link monitoring	Samsung
R1-1710806	Discussion on Radio Link Monitoring	MediaTek Inc.
R1-1711071	Discussion on NR RLM and RLF	NTT DOCOMO, INC.
R1-1711269	NR Radio link monitoring	Nokia, Alcatel-Lucent Shanghai Bell
R1-1711386	Radio link monitoring	Ericsson
R1-1711901	WF on remaining RLM issues with RAN4 impact	Ericsson

5.1.1.6 Other

R1-1709922	On numerology determination during initial access	Huawei, HiSilicon
R1-1710445	Minimum UE bandwidth in NR	Huawei, HiSilicon
R1-1710640	Discussion on SS periodicity and PBCH TTI	Samsung
R1-1710641	Considerations on PRACH design in high-mobility scenario	Samsung
R1-1711387	Consideration of PRACH Configuration in NR	Ericsson
R1-1711388	Additional synchronization provision	Ericsson
R1-1711598	On numerology for NR RACH	Samsung
R1-1711619	Discussion on msg.3 tx timing determination	Samsung
R1-1711620	Discussion on RACH design	Samsung
R1-1711621	Assisted information for Msg.3 tx beam determination	Samsung
R1-1711626	RRM for wider bandwidth operations	Samsung

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5.1.2 MIMO

R1-1711916 Chairman's notes of AI 5.1.2 MIMO Ad-Hoc chair (Qualcomm)
The document was presented by Wanshi Chen from Qualcomm.
Decision: The document is endorsed and content is incorporated as below, with the add-on regarding the conclusion on beam management details (see 5.1.2.2.1).

5.1.2.1 Multi-antenna scheme

Physical control channel related issues are to be discussed in the agenda item for scheduling/HARQ aspects.

5.1.2.1.1 Codeword mapping

Including codeword-to-layer mapping, codeword to resource mapping and interleaving

R1-1710642 Finalizing Layer Mapping Samsung
R1-1710446 Codeword to layer mapping in NR Huawei, HiSilicon
R1-1711007 Codeword to layer mapping for DL and UL Ericsson
R1-1711152 CW to layer mapping and frequency domain interleaving Qualcomm Incorporated
R1-1710426 Remaining details of codeword mapping for NR MIMO AT&T
R1-1710517 Remaining details on CW to MIMO layer mapping Intel Corporation

Continue discussion offline – Youngwoo (Samsung)/Leiming (Huawei)
R1-1711935 Summary of Open Issues on Layer Mapping Samsung

Agreements:

- Companies are encouraged to provide evaluation results especially for URLLC, intra-slot frequency hopping, dynamic TDD and high speed train scenarios
  - Practical simulation assumptions e.g. CBG based HARQ, pre-emption indication, DMRS, interleaver should be considered.
  - For both CP-OFDM and DFT-S waveforms
  - Evaluation should be done considering both slot and mini-slot.

Agreements:

- NR supports higher layer signalling for the maximum number of MCS/RV/NDI in DCI for PDSCH
  - FFS HARQ ID
  - Unless indicated otherwise, UE assumes single MCS/RV/NDI in DCI, i.e. up to four MIMO layers
- NR supports higher layer signalling for the maximum number of CQIs in UCI
  - Unless indicated otherwise, UE assumes single CQI in UCI, i.e. up to four MIMO layers in RI report
    - FFS subband CQI
  - FFS Whether or not the actual number of CQIs is also RI dependent
  - Note: This higher layer signalling can be the other signalling related to RI/PMI reporting (e.g. RI restriction)
  - FFS applicability on single/multi TRP

Not treated.
R1-1709904 Discussion on Remaining Details of Codeword Mapping Beijing Xinwei Telecom Techn.
R1-1710050 On codeword mapping CATT
R1-1710255 Remaining details on DMRS ports and number of layers indication NEC Corporation
R1-1710275 Discussion on codeword mapping LG Electronics
R1-1710594 On codeword to RE mapping scheme Lenovo, Motorola Mobility
R1-1710611 Discussion on codeword mapping ETRI
R1-1710815 codeword mapping in NR MediaTek Inc.
R1-1711072 Discussion on codeword mapping NTT DOCOMO, INC.
R1-1711606 Codeword mapping and interleaving ZTE
R1-1711662 WF on CW to layer mapping Huawei, HiSilicon, ZTE, Xinwei, China Unicom, ETRI, Softbank, NTT DOCOMO, LGE, Deutsche Telekom, CATR
R1-1711664 WF on number of MCS and CQI configuration Intel, Samsung
R1-1711665 WF on MIMO layer to CW correspondence Intel, AT&T
R1-1711777 WF on CW to layer mapping scheme for data channels Qualcomm, ATT, Ericsson, Samsung, Nokia, ASB, CATT, Interdigital, Intel, Sharp, Verizon, BT, CHTTL, Panasonic, NEC, KDDI
R1-1711793 WF on codeword mapping MediaTek Inc.

5.1.2.1.2 Codebook based transmission for UL

R1-1710643 Codebook-Based UL Transmission Samsung

R1-1710518 **On codebook based UL tansmission** **Intel Corporation**
R1-1710051 **Considerations on codebook based UL transmission** **CATT**
R1-1711610 **UL MIMO for codebook based transmission** **Ericsson** (Revision of R1-1711008)
R1-1711073 **Codebook design for uplink** **NTT DOCOMO, INC.**

Continue discussion offline – Yushu (Intel)
R1-1711674 Summary of Issues and WFs on Codebook based transmission for UL Intel
R1-1711881 **Summary of Issues and WFs on Codebook based transmission for UL** **Intel**

Conclusion:
- To better understand the tradeoff of uplink cell throughput gain vs. the overhead of control signalling for down-selection, determine the control signalling for frequency-selective precoding after the codebook is defined

R1-1711874 **NR UL MIMO Signaling Mechanism** **Ericsson, Nokia, Alcatel-Lucent Shanghai Bell, Qualcomm, CATT, ZTE**
R1-1711792 **WF on codebook based UL transmission** **MediaTek, Nokia, Alcatel-Lucent Shanghai Bell**

Not treated.
R1-1710140 On uplink codebook design Guangdong OPPO Mobile Telecom.
R1-1710176 Codebook based UL transmission ZTE
R1-1710276 Discussion on codebook based transmission for UL LG Electronics
R1-1710447 Codebook based transmission for UL MIMO Huawei, HiSilicon
R1-1710816 Codebook based transmission in UL MediaTek Inc.
R1-1710920 TPMI Indication for Frequency Selective UL Precoding InterDigital, Inc.
R1-1711153 Codebook based UL transmission Qualcomm Incorporated
R1-1711284 Codebook Based Transmission and Codebook Design for UL MIMO Nokia, Alcatel-Lucent Shanghai Bell

5.1.2.1.3 Non-codebook based transmission for UL

R1-1709923 **Non-codebook based transmission for UL MIMO** **Huawei, HiSilicon**
R1-1710177 **Non-Codebook based and Hybrid based UL transmission** **ZTE**
R1-1710644 **Discussion on Non-Codebook-Based UL Transmission** **Samsung**
R1-1711154 **Non-codebook based UL transmission** **Qualcomm Incorporated**

Continue discussion offline – Jun (Nokia)
R1-1711884 **Summary of issues on UL non-codebook based transmissions** **Nokia, ASB**
R1-1711750 **WF on UL non-codebook based transmission** **Huawei, HiSilicon, DOCOMO, Sharp, LGE, Ericsson, China Telecom, Deutsche Telekom, Xinwei, Vodafone, CeWiT, China Unicom, Tejas Networks, CATR, IITH, IITM, Panasonic, ZTE, InterDigital, AT&T, SoftBank, KDDI**
Also supported by Fujitsu, Mitsubishi

Agreements:
- For PUSCH precoder determination in non-codebook-based UL MIMO, support at least one of the followings:
  - Alt.1: Signalling of SRI(s) only, without TPMI indication in the UL grant
  - Alt.2: Signalling of TRI only, without TPMI indication in the UL grant
  - Alt.3: Signalling of TRI and a single SRI, without TPMI indication in the UL grant
  - Alt. 4: signalling of a single TRI, a single CRI without TPMI indication in the UL grant
  - To down-select in the next meeting considering single- vs. multi-panel (companies are encouraged to perform more evaluations)
  - Note: this may depend UE's capability in terms of calibration

Not treated.
R1-1710052 On non-codebook based UL transmission CATT
R1-1710277 Discussion on non-codebook based transmission for UL LG Electronics
R1-1710519 On non-codebook based UL transmission Intel Corporation
R1-1711009 UL MIMO for non-codebook based transmission Ericsson
R1-1711074 Beam determination for non-codebook based transmission for uplink NTT DOCOMO, INC.
R1-1711285 Non-codebook based UL-MIMO transmission Nokia, Alcatel-Lucent Shanghai Bell
R1-1711890 WF on UL frequency selective precoding in UL non-codebook based transmission Huawei, HiSilicon, LG Electronics

5.1.2.1.4 Diversity transmission for UL

R1-1710427 UL diversity transmision for NR AT&T
R1-1710178 Diversity based uplink transmission schemes ZTE

Continue offline discussion – Cristina (Mitsubishi)
R1-1711845 Summary of AI 5.1.2.1.4 Diversity transmission for UL Mitsubishi

Conclusion:

- Companies are strongly encouraged to perform analysis and simulations for diversity transmission for both CP-OFDM and DFT-s-OFDM based UL considering various scenarios
- Aim to conclude in the next meeting

Not treated.

R1-1710053	Considerations on transmission diversity scheme in UL	CATT
R1-1710278	Discussion on diversity transmission for UL	LG Electronics
R1-1710448	Diversity-based transmission for UL	Huawei, HiSilicon
R1-1710520	On diversity based UL transmission	Intel Corporation
R1-1710645	Diversity transmission for UL	Samsung
R1-1710886	UL diversity transmission for DFTsOFDM	Mitsubishi Electric RCE
R1-1710921	STBC-based Transmission for Uplink Transmit Diversity	InterDigital, Inc.
R1-1711010	Robust Transmission Scheme for PUSCH	Ericsson
R1-1711155	On UL diversity transmission scheme	Qualcomm Incorporated
R1-1711286	UL-MIMO diversity-based transmission	Nokia, Alcatel-Lucent Shanghai Bell

5.1.2.1.5 PRB bundling for DL

R1-1709905 Further Discussion on DL PRB Bundling Beijing Xinwei Telecom Techn.
R1-1711287 On details of PRB Bundling Nokia, Alcatel-Lucent Shanghai Bell
R1-1711156 Discussion on PRB bundling for DL Qualcomm Incorporated

Continue offline discussion – Peng (Xinwei)
R1-1711960 Summary of Issues on DL PRB bundling Xinwei
R1-1711990 WF on DL PRB Bundling Xinwei, Huawei, HiSilicon, Qualcomm

Agreements:

- For DL data transmission:
  - PRB bundling size values include
    - Case 1: one or more values down-selected from the following set
      - {[1], 2, 4, 8 and 16};
      - FFS the relationship with RBG size;
    - Case 2: values equal to consecutively scheduled bandwidth in frequency;
  - For UE-specific PRB bundling size indication, support dynamically indicated PRB bundling size with up to 1 bit overhead;
    - FFS implicit indication to reduce configuration overhead, e.g., based on DMRS configuration etc;
    - FFS the usage of above 1 bit, e.g. whether to switch between Case 1 and Case 2 or between two configured Case 1 values;
    - FFS other aspects related to MU-MIMO pairing and higher-layer signaling

Not treated.

R1-1710521	On PRB bundling for DL	Intel Corporation
R1-1709925	PRB bundling size for DL data precoding	Huawei, HiSilicon
R1-1710054	PRB bundling for DL transmission	CATT
R1-1710179	On PRB Bundling	ZTE
R1-1710360	Discussion on PRB bundling size for NR DL	Spreadtrum Communications
R1-1710646	PRB bundling for NR DMRS	Samsung
R1-1710922	PRG Size Indication in NR	InterDigital, Inc.
R1-1711011	PRB bundling	Ericsson

5.1.2.1.6 Multi-TRP and Multi-panel transmission

DL
R1-1711013 DL multi-TRP and multi-panel transmission Ericsson

Agreements:

- The maximum supported number of unicast and dynamically scheduled NR-PDSCHs a UE can be expected to simultaneously receive is 2 on a per component carrier basis in case of one bandwidth part for the component carrier
  - FFS in case of two or more bandwidth parts for the component carrier
  - FFS the max number of corresponding NR-PDCCHs

R1-1710180 Multi-TRP Transmission and interference coordination ZTE

UL
R1-1710648 Discussions on NR UL multi-panel/multi-TRP Samsung
R1-1710522 Discussion on uplink multi-panel and multi-TRP operation Intel Corporation

R1-1711667 WF on multiple PDSCH approach of supporting NC-JT Intel

Agreements:

- Send LS to RAN2 (cc RAN3) to inform about RAN1 agreement from RAN1#89 on the support of multiple PDSCHs transmission to the UE to support NC-JT operation
- Include in the LS the following content
  - RAN1 agreement from RAN1#89
  - RAN1 is considering different scenarios including TRPs connected with ideal and non-ideal backhaul link, TRPs with same and different cell IDs, etc. to provide an increased throughput for users covered by different TRPs, and greater radio link reliability through dual connectivity-like operation
  - RAN1 thinks that the above agreement may have impact on RAN2 specification
  - Actions: RAN1 asks RAN2 to take into account the above agreement in RAN2's work and provide any information that may be relevant for future RAN1's work on this topic

Draft LS is endorsed in R1-1711820. Final LS is approved in R1-1712000.

Continue discussion offline – Xin (CATT)
R1-1711857 Summary of views on multi-TRP & multi-panel transmission CATT

Not treated.
R1-1709924 Multiple NR-PDCCH for Multiple TRP transmission Huawei, HiSilicon
R1-1710055 Considerations on multi-panel/multi-TRP transmission CATT
R1-1710141 Considerations on the multi-TRP/Multi-pannel design to support the reception of multiple PDCCHGuangdong OPPO Mobile Telecom.
R1-1710235 Discussion on multiple NR-PDCCHs in NC-JT scheme Fujitsu
R1-1710279 Discussion on cooperative transmission LG Electronics
R1-1710428 On the details of multi-TRP and multi-panel transmission AT&T
R1-1710451 CSI acquisition details for NCJT Huawei, HiSilicon
R1-1710523 Support of downlink NC-JT in NR Intel Corporation
R1-1710647 Discussions on NR DL network coordination Samsung
R1-1710814 Multi-TRP and panel transmission MediaTek Inc.
R1-1710923 DCI Design for Multi-TRP/Panel Transmission for DL InterDigital, Inc.
R1-1710969 NR-PDCCH for multi-TRP transmission China Telecommunications
R1-1711012 UL multi-panel transmission Ericsson
R1-1711157 On multi-TRP and multi-panel transmission Qualcomm Incorporated
R1-1711288 On the maximum number of PDSCH/PDSCHs to be supported for multi-TRP transmission Nokia, Alcatel-Lucent Shanghai Bell
R1-1711769 WF on CSI feedback for NCJT LG Electronics, Ericsson, Intel
R1-1711805 WF on Single DCI based NCJT LG Electronics, Intel Corporation, ZTE

5.1.2.1.7 Rate matching

R1-1710649 On PDSCH rate matching for NR Samsung
R1-1711014 On rate matching Ericsson

Agreements:

- A UE is configured with resources for PDSCH rate matching
  - FFS details
- A UE is configured with resources for PUSCH rate matching
  - FFS details

Continue discussion offline – Kunil (LGE)
R1-1711841 **Summary of views on resource for PDSCH and PUSCH rate matching** **LGE**

Not treated.
R1-1709933 Rate matching for data channel Huawei, HiSilicon
R1-1710181 Discussion on rate matching ZTE
R1-1710280 Discussion on rate matching LG Electronics
R1-1710429 On the need of per RE level PDSCH rate-matching and RE mapping signalling AT&T
R1-1710524 Rate matching for NR Intel Corporation
R1-1711158 On PDSCH and PUSCH RE mapping Qualcomm Incorporated
R1-1711808 WF on PDSCH rate matching LG Electronics, Panasonic, NTT DOCOMO, InterDigital, Intel

5.1.2.1.8 Other

R1-1711159 **Transmission scheme for broadcast PDSCH** **Qualcomm Incorporated**

Agreement: For NR in Rel-15, DL transmission scheme 2 is not explicitly supported for broadcast PDSCH in specification

Not treated.
R1-1709926 Discussion on transmission parameter sets Huawei, HiSilicon
R1-1710182 On transmission setting ZTE
R1-1710650 Discussion on transmission parameter sets Samsung
R1-1710651 Discussion of number of PDSCHs in NR-CoMP Samsung
R1-1710652 Multi-TA procedures for Multi-TRP Samsung
R1-1711441 On the feedback overhead reduction for multi-subband UL MIMO Huawei, HiSilicon
R1-1711444 Continuous precoding for NR DMRS in time domain Samsung
R1-1711638 Discussion on transition between NR network coordination schemes Samsung

5.1.2.2 Beam management

5.1.2.2.1 Beam management details

R1-1710654 **DL beam management for NR** **Samsung**
R1-1711160 **Beam management for NR** **Qualcomm Incorporated**
R1-1710183 **DL beam management for NR MIMO** **ZTE**
R1-1709928 **UL beam management** **Huawei, HiSilicon**
R1-1711016 **UL beam management details** **Ericsson**

Continue offline discussion – Sundar (Qualcomm)
R1-1711965 **Beam management offline summary** **Qualcomm**

Agreements:
- RAN1 to study the relation (if any) between a measurement and/or reporting on a reference signal and a subsequent beam indication for beam management purposes
  - Study the indicator(s) used for PDCCH and PDSCH
  - Study whether there is a relationship between the indicator types e.g. same type of indicator or different types
- Study L1-RSRP reporting of multiple beams considering
  - Differential L1-RSRP for multiple beams
    - Reference RSRP for L1-RSRP differential report,e.g., predefined or configurable
  - Bit-width of reporting,
  - Number of groups/beams per group
  - UCI design of the beam reporting,
  - FFS: Other issues

Agreements:
- RAN1 agrees that the certain number of beam failure recovery request transmissions is NW configurable by using some parameters
  - Parameters used by the NW could be:
    - Number of transmissions
    - Solely based on timer
    - Combination of above
- FFS: whether beam failure recovery procedure is influenced by the RLF event

Agreements:

- In case of unsuccessful recovery from beam failure, UE sends an indication to higher layers, and refrains from further beam failure recovery
  - Relationship between RLF and unsuccessful beam failure recovery indication (if any) e.g. whether beam failure recovery procedure influences or is influenced by the RLF event
  - Send LS to inform RAN2 – to be done next meeting

Proposals:

- Support L1-RSRP reporting of measurements on SS block for beam management procedures
  - Supported by: Qualcomm, Samsung, Ericsson, vivo, NTT DOCOMO, Lenovo, MotM, OPPO, Spreadtrum, LGE, Sharp, Nokia, ASB, MediaTek, ZTE, AT&T, CEWiT, Panasonic
  - Objected by: InterDigital, Intel, Huawei, HiSilicon, CATT

~~Conclusion:~~
No consensus to support L1-RSRP reporting of measurements on SS block for beam management procedures in Rel-15

Friday:
Qualcomm: strongly requested to remove the above conclusion – and suggested to leave the topic opened for the next meeting
Intel: concern with the process of deleting what was already agreed during the MIMO session – RAN1 spent a lot of time to reach and write down that conclusion
InterDigital: similar view as Intel
Samsung/Ericsson/Panasonic: ok to delete it
Qualcomm: Can "in Rel-15" be replaced by "in this meeting"
Ericsson: do not agree – it has a complete different meaning

Final conclusion:

- No consensus at this meeting to support L1-RSRP reporting of measurements on SS block for beam management procedures in Rel-15

Note: Any company/university/organization is free to contribute to this topic in future meetings

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Not treated.

R1-1709906	Discussion on DL Beam Management	Beijing Xinwei Telecom Techn.
R1-1710056	Further consideration on downlink beam management	CATT
R1-1710057	Considerations on UL beam management	CATT
R1-1710142	Discussion on the DL Beam Management	Guangdong OPPO Mobile Telecom.
R1-1710143	Discussion on the UL Beam Management	Guangdong OPPO Mobile Telecom.
R1-1710184	UL beam management for NR MIMO	ZTE
R1-1710281	Discussion on DL beam management	LG Electronics
R1-1710282	Discussion on UL beam management	LG Electronics
R1-1710361	Differential RSRP report for beam management	Spreadtrum Communications
R1-1710399	Beam management and beam reporting	vivo
R1-1710430	DL beam management details	AT&T
R1-1710525	Details for UL Beam Management	Intel Corporation
R1-1710526	Details for DL Beam Management	Intel Corporation
R1-1710595	Discussion of RS for DL beam management	Lenovo, Motorola Mobility
R1-1710653	UL beam management	Samsung
R1-1710776	Comparisons on Beam Reporting in NR	CMCC
R1-1710808	Discussions on NR DL beam management	MediaTek Inc.
R1-1710809	Efficient UL beam management with imperfect beam correspondence	MediaTek Inc.
R1-1710851	Considerations on DL beam management	Sony
R1-1710852	Considerations on UL beam management	Sony
R1-1710924	On Beam Management for DL Control and Data Channels	InterDigital, Inc.
R1-1710925	On Efficient UL Beam Management	InterDigital, Inc.
R1-1711015	On DL beam indication	Ericsson
R1-1711075	View on Beam Management Details	NTT DOCOMO, INC.
R1-1711289	On the utilization of SS block for beam management	Nokia, Alcatel-Lucent Shanghai Bell
R1-1711290	SRS transmission for beam management	Nokia, Alcatel-Lucent Shanghai Bell
R1-1711334	Considerations on UE Beamforming Management	ASUSTEK COMPUTER (SHANGHAI)
R1-1711336	Discussion on group based beam reporting	China Unicom
R1-1711473	View on Multi-Beam Management	KT Corp.

R1-1711636 General views on DL beam management Huawei, HiSilicon
R1-1711712 WF on group-based beam reporting ZTE, ASTRI, Nokia, ASB, NTT DOCOMO, Intel, Qualcomm, Samsung, AT&T
R1-1711838 WF on Beam Reporting Intel, Huawei, HiSilicon, InterDigital, CATT
R1-1711859 WF on SRS beam sweeping behavior LG Electronics, Huawei, HiSilicon, Samsung, Ericsson
R1-1711896 WF on UE assistance information for UL beam mangement MediaTek, Samsung, Intel
R1-1711903 WF on SRS for UL beam management OPPO, Intel, Samsung, Xinwei
R1-1711929 WF on Beam Reporting Huawei, HiSilicon, Samsung, Intel, Nokia, Oppo, National Instruments

5.1.2.2.2 Mechanism to recover from beam failure

R1-1710810 Mechanism for flexible beam failure recovery MediaTek Inc.
R1-1710527 Discussion for Mechanism to Recover from Beam Failure Intel Corporation
R1-1711291 Beam Recovery in NR Nokia, Alcatel-Lucent Shanghai Bell
R1-1710283 Discussion on beam failure recovery LG Electronics
R1-1711076 Further views on mechanism to recover from beam failure NTT DOCOMO, INC.

Discuss discussion offline – Chia-Hao (MTK)
R1-1711897 Offline Discussion Summary on Beam Recovery MediaTek
R1-1711717 WF on using SS block for beam recovery ZTE, Ericsson, NTT DOCOMO, MediaTek, Spreadtrum, vivo, OPPO, Qualcomm, Xinwei, LG Electronics, AT&T, Lenovo, CMCC, China Unicom, China Telecom, ASTRI, Samsung, Nokia, ASB, III, MTI, Sharp, National Instruments

Proposals:
- In addition to periodic CSI-RS, SS-block within the serving cell can be used for new candidate beam identification
- Supported by: ZTE, Ericsson, NTT DOCOMO, MediaTek, Spreadtrum, vivo, OPPO, Qualcomm, Xinwei, LG Electronics, AT&T, Lenovo, CMCC, China Unicom, China Telecom, ASTRI, Samsung, Nokia, ASB, III, MTI, Sharp, National Instruments
- Objected by: IDC, HW, HiSi, Intel

Continue discussion next meeting

Not treated.
R1-1709907 Discussion on Beam Failure Recovery Beijing Xinwei Telecom Techn.
R1-1709929 General views on beam failure recovery Huawei, HiSilicon
R1-1710058 Consideration on DL beam failure and recovery CATT
R1-1710144 On Beam Recovery Mechanism Guangdong OPPO Mobile Telecom.
R1-1710185 Discussion on beam recovery mechanism ZTE
R1-1710236 Discussion on beam failure recovery procedure Fujitsu
R1-1710251 Discussion on beam failure recovery request NEC Corporation
R1-1710364 Discussion on beam failure recovery Spreadtrum Communications
R1-1710400 Beam failure recovery procedure vivo
R1-1710431 Considerations on beam failure recovery mechanism AT&T
R1-1710596 Discussion of beam recovery procedure Lenovo, Motorola Mobility
R1-1710655 Beam failure recovery Samsung
R1-1710926 On Remaining Details of Beam Failure Recovery InterDigital, Inc.
R1-1711017 Mechanism to recover from beam failure Ericsson
R1-1711161 Beam recovery procedures Qualcomm Incorporated
R1-1711234 Discussion on mechanisms for beam failure recovery Sharp
R1-1711858 WF on beam failure recovery request LG Electronics, Intel, Huawei, HiSilcon, vivo
R1-1711927 WF on gNB response for beam failure request Huawei, HiSilicon, LG Electronics, Intel
R1-1711928 WF on PRACH for beam failure recovery request transmission Huawei, HiSilicon, LG Electronics, Ericsson, CATT, NTT DOCOMO

5.1.2.2.3 Other

R1-1710186 Beam grouping evaluation for beam management ZTE
R1-1710662 On SS-block based beam management Samsung
R1-1711292 BPL definition and Spatial QCL time indication Nokia, Alcatel-Lucent Shanghai Bell

Not treated.
R1-1709927 Beam indication for DL control channel Huawei, HiSilicon
R1-1709930 Procedure details for beam failure recovery Huawei, HiSilicon

R1-1710005	Considerations on timing advance design in NR	Huawei, HiSilicon
R1-1710145	Beam association relationship between data and control channels	Guangdong OPPO Mobile Telecom.
R1-1710228	Further discussion on channel reciprocity and beam correspondence	MTI
R1-1710450	Multi-beam transmission for DL control channel	Huawei, HiSilicon
R1-1710459	Discussion on UL SRS transmission power	Huawei, HiSilicon
R1-1710473	Network-based mechanism for millimeter-wave link recovery	Huawei, HiSilicon
R1-1710528	On Timing Advance for multi-beam operation	Intel Corporation
R1-1710656	Measurement and reporting for beam management	Samsung
R1-1710657	Discussion on Group based reporting	Samsung
R1-1710658	Discusssion on Tx beam grouping configuration	Samsung
R1-1710659	Discussion on beam indication for PDSCH	Samsung
R1-1710660	L1 RSRP reporting for beam management	Samsung
R1-1710661	L1-RSRP measurement duration	Samsung
R1-1710663	DL beam management configuration	Samsung
R1-1710664	QCL associations for beam management RS	Samsung
R1-1710665	Aperiodic BSI reporting	Samsung
R1-1711018	Beam management in C-DRX	Ericsson
R1-1711019	On the use of SS for beam management	Ericsson
R1-1711020	Further results on beam management without beam indication	Ericsson
R1-1711021	Performance of beam grouping	Ericsson
R1-1711022	On beam grouping	Ericsson
R1-1711023	Analysis of beam indication signalling options	Ericsson
R1-1711293	On beam grouping and reporting	Nokia, Alcatel-Lucent Shanghai Bell
R1-1711294	On Multi-beam Downlink Control Channel Operation	Nokia, Alcatel-Lucent Shanghai Bell
R1-1711295	Multi-beam Uplink Control Channel Operation	Nokia, Alcatel-Lucent Shanghai Bell
R1-1711401	Measurement RS for beam management	Huawei, HiSilicon
R1-1711402	Relationship between beam failure recovery and RLF	Huawei, HiSilicon
R1-1711403	Robust transmission for UL control channel	Huawei, HiSilicon
R1-1711410	Cross-carrier beam management	Huawei, HiSilicon
R1-1711445	System level evaluation results for beam management	Samsung
R1-1711446	Link level evaluation results for beam management	Samsung
R1-1711447	Link level simulation assumptions for beam management	Samsung
R1-1711448	System level simulation assumptions for beam management	Samsung
R1-1711592	Composite beam transmission for SS blocks	Samsung
R1-1711604	Beam management for PDCCH	Samsung
R1-1711962	Way Forward on network-based beam failure recovery	Huawei, HiSilicon
R1-1711988	WF on beam indication for PDCCH	Samsung

5.1.2.3 CSI acquisition

5.1.2.3.1 CSI framework

Including beam management framework

R1-1709931	**Discussion on CSI Framework Design**	**Huawei, HiSilicon**
R1-1711024	**Further details of CSI framework**	**Ericsson**
R1-1710059	**Summary of email discussion [89-17] NR CSI framework**	**CATT**

Offline to come up with overhead numbers based on R1-1710059 – Rakesh (CATT)

Continue offline discussion – Xiaoyi (AT&T)

R1-1711893	**Offline discussion summary on CSI framework**	**AT&T**

Agreements:

- For aperiodic CSI-RS triggering offset X, X is fixed to zero.
- For aperiodic CSI reporting on PUSCH, Y is indicated by DCI.
  - DCI to be used for indicating the timing for PUSCH is also used to indicate Y.
    - This applies to both UCI only and UCI+Data PUSCH
  - The set of values is configured by higher layer
    - The candidate set of values of Y is selected according to restricted conditions inferred from configuration of CSI related settings.
    - The condition include at least;
      - CSI parameter
      - Number of CSI-RS antenna ports if PMI is included
      - CSI-RS location

- Frequency granularity of CSI
  - FFS: number of simultaneous CSI calculations
  - FFS on mechanisms to relax CSI report timing according to number of simultaneous CSI calculations
  - FFS different or same candidate Y value for the cases of UCI multiplexed with data and UCI only

Not treated.

R1-1709908 Discussion on CSI Framework and Semi-persistent CSI-RS Resources and Reports Activation Beijing Xinwei Telecom Techn.
R1-1710060 Views on CSI framework CATT
R1-1710284 Discussion on CSI framework LG Electronics
R1-1710432 Discussion on the channels to carry CSI report AT&T
R1-1710529 On NR CSI framework Intel Corporation
R1-1710667 CSI Acquisition and Beam Management Framework Samsung
R1-1710927 On CSI framework for NR InterDigital, Inc.
R1-1711077 Discussion on CSI framework NTT DOCOMO, INC.
R1-1711162 Details of CSI framework Qualcomm Incorporated
R1-1711296 On the CRI definition and usability in NR Nokia, Alcatel-Lucent Shanghai Bell
R1-1711607 On CSI framework details ZTE

5.1.2.3.2 Details of CSI acquisition

Including channel and interference measurement and reporting

R1-1710530 On Details of CSI acquisition Intel Corporation
R1-1711297 Remaining aspects on interference estimation options and configuration Nokia, Alcatel-Lucent Shanghai Bell

Continue discussion offline – Yuichi (DCM)
R1-1711924 Summary of CSI Acquisition Details NTT DoCoMo

Not treated.

R1-1710061 Discussion on details of CSI acquisition CATT
R1-1710188 Details of CSI acquisition ZTE
R1-1710285 Discussion on interference measurement LG Electronics
R1-1710433 On the details of CSI acquisition AT&T
R1-1710668 Discussions on CSI measurements and reporting for NR Samsung
R1-1710854 Considerations on interference measurement Sony
R1-1710928 On CSI acquisition for NR InterDigital, Inc.
R1-1711025 On CSI acquisition and reporting Ericsson
R1-1711078 On CSI measurement for NR NTT DOCOMO, INC.
R1-1711163 Details of CSI acquisition Qualcomm Incorporated
R1-1711632 Channel and interference measurement for CSI acquisition Huawei, HiSilicon
R1-1711811 WF on CSI measurement details NTT DOCOMO, ZTE, Nokia, ASB, NEC

5.1.2.3.3 CSI acquisition for reciprocity based operation

R1-1710669 CSI Reporting for Reciprocity Operation Samsung
R1-1711298 On the channel reciprocity support for CSI acquisition Nokia, Alcatel-Lucent Shanghai Bell

Continue offline discussion – Ruyue (ZTE)
R1-1711725 Summary of CSI acquisition for reciprocity based operation ZTE

Not treated.

R1-1710062 Views on reciprocity based CSI acquisition CATT
R1-1710286 Discussion on CSI acquisition for reciprocity based operation LG Electronics
R1-1710812 CSI acquisition for reciprocity based operation MediaTek Inc.
R1-1711164 CSI acquisition for reciprocity based operation Qualcomm Incorporated
R1-1711404 Discussion on reciprocity based CSI acquisition mechanism Huawei, HiSilicon
R1-1711608 On reciprocity based CSI acquisition ZTE
R1-1711609 Further discussion on CSI acquisition for reciprocity-based operation Ericsson
R1-1711715 WF on channel reciprocity based CSI ZTE, Nokia, ASB, LG Electronics, ASTRI, Ericsson, NTT DOCOMO

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R1-1711716 WF on partial channel reciprocity based CSI ZTE, CMCC, China Telecom, China Unicom, ASTRI

5.1.2.3.4 CSI feedback

Including type I/II codebook based scheme and other potential use cases, e.g., semi-open-loop

R1-1710190 CSI feedback mechanism on PUCCH ZTE
R1-1710672 CSI parameters and multiplexing Samsung

Continue discussion offline – Mark (Ericsson)
R1-1711904 Summary of views on CSI feedback for Type I and Type II Ericsson

Agreement:
- Periodic CSI reporting is carried at least on
  - Short PUCCH
  - Long PUCCH
  - FFS whether in single-slot only or in multiple slots

Agreements:
- Type I CSI feedback is supported for P/SP/A-CSI and can be carried on either one of PUCCH and PUSCH
- Type I subband CSI can be carried on either one of PUSCH and long PUCCH
- Type II CSI is carried at least on PUSCH
  - FFS CSI on PUCCH

CSF for TS2
R1-1711300 CSI feedback in support of semi-open loop transmission Nokia, Alcatel-Lucent Shanghai Bell
R1-1711405 CSI acquisition for DL robust transmission Huawei, HiSilicon

Continue discussion offline – Mark (Ericsson)

R1-1711905 Summary of CSI Feedback for Open-loop/Semi-open-loop Ericsson

Not treated.
R1-1710063 Discussion on periodic and aperiodic CSI feedback CATT
R1-1710191 CSI feedback mechanism on PUSCH ZTE
R1-1710192 Overhead reduction for Type II CSI ZTE
R1-1710287 Discussion on overhead reduction for Type II codebook LG Electronics
R1-1710288 Discussions on CSI reporting contents LG Electronics
R1-1710289 CSI feedback for OL and semi-OL MIMO LG Electronics
R1-1710290 UL channel utilization for CSI reporting LG Electronics
R1-1710434 CSI feedback for closed loop and semi open loop transmission schemes AT&T
R1-1710452 CSI acquisition details for hybrid CSI Huawei, HiSilicon
R1-1710453 The remaining issues for Type I codebook Huawei, HiSilicon
R1-1710454 The remaining issues for Type II codebook Huawei, HiSilicon
R1-1710670 Remaining details of Type I and Type II CSI codebooks Samsung
R1-1710671 CSI support for transparent precoder cycling Samsung
R1-1710673 Differential reporting of Type II CSI Samsung
R1-1710674 On higher rank (3 and 4) Type II CSI Samsung
R1-1710813 Remaining issues in NR CSI feedback MediaTek Inc.
R1-1711027 CSI feedback and Transparent PDSCH TxD Ericsson
R1-1711028 Codebook subset restriction Ericsson
R1-1711029 Type I & II CSI reporting Ericsson
R1-1711030 Encoding and mapping of CSI parameters Ericsson
R1-1711031 CSI feedback for multi-TRP Ericsson
R1-1711079 CSI Feedback Design for NR MIMO NTT DOCOMO, INC.
R1-1711080 Feedback Design for CSI Type I NTT DOCOMO, INC.
R1-1711081 Feedback Design for CSI Type II NTT DOCOMO, INC.
R1-1711165 On Type I and Type II CSI feedback using PUCCH Qualcomm Incorporated
R1-1711166 On CSI feedback for open- or semi-open-loop transmission Qualcomm Incorporated
R1-1711407 Multiple-panel codebook Huawei, HiSilicon
R1-1711408 Category 2 codebook design for type II codebook Huawei, HiSilicon
R1-1711409 Codebook design for beamformed CSI-RS Huawei, HiSilicon

R1-1711566 On semi-persistent CSI reporting on PUSCH Ericsson
R1-1711590 Feedback transmission of type II codebook Nokia, Alcatel-Lucent Shanghai Bell
R1-1711719 WF on CSI in PUCCH ZTE, NTT DOCOMO
R1-1711720 WF on Type II CSI ZTE, MediaTek
R1-1711785 WF on periodic CSI reporting on short PUCCH Ericsson, Samsung, Huawei, HiSilicon, CATT
R1-1711786 WF on unifying wideband and partial band definitions Ericsson, LGE, Samsung
R1-1711942 WF on periodic CSI reporting on short PUCCH Ericsson, Samsung, Huawei, HiSilicon, CATT

5.1.2.3.5 Other

R1-1710675 Discussion on CSI-RS Resource Activation Samsung
R1-1710676 Discussions on channel and interference measurements for NR Samsung
R1-1710677 Discussions on CSI Feedback Signalling Overhead Reduction Samsung
R1-1711032 On Dynamic Triggering for CSI Reports and CSI-RS Ericsson
R1-1711033 A comparison of CSI-RS activation schemes based on MAC CE and DCI Ericsson
R1-1711034 Identifying bounds on parameters in CSI framework Ericsson
R1-1711035 Frequency parametrization for Type II CSI codebook Ericsson
R1-1711036 Further details of measurement restriction configuration Ericsson
R1-1711038 On partial bands and CSI acquistion Ericsson
R1-1711039 NR CSI Computation Capability Ericsson
R1-1711301 On the CSI timing relationhips Nokia, Alcatel-Lucent Shanghai Bell
R1-1711406 Other remaining issues for CSI framework Huawei, HiSilicon
R1-1711449 Discussions on service specific CSI for NR Samsung
R1-1711671 Performance impact of inactive antenna ports Ericsson

5.1.2.4 Reference signals and QCL

5.1.2.4.1 Multiplexing of different types of RSs

Including multiplexing and RE mapping of RSs

R1-1710193 Discussion on multiplexing of different RSs ZTE
R1-1710064 Discussion on RS multiplexing CATT
R1-1710435 Multiplexing of CSI-RS with PDSCH in mixed numerology scenarios AT&T

Agreement:
- In NR, for a given BWP, support the case where CSI-RS for CSI acquisition and beam management is always transmitted with the same numerology as the PDSCH of the UE if PDSCH is present
  - FFS the case when PDSCH is not present

R1-1710678 Discussions on multiplexing of different types of RSs for DL Samsung

Discuss further offline – Leiming (Huawei)
R1-1711974 Summary of views on multiplexing of different types of RS Huawei, HiSilicon

Not treated.
R1-1710009 Multiplexing different types of DL RS Huawei, HiSilicon
R1-1710010 Multiplexing different types of UL RS Huawei, HiSilicon
R1-1710291 On collision avoidance for PTRS and other RSs LG Electronics
R1-1710531 On multiplexing of different RS types Intel Corporation
R1-1710679 Discussions on multiplexing of different types of RSs for UL Samsung
R1-1711040 On Multiplexing of RS types for downlink Ericsson
R1-1711167 On multiplexing of different types of RSs Qualcomm Incorporated
R1-1711302 On multiplexing of different RS types Nokia, Alcatel-Lucent Shanghai Bell
R1-1711558 Multiplexing of different types of RS for uplink Ericsson
R1-1711986 WF on PTRS multiplexing with other RSs for CP-OFDM ZTE

5.1.2.4.2 CSI-RS

R1-1711041 On CSI-RS for CSI-acquisition Ericsson
R1-1711759 Summary of offline discussion on CSI-RS Samsung

Agreements:
- At least for CSI acquisition, for N=4 OFDM symbols,

- Support two pairs of adjacent OFDM symbols for one CSI-RS resource where the two pairs can be adjacent or non-adjacent
  - For each pair, support a uniform RE mapping pattern in the time domain wherein the same sub-carriers are occupied in the two adjacent OFDM symbols
  - Note: CDM pattern will be discussed separately

Agreements:
- Support for CSI-RS sequence design:
  - (Working assumption) PN sequence at least for CSI-RS for CSI acquisition
  - UE specifically configured CSI-RS sequence seed
  - FFS, sequence design, e.g. PN sequence, ZC sequence, M sequence, etc., for other use cases such as beam management and fine time/frequency tracking

Agreements:
- For beam management, CSI-RS with sub-time units smaller than an OFDM symbol in a reference numerology is not supported in Rel-15

Continue discussion offline – Lu (Huawei)

R1-1711922 **WF on CSI-RS for BM Intel, Ericsson, CATT, Samsung, MediaTek, AT&T, NTT Docomo, KT**
Also supported by Spreadtrum, Qualcomm
R1-1711923 **WF on CSI-RS for BM Samsung, Intel, AT&T, NTT DOCOMO, ZTE**

R1-1711787 **WF on CSI-RS Samsung, Ericsson, NTT DOCOMO, CATT, LGE**

Agreements:
- Regarding CSI-RS RE Patterns for CSI Acquisition, support at least the following CSI-RS RE patterns for CSI acquisition for OCC based CDM

X	Density [RE/RB/port]	N	(Y,Z)	CDM	Remark
1	>1, 1	1	N.A.	No CDM	
2	1	1	(2,1)	FD-CDM2	
4	1	2	(2,2)	FD-CDM2, CDM4(FD2,TD2)	
8	1	2	(2,2)	FD-CDM2, CDM4(FD2,TD2)	
16	1	2	(2,2)	FD-CDM2, CDM4(FD2,TD2)	
32	1, 1/2	4	(2,2)	FD-CDM2, CDM4(FD2,TD2)	FFS, CDM8 details

  - Note: The RE pattern for an X-port CSI-RS resource spans N ≥ 1 OFDM symbols in the same slot and is comprised of one or multiple component CSI-RS RE patterns, where a component CSI-RS RE pattern is defined within a single PRB as Y adjacent REs in the frequency domain and Z adjacent REs in the time domain (agreements in RAN1#88)
  - Note: Density 1/2 is based on a PRB-level comb with the same comb offset value for all ports.
  - Note: REs for CDM2 and CDM4(FD2,TD2) comprise adjacent REs
  - Note: RAN1 will continue discussing adding more entries to the above table

Agreement:
- For partial-band CSI-RS, partial-band can be the same as bandwidth part
  - FFS whether or not to have small values than the bandwidth of bandwidth part

Agreements:
- Confirm the WA with the following revision
  - Support PN sequence for CSI-RS for CSI acquisition and beam management
- FFS detailed sequence generation and initialization methods
  - E.g. function of slot number, OFDM symbol number, CP length, UE ID, cell ID, virtual cell ID, function of PRB position of configured CSI-RS resource, etc.

Agreement:
- Down-select among the following two options in the next meeting
  - Option 1-1: From a UE perspective, CSI-RS is not multiplexed on SS block OFDM symbol(s)

- Option 1-2: From a UE perspective, CSI-RS can be multiplexed on SS block symbol(s)

Agreements:
- Down-select among the following two options in the next meeting:
  - Option 2-1: From a UE perspective, CSI-RS is not multiplexed on PDCCH OFDM symbol(s) for a slot
  - Option 2-2: From a UE perspective, CSI-RS can be multiplexed on PDCCH OFDM symbol(s) for a slot
    - Note: PDCCH decoding behavior at UE side will not be changed by Option 2-2.
  - Note: up to each company to define PDCCH OFDM symbols based on the max possible number of symbols or the configured PDCCH OFDM symbols for the slot

R1-1711804 **WF on CDM-8 in CSI-RS for CSI acquisition** **LG Electronics, Samsung, CATT, NTT DOCOMO**

Agreements:
- For CDM-8 in CSI-RS for CSI acquisition, support at least one of the following:
  - Alt 1: Distributed across multiple of the component CSI-RS RE patterns
  - Alt 2: Fully contained within one component CSI-RS RE pattern
- For CDM-4, study further whether to support the ports being distributed across multiple of the component CSI-RS RE patterns

R1-1711803 **WF on configuration of CSI-RS for CSI acquisition** **LG Electronics, Samsung**

Agreements:
- For CSI acquisition, at least the following parameters associated with a CSI-RS resource can be indicated to be a UE based on higher-layer configuration:
  - Number of CSI-RS ports
  - Density (RE/PRB/port)
    - For density = 1/2, comb offset
  - CDM (Length, Type)
  - Locations of the component RE patterns for the corresponding CSI-RS resource
    - FFS on signaling details
  - Scrambling ID
- Note: the detailed approach for the above signaling is FFS

R1-1711976 **WF on CSI-RS for beam management** **NTT DOCOMO, Ericsson, Samsung**
R1-1711973 WF on CSI-RS for BM Intel, Ericsson, Spreadtrum, MediaTek, Samsung, Verizon

Agreements:
- CSI-RS resource with 1-port and 2-port for one OFDM symbol can be used for beam management
  - Value of D>=1 represents RE/RB/port within a OFDM symbol.
  - For the case of 1-port
    - No CDM
      - Subcarrier spacing within a PRB for D>1
        - Even spacing
      - Constant subcarrier spacing across PRB(s)
      - Constant subcarrier spacing within a BWP
      - FFS the values of D
  - For the case of 2-port:
    - Reuse the same pattern as that of for CSI acquisition at least for D=1 (if supported)
- FFS: the potential number of CSI-RS OFDM symbols for beam management
- FFS: other values of X and D for beam management
- In the LS to RAN4, add "RAN1 are discussing the respective possible limited set values of D for 1-port and 2-port CSI-RS resource, e.g., taking from {1, 2, 3, 4, 6}. RAN4 is also welcome to provide inputs to select the values of D for 1-port and 2-port CSI-RS resources, respectively"

LS to be prepared in R1-1712003 (Yuichi, DCM)
Email approval for the LS in R1-1712003 until 7/7 (Yuichi, NTT DOCOMO)

R1-1710532 **On CSI-RS for beam management** **Intel Corporation**
R1-1710811 **IFDMA Based Beam Management CSI-RS for Flexible TX/RX Beam Sweeping** **MediaTek Inc.**
R1-1710931 **CSI-RS Design for Beam Management** **InterDigital, Inc.**
R1-1711042 **On CSI-RS for beam management** **Ericsson**

Not treated.

R1-1709946	CSI-RS design in NR	Huawei, HiSilicon
R1-1709947	CSI-RS design for beam management	Huawei, HiSilicon
R1-1710065	Design of CSI-RS for CSI acquisition	CATT
R1-1710066	Design of CSI-RS for beam management	CATT
R1-1710146	Disussion on CSI-RS design for beam management	Guangdong OPPO Mobile Telecom.
R1-1710194	On CSI-RS for beam management	ZTE
R1-1710195	On CSI-RS for CSI acquisition	ZTE
R1-1710256	CSI-RS design for beam management and interference measurement	NEC Corporation
R1-1710292	On CSI-RS design for beam management	LG Electronics
R1-1710293	On CSI-RS design for CSI acquisition	LG Electronics
R1-1710365	Discussion on CSI-RS design for CSI acquisition	Spreadtrum Communications
R1-1710401	On CSI-RS design for beam management	vivo
R1-1710436	Remaining details of CSI-RS	AT&T
R1-1710533	On CSI-RS for CSI acquisition	Intel Corporation
R1-1710680	Discussions on CSI-RS design for NR MIMO	Samsung
R1-1710681	CSI-RS for beam management	Samsung
R1-1710833	On CSI-RS configuration for fine time and frequency tracking support	MediaTek Inc.
R1-1710974	Discussion on using sub-time unit for CSI-RS of beam management	ITRI
R1-1711082	CSI-RS for beam managmenent	NTT DOCOMO, INC.
R1-1711083	CSI-RS for CSI acquisition	NTT DOCOMO, INC.
R1-1711303	On the CSI-RS configurations for NR CSI acquisition	Nokia, Alcatel-Lucent Shanghai Bell
R1-1711304	On CSI-RS Design for DL Beam Management	Nokia, Alcatel-Lucent Shanghai Bell
R1-1711339	Consideration on the CSI-RS design for NR	CATR
R1-1711468	On CSI-RS design for DL beam management	KT Corp.
R1-1711168	Discussion on CSI-RS design	Qualcomm Incorporated
R1-1711660	WF on CSI-RS	Samsung, Ericsson, NTT DOCOMO, CATT
R1-1711661	Summary of views on NR CSI-RS	Huawei, HiSilicon
R1-1711723	WF on CSI-RS CDM pattern	ZTE

5.1.2.4.3 DMRS

R1-1709909	**Further Evaluation and Discussion on DMRS Design Details**	**Beijing Xinwei Telecom Techn.**
R1-1710196	**Discussion on downlink DMRS design**	**ZTE**
R1-1711043	**On DL DMRS design**	**Ericsson**
R1-1710831	**On downlink DMRS design**	**MediaTek Inc.**

Continue discussion offline – Alex (Qualcomm)
R1-1711778 **Remaining issues on NR DM-RS** **Qualcomm**
R1-1711797 **WF on DMRS sequence** **Samsung, Ericsson, Qualcomm Incorporated, CATT, Nokia, Alcatel-Lucent Shanghai Bell, Intel, AT&T, NTT DOCOMO, INC., LG Electronics, KT Corp., MediaTek Inc., Mitsubishi Electric Co., Spreadtrum, Fujitsu, Xinwei, KDDI, Panasonic, ITL**
Also supported SONY, KRRI

Agreement: Both in DL and UL DMRS for CP-OFDM, only PN sequence is supported

R1-1711784 **WF on DMRS design** **MediaTek, Huawei, HiSilicon, China Telecom, ZTE, ASUSTek, CeWiT, Spreadtrum, Tejas Networks, CATR, Deutsche Telekom, IITH, Xinwei, MTI, CHTTL, China Unicom, IITM, ITRI**

Agreements:
- The working assumption made in RAN1#89 for DM-RS is updated and agreed as follows for CP-OFDM:
  - A UE is configured by higher layers with DMRS pattern either from the front-loaded DMRS Configuration type 1 or from the front-loaded DMRS Configuration type 2 for DL/UL:
    - Configuration type 1:
      - One symbol:
        - Comb 2 + 2 CS, up to 4 ports
      - Two symbols:
        - Comb 2 + 2 CS + TD-OCC ({1 1} and {1 -1}), up to 8 ports
          - Note: It should be possible to schedule up to 4 ports without using both {1,1} and {1,-1}.
    - Configuration type 2:
      - One symbol:

- 2-FD-OCC across adjacent REs in the frequency domain, up to 6 ports
- Two symbols:
  - 2-FD-OCC across adjacent REs in the frequency domain + TD-OCC (both {1,1} and {1,-1}) up to 12 ports
    - Note: It should be possible to schedule up to 6 ports without using both {1,1} and {1,-1}.
- From UE perspective, frequency domain CDMed DMRS ports are QCLed.
- FFS: Whether the front-load DMRS configuration type for a UE for UL and DL can be different or not.
- Note: If there are significant complexity/performance issues involved in the above agreements, down-selection can still be discussed

R1-1711813 **WF on DM-RS NTT DOCOMO, Ericsson, Nokia, ASB, ZTE, KT Corp, Sharp, Qualcomm**
Proposals:
- In configuration 1 for DL, at least for SU-MIMO,
  - For 1-symbol, DM-RS N<=2 layer reception are multiplexed without any CDM in frequency for a UE
  - For 2-symbol, DM-RS N<=4 layer reception are multiplexed without any CDM in frequency for a UE
- FFS the case of UL MU-MIMO

Discuss till next meeting

R1-1711783 **WF on UL DMRS pattern for DFT-S-OFDM** **LG Electronics, ZTE, Ericsson, NEC, NTT DOCOMO**

Agreements:
- For DFT-S-OFDM based PUSCH DMRS
  - DMRS are mapped to resource elements using a comb structure (IFDMA).
    - DMRS and associated PUSCH are multiplexed in time domain
    - At least the following (repetition factor, CS) combinations is supported
      - (2, 2)
  - Front load DMRS is allocated to 1 or 2 OFDM symbols
    - When 2 OFDM symbols are allocated, TD-OCC ({1 1} and {1 -1}) are supported for orthogonal DMRS port multiplexing.
    - FFS the detailed applicability of 1 vs. 2 OFDM symbols
    - FFS the location of the DMRS symbol(s)

R1-1711816 **WF on front-loaded DMRS design for slot aggregation** **vivo, Huawei, HiSilicon**
Further discussion till next meeting

R1-1711770 **WF on DL DMRS for broadcast/multicast PDSCH** **LG Electronics, Qualcomm**

Agreements:
- For broadcast/multicast PDSCH (other than PBCH), the PDSCH is transmitted with a single DMRS port:
  - Support using only one front-load DMRS Configuration from Configuration 1 and Configuration 2. To down-select from:
    - Alt 1: Configuration 1 (FFS 1 or 2 symbols)
    - Alt 2: Configuration 2 with 2 symbols
  - Support additional DM-RS. To down-select from:
    - Alt 1: Additional DMRS is always present
    - Alt 2: Additional DMRS is configurable
    - FFS the number of additional DMRS symbol(s)

R1-1711722 **WF on multiplexing between DMRS and data** **ZTE, Qualcomm, KT Corp., NTT DOCOMO**

Agreements:
- Study further aspects related to DMRS and data multiplexing in DL and UL considering 14 and 7 symbol slots/mini-slots, 1 vs. 2 front loaded DM-RS symbols, additional DM-RS, etc.
- Study further aspects related to possibly power boosting DM-RS (performance, complexity, spec impact)

R1-1711714 **WF on DMRS multiplexing scheme in time domain** **ZTE, Xinwei, ASTRI, Spreadtrum**

R1-1711666 **WF on SS block and DM-RS collision handling** **Intel**

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Agreements:
- Study further how to handle DM-RS and SS block collision (if any)
  - E.g., changing DM-RS symbol(s) position in time domain, no PDSCH transmission on the collided PRBs, dropping the DM-RS symbol in collision, etc.

R1-1711771 WF on signalling DMRS configuration LG Electronics, ZTE

Agreements:
- The number of front-load DMRS symbols can be 1 or 2 when the number of DMRS ports allocated to UE is equal or less than N
  - N is 4 for Configuration 1 and 6 for Configuration 2.
  - FFS the details to determine 1 or 2 symbols

Not treated.

R1-1709941 Design of DL DMRS for data transmission Huawei, HiSilicon
R1-1709942 Evaluation results of DMRS design for DL data channel Huawei, HiSilicon
R1-1709943 UL DMRS design for data transmission Huawei, HiSilicon
R1-1709944 Evaluation results of DMRS design for UL data channel Huawei, HiSilicon
R1-1710067 On DMRS design for DL CATT
R1-1710068 On DMRS design for UL CATT
R1-1710197 Evaluation results on DL DMRS ZTE
R1-1710198 Discussion on uplink DMRS design ZTE
R1-1710257 Considerations on the design of DMRS NEC Corporation
R1-1710294 On DL DMRS design LG Electronics
R1-1710295 On UL DMRS design LG Electronics
R1-1710362 DMRS configurations for CP-OFDM. Spreadtrum Communications
R1-1710402 On DL DMRS design vivo
R1-1710410 Evaluation of DL DMRS designs Mitsubishi Electric Co.
R1-1710411 Views on DL DMRS designs Mitsubishi Electric Co.
R1-1710534 On the remaining details of DM-RS design Intel Corporation
R1-1710607 On DM-RS for NR Intel Corporation
R1-1710612 Discussion on downlink DMRS design ETRI
R1-1710613 Discussion on uplink DMRS design ETRI
R1-1710682 Discussion on DL DMRS design for NR Samsung
R1-1710683 Evaluation results on DL DMRS for NR Samsung
R1-1710684 Discussion on UL DMRS design for NR Samsung
R1-1710685 Evaluation results on UL DMRS for NR Samsung
R1-1710933 On DM-RS design for NR InterDigital, Inc.
R1-1710970 On front-load DMRS design China Telecommunications
R1-1711044 On DL DMRS evaluations Ericsson
R1-1711045 On UL DMRS design Ericsson
R1-1711046 On UL DMRS evaluations Ericsson
R1-1711084 Evaluation results of DM-RS NTT DOCOMO, INC.
R1-1711085 Discussion on DM-RS design NTT DOCOMO, INC.
R1-1711169 Discussion on UL DMRS design Qualcomm Incorporated
R1-1711170 Discussion on DL DMRS design Qualcomm Incorporated
R1-1711171 Evaluation of UL DMRS design Qualcomm Incorporated
R1-1711172 Evaluation of DL DMRS design Qualcomm Incorporated
R1-1711305 On design of DL DM-RS for NR physical data channels Nokia, Alcatel-Lucent Shanghai Bell
R1-1711306 DL DM-RS patterns link performance evaluation Nokia, Alcatel-Lucent Shanghai Bell
R1-1711307 On design of UL DM-RS for NR physical data channels Nokia, Alcatel-Lucent Shanghai Bell
R1-1711340 Consideration on the font loaded DM RS design for NR CATR
R1-1711350 DMRS pattern configuration for NR ITL

5.1.2.4.4 PT-RS

R1-1710296 On DL PT-RS design LG Electronics
R1-1709940 PTRS for DFT-s-OFDM Huawei, HiSilicon
R1-1710936 Remaining Issues on PTRS for NR InterDigital, Inc.

Continue offline discussion – Mattias (Ericsson)

R1-1711914 Overview of WFs on PTRS Ericsson
R1-1711815 WF on PT-RS for DFT-S-OFDM NTT DOCOMO, Mitsubishi Electric, Huawei, HiSilicon, Nokia, ASB

Agreements:
- For PT-RS insertion for UL DFT-S-OFDM
  - Companies are encouraged to perform simulations with realistic simulation assumptions comparing pre-DFT vs. post-DFT PT-RS insertion
    - For pre-DFT, companies are encouraged to compare chunk-based distribution vs. non-chunk based distribution

Agreements:
- Support at least full symbol-level time density for time-domain PT-RS for DFT-S-OFDM (every PUSCH carrying symbol)
  - FFS: whether to support configurable symbol-level time density for time-domain PT-RS density reduction for DFT-S-OFDM
    - Note: If supported, the configuration can be implicit (associated with scheduled MCS and/or BW and/or DM-RS port(s)/position) or explicit, which is to be decided in next meeting

R1-1711891 **WF on PT-RS for DFT-S-OFDM Samsung, Intel, CATT**

R1-1711814 **WF on PT-RS for CP-OFDM NTT DOCOMO, Ericsson, Nokia, ASB, Panasonic, Spreadtrum, ZTE**

Agreements:
- If one DL PT-RS port is configured for a DL DM-RS port group, the DL PT-RS port and one DL DM-RS port in the DL DM-RS port group are associated for phase tracking, the association is determined in the specification
  - FFS details for the association
- If one DL PT-RS port is configured for a DL DM-RS port group, the DL PT-RS port is associated with:
  - Alt 1: the lowest DL DM-RS port in the DL DM-RS port group.
  - Alt 2: one DL DM-RS port in the DL DM-RS port group in a RB, where the one DL DM-RS port may vary across RBs
  - Other alternatives are not precluded
  - To conclude with one alternative next meeting
- FFS the case of two codewords

R1-1711688 Way Forward on PTRS Intel, Huawei, HiSilicon, National Instruments, MediaTek
R1-1711941 **Way Forward on PTRS Intel, Huawei, HiSilicon, National Instruments, MediaTek**

Agreements:
- Study further whether or not to support power boosting for PT-RS considering different or same number of ports compared with DM-RS
- Down-selection among the following for CP-OFDM DL & UL for PTRS:
  - Opt-1: a single association table pair per subcarrier spacing
  - Opt-2: UE recommends the preferred thresholds in tables and/or gNB to update/confirm
  - Opt-3: multiple association tables for each subcarrier spacing, to reflect different phase noise models resulting from different carrier frequencies, subcarrier spacings, UE implementations
  - Opt-4: a single association table pair per subcarrier spacing based on UE capability

R1-1711895 **WF on Remaining Issues on PTRS for CP-OFDM – Part IIHuawei, HiSilicon, InterDigital, Xinwei, Intel, NI, Panasonic, Spreadtrum**
R1-1711932 **WF on PT-RS pattern in frequency domain LG Electronics**

Agreements:
- For PTRS for CP-OFDM, study further how to handle mapping PTRS in case of non-consecutive scheduling
  - Alt 1: based on PRBs
  - Alt 2: based on VRBs
  - Other alternatives are not precluded
  - Note: consecutive scheduling can be considered as a special case
- For PTRS for CP-OFDM, study further whether or not there is need for interference randomization for PT-RS and if so, how
  - Companies are encouraged to provide simulation results
- To continue study to finalize the PT-RS density tables w.r.t. to MCS and scheduled bandwidth

R1-1711773 **WF on PT-RS collision avoidance** **LG Electronics, Huawei, CATT, ZTE**

Agreement: Study further how to handle PT-RS collision with CSI-RS

R1-1711894 **WF on Remaining Issues on PTRS for CP-OFDM – Part I** **Huawei, HiSilicon, InterDigital, Xinwei, NI, Panasonic**

Agreements:
- For PTRS for CP-OFDM, NR supports
  - Information related to UE to facilitate PTRS port configuration
    - FFS details, e.g., UE to report information (if so, details), or re-using UE information available for other purposes

R1-1710230 **UL PTRS for DFTsOFDM waveform** **Mitsubishi Electric RCE**
R1-1710535 **On PT-RS for CP-OFDM** **Intel Corporation**
R1-1710536 **On PT-RS for DFT-s-OFDM** **Intel Corporation**

Not treated.
R1-1709939 PTRS for CP-OFDM Huawei, HiSilicon
R1-1710069 Considerations on RS for phase tracking CATT
R1-1710199 Discussion on RS for phase tracking ZTE
R1-1710359 PT-RS design Panasonic Corporation
R1-1710363 Considerations on PT-RS for CP-OFDM Spreadtrum Communications
R1-1710403 On PT-RS design for CP-OFDM vivo
R1-1710686 On DL PTRS design Samsung
R1-1710687 On UL PTRS for DFT-s-OFDM Samsung
R1-1710777 Discussion on PT-RS design CMCC
R1-1711047 On PTRS DL design Ericsson
R1-1711048 On PTRS UL design Ericsson
R1-1711086 Discussion on PT-RS design NTT DOCOMO, INC.
R1-1711173 Phase and frequency tracking reference signal considerations Qualcomm Incorporated
R1-1711308 Discussion on PT-RS design for CP-OFDM Nokia, Alcatel-Lucent Shanghai Bell
R1-1711631 On Details of the PT-RS Design for DFT-s-OFDM Nokia, Alcatel-Lucent Shanghai Bell
R1-1710297 On UL PT-RS design LG Electronics

5.1.2.4.5 SRS

R1-1710855 **Considerations on SRS design** **Sony**
R1-1711049 **On SRS design** **Ericsson**
R1-1711087 **Discussions on NR SRS Design** **NTT DOCOMO, INC.**
R1-1711174 **Discussion on SRS design** **Qualcomm Incorporated**

Agreement: For NR SRS, support sounding bandwidth in multiple of 4 PRBs
- FFS the detailed set of SRS sounding bandwidths to be supported
- At least 4 PRBs as SRS sounding bandwidth is supported

Continue offline discussion – Takano (SONY)
R1-1711951 **Open issues on SRS design** **SONY**
R1-1711791 **Way Forward on SRS Switching** **Huawei, HiSilicon, Softbank, CMCC, Deutsche Telekom, CATR, Tejas Networks, OPPO, Qualcomm, CeWiT, Sony, ZTE, Xinwei, IITM, China Unicom, IITH, Ericsson, InterDigital, China Telecom, MediaTek**

Agreement**:** Support antenna switching for SRS transmission within a carrier:
- FFS: Support at least [2Tx, 4Tx] switching

R1-1711869 **WF_config_collision_SRS_PUCCH_L** **Mitsubishi Electric, AT&T, Panasonic, Samsung, Huawei, HiSilicon, ZTE**

Agreements:
- From a UE perspective, NR supports one or both of the following options on a given carrier:

- Option 1 : Support only one of the following options for avoiding collisions between NR-SRS and short PUCCH
  - Option 1-1 : symbol level TDM
  - Option 1-2 : FDM
  - Option 1-3 : both symbol level TDM and FDM
  - FFS : details
  - Note : other options are not precluded
- Option 2: Prioritize SRS or short PUCCH transmission, i.e., drop SRS or short PUCCH in case of collision
  - FFS whether to have one prioritization rule, or configurable prioritization

R1-1711852 **WF on SRS Sequence Design** **Ericsson, Huawei, HiSilicon, Nokia, ASB, Panasonic, NTT DOCOMO**
R1-1711668 **WF on SRS sequence for NR** **Intel, Samsung, Qualcomm**
Also supported by LGE, KT, CATT
R1-1711767 **WF on SRS sequence generation for partial overlapping** **LG Electronics, Intel Corporation, ZTE**

Agreements:

- NR supports at least the following SRS sequences
  - LTE SRS sequences
- Study further whether or not to additionally support the following for NR SRS sequence design:
  - Opt-1: Truncated ZC design
    - Set of [60] long ZC sequences designed for each of [5] different reference carrier bandwidths where the sequence length exceeds the carrier bandwidth before truncation
      - The portion of the truncated sequence corresponds to the SRS PRB location assigned to the UE
    - Ports on the same comb are separated by cyclic shifts which are repeated every n SRS REs, e.g. n=[8,12]
  - Opt-2: block-wise concatenation based ZC sequence generation.
    - The number of blocks (e.g. 1, 2, …) and/or block length (e.g. 4RBs, 8RBs, …) per each block is informed to UE
      - Alt1. the number of blocks and/or block length are configured by network. If 1 block is configured, SRS sequence for NR is the same as LTE SRS sequence
      - Alt2. Implicit signaling e.g. the number of blocks and block length are dependent on waveform. When DFT-S-OFDM is configured to UE, the number of block is one and the block length is equal to SRS BW; When CP-OFDM is configured, the number of blocks can be larger than 1.
  - Opt-3: Same LTE SRS sequence generation mechanism with additional roots
- To conclude during the next meeting
  - Evaluations to consider at least CM/PAPR and sequence cross-correlation for the case of fully and partially overlapping SRS allocations
  - Evaluations to further consider CM/PAPR for carrier bandwidths different than the reference ones

R1-1711920 **WF on SRS design in NR** **LG Electronics, CATT, Intel Corp., KT Corp., Qualcomm**

R1-1711930 **WF on SRS Configuration** **Huawei, HiSilicon, OPPO**

Agreement: Support gNB to configure one or more groups where each group contains one or more SRS resource(s) to UE

- Note: different groups may be for different purposes, e.g., one or more groups for beam management, one for DL CSI acquisition, one for UL CSI acquisition, etc.

Not treated.
R1-1709936 UL SRS design for beam management and CSI acquisition Huawei, HiSilicon
R1-1710070 Further considerations on SRS design CATT
R1-1710147 On SRS design for NR Guangdong OPPO Mobile Telecom.
R1-1710200 Discussion on SRS design for NR ZTE
R1-1710298 On SRS design and related operations LG Electronics
R1-1710409 Views on SRS designs Mitsubishi Electric Co.
R1-1710537 Discussion on SRS for NR Intel Corporation
R1-1710688 SRS design for NR Samsung
R1-1710817 SRS design in NR MediaTek Inc.
R1-1710929 Discussion on SRS sequence generation for NR Panasonic Corporation
R1-1710938 On SRS for NR InterDigital, Inc.

R1-1711310 UL SRS design considerations in NR Nokia, Alcatel-Lucent Shanghai Bell
R1-1711643 Views on SRS designs Mitsubishi Electric

5.1.2.4.6 TRS

R1-1709934 Reference signal for fine time and frequency tracking Huawei, HiSilicon
R1-1710832 On TRS design requirement MediaTek Inc.
R1-1711175 Further analysis on fine time/frequency tracking RS design Qualcomm Incorporated

Further discussion offline, especially to narrow-down (possibly selecting) the possible range/set of values for the following parameters for TRS:

- **X**: the length of TRS burst in terms of number of slots
- **Y**: the TRS burst periodicity in terms of number of slots
- **S_f**: TRS subcarrier spacing
- **S_t**: TRS symbol spacing within a slot
- **N**: Number of OFDM symbols per TRS within a slot
- **B**: TRS bandwidth in terms of number of RBs

Revisit later this week – Chiao-yao (MTK) (including possible other aspects for TRS)

R1-1711765 Summary of views on TRS MediaTek
R1-1711766 WF on TRS MediaTek, Huawei, HiSilicon, Ericsson, Qualcomm

Agreements:

- Slide 3 and slide 4 in R1-1711766 are agreed with the following updates:
  - N: add value of 1
  - B: 50 RBs assuming SCS=15KHz (FFS, for other SCS values)

Agreements:

- TRS is UE-specifically managed
- NR supports TRS for multi-TRP transmission
  - Details FFS
- FFS how to handle the case of initial access and idle mode (e.g., the necessity of TRS or not, default value if TRS is necessary, etc)
- FFS how to handle multi-beam transmission
- FFS: whether the tracking performance enhancement is needed for long DRX

Not treated.
R1-1710201 Discussion on fine time/frequency tracking of channel ZTE
R1-1710299 Discussion on fine time/frequency tracking of channel LG Electronics
R1-1710538 Discussion on TRS Intel Corporation
R1-1710689 Discussions on fine time/frequency tracking for NR Samsung
R1-1710853 Considerations on fine time/frequency tracking Sony
R1-1711613 On time and frequency tracking of the channel Ericsson (rev of R1-1711050)
R1-1711311 Views on the fTFT-RS in NR Nokia, Alcatel-Lucent Shanghai Bell

5.1.2.4.7 QCL

R1-1710202 QCL design for UL and DL MIMO ZTE
R1-1710539 On QCL for different BW parts and other QCL details Intel Corporation
R1-1711176 Discussion on QCL Qualcomm Incorporated
R1-1711312 On QCL Framework and Configurations in NR Nokia, Alcatel-Lucent Shanghai Bell

Agreements:

- For QCL, NR supports:
  - At least one or two DM-RS antenna port groups per PDSCH
    - FFS other number of groups
  - QCL assumption across carriers and bandwidth parts for DL
    - FFS details for indication, the applicable RS(s), the applicable QCL parameters, and configurability
    - FFS whether or not to have UE assisted management

Continue offline discussion – Mihai (Nokia)

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Not treated.
R1-1709935 Details of QCL assumptions and related RS design considerations Huawei, HiSilicon
R1-1710071 On QCL for NR CATT
R1-1710300 Discussion on QCL for NR LG Electronics
R1-1710690 On QCL for NR Samsung
R1-1710941 On QCL for NR InterDigital, Inc.
R1-1711051 The QCL framework in NR Ericsson
R1-1711672 Summary of QCL Nokia, Alcatel-Lucent Shanghai Bell
R1-1711971 WF on QCL assumption in NR ZTE, ASTRI, Nokia, ASB

5.1.2.4.8 Other

R1-1709937 UL SRS sequence design in NR Huawei, HiSilicon
R1-1709945 Common UL/DL DMRS design Huawei, HiSilicon
R1-1710455 Signaling of DMRS ports for SU/MU-MIMO Huawei, HiSilicon
R1-1710456 DMRS design for URLLC Huawei, HiSilicon
R1-1710457 Considerations on UE-specific RS Sequence Design Huawei, HiSilicon
R1-1710458 Discussion on UL DMRS power boosting Huawei, HiSilicon
R1-1711052 On the number of antenna ports for CSI-RS Ericsson
R1-1711053 On the collision between DMRS and DC subcarrier Ericsson
R1-1711246 Discussion on Bursty Interference Measurement Resources Qualcomm Incorporated
R1-1711591 Link level performance evaluation for mobility scenario Samsung
R1-1711599 Remaining issues on PT-RS dendisy in CP-OFDM Samsung

5.1.2.5 Other

Including MIMO calibration

R1-1709910 NR MIMO System Level Phase 3 Calibration Results Beijing Xinwei Telecom Techn.
R1-1709938 SRS antenna switching Huawei, HiSilicon
R1-1710072 System level calibration results for NR MIMO CATT
R1-1710073 Link level calibration results for NR MIMO CATT
R1-1710206 Calibration results for Phase 2 NR MIMO system level calibration ZTE
R1-1710207 Calibration results for Phase 3 NR MIMO calibration ZTE
R1-1710208 Further clarification on Phase 3 NR MIMO calibration ZTE
R1-1710301 Phase 3 SLS Calibration Results for NR MIMO LG Electronics
R1-1710302 Phase 2 LLS Calibration Results for NR MIMO LG Electronics
R1-1710540 Calibration results for Phase 2 NR MIMO system level calibration Intel Corporation
R1-1711393 Calibration results for Phase 1 NR MIMO system level calibration MOTOROLA MOBILITY LLC
R1-1711450 MIMO Phase-2 SLS calibration results on 30GHz frequency band Samsung
R1-1711451 MIMO Phase-2 LLS calibration results on 30GHz frequency band Samsung
R1-1711452 Evaluation results for dense urban on 30GHz frequency band Samsung
R1-1711579 Calibration results for Phase 1 and Phase 2 NR MIMO system level calibration vivo
R1-1711593 System level evaluation on effect of penetration loss in sub-6GHz and above-6GHz frequency bands Samsung
R1-1711594 Analysis on random cluster effect in map-based hybrid channel model Samsung

5.1.3 Scheduling/HARQ aspects

5.1.3.1 Physical downlink control channel

R1-1711567 Summary of e-mail discussion on DCI content Ericsson LM

R1-1711910 [DRAFT] Reply LS on PDCCH design Ericsson
R1-1711972 [DRAFT] Reply LS on PDCCH design Ericsson, CATT
R1-1711992 [DRAFT] Reply LS on PDCCH design Ericsson, CATT
Decision: The document is noted and final LS is approved in R1-1712005 by deleting a sentence **"**RAN1 may downselect between 7 and 14 symbols in the future." and capture past agreements related to it in RAN1 #86bis (in Lisbon) as it is in Section 1.

5.1.3.1.1 PDCCH structure

R1-1712006 WF on UE behaviour for reserved resource Samsung

5.1.3.1.1.1 CCE-to-REG mapping and PDCCH-to-CCE mapping

Including REG bundle size/structure.

R1-1711411 Evaluation on REG bundle sizes for 1-symbol CORESET duration Huawei, HiSilicon

Observation 1: For 1-symbol CORESET configured with REG-to-CCE mapping without interleaving, same precoder across multiple CCEs, i.e., higher REG bundling size such as 12 REGs, will improve PDCCH performance.
Observation 2: for 1-symbol CORESET configured with REG-to-CCE mapping with interleaving,
- using smaller REG bundling size hence finer cycling granularity, precoder cycling can obtain more diversity gain, i.e., the performance curve of BLER vs SNR will have a steeper slope, especially for the case of low Delay spread(hence low frequency selectivity)and in high SNR region, where channel estimation performance can be ensured with smaller REG bundling size, e.g.,2;
- using larger REG bundling size such as 3 or 6, channel estimation performance can be improved, especially for the case of high Delay spread(hence high frequency selectivity)and in low SNR region, where PDCCH performance will be ensured by high PDCCH aggregation level;
- higher PDCCH aggregation level will benefit from larger bundling size;

Proposal: Configurable REG bundling size should be supported for 1-symbol CORESE configured with REG-to-CCE mapping with interleaving, and bundle size 2, 3 or 6 can be configured.

Decision: The document is noted.

R1-1711412 Evaluation on REG bundle sizes for more than 1 symbol CORESET duration Huawei, HiSilicon

Observation 1: for 2- or 3-symbol CORESET configured with REG-to-CCE mapping without interleaving, same precoder across multiple CCEs, i.e., higher REG bundling size such as 12 REGs, will improve PDCCH performance.
Observation 2: for 2- or 3-symbol CORESET configured with REG-to-CCE mapping with interleaving:
- using lower REG bundling size (REG bundle pattern 0) have finer cycling granularity, precoder cycling can obtain more diversity gain, especially for the case high SNR region;
- using higher REG bundling size (REG bundle pattern 1), channel estimation performance can be improved, especially for the case of low SNR region;
- higher PDCCH aggregation level will benefit from larger bundling size;

Proposal: For Option2 in 2 and 3 OFDM symbol CORESET, the following REG bundle patterns can be configured:
- 1 symbol in time domain and {3,6} consecutive REGs in frequency domain;
- 1 symbol in time domain and {2,6} consecutive REGs in frequency domain;
- 2 symbols in time domain and 1 REG per symbol in frequency domain;
- 2 symbols in time domain and 3 consecutive REGs per symbol in frequency domain; Or
- 3 symbols in time domain and 1 REG per symbol in frequency domain;
- 3 symbols in time domain and 2 consecutive REGs per symbol in frequency domain.

Decision: The document is noted.

R1-1710541 NR PDCCH physical structure Intel Corporation

- Observation 1: In case of CORESET of 1 OS and 48 RBs, REGBs of 3 and 6 REGs exhibit similar performance. While REGB of 6 REGs shows slightly better performance than REGB of 3 REGs for high AL NR-PDCCH in low SNR, the performance of REGB of 3 REGs is slightly better than that of REGB of 6 REGs for low AL NR-PDCCH in high SNR.
- Observation 2: In case of CORESET of 2(3) OS and 24(16) RBs, REGBs of 2(3) and 6 REGs exhibit similar performance. Specifically REGB of 6 REGs shows slightly better performance than REGB of 2(3) REGs for high AL NR-PDCCH in low SNR.
- Proposal 1: For non-interleaved REG-to-CCE mapping in 1-symbol CORESET, UE assumption of same precoding over multiple REG bundles can be configured by the gNB.
- Proposal 2: For interleaved REG-to-CCE mapping in 1-symbol CORESET, REG bundle size is 3REGs and UE assumption of same precoding over multiple REG bundles can be configured by the gNB.
- Proposal 3: For non-interleaved REG-to-CCE mapping in CORESET of more than 1 symbol with time-first mapping of REG-to-CCE, UE assumption of same precoding over multiple REG bundles can be configured by the gNB.
- Proposal 4: For interleaved REG-to-CCE mapping in CORESET of more than 1-symbol with time-first mapping of REG-to-CCE, REG bundle size is 2 REGs and 3 REGs for 2-symbol and 3-symbol CORESETs respectively, and UE assumption of same precoding over multiple REG bundles can be configured by the gNB.
- Proposal 5: At least for interleaved REG-to-CCE mapping in 1-symbol and multi-symbol CORESETs with time-first mapping, when configured, the same precoding may be assumed across no more than [2] REG bundles.
- Proposal 6: For multi-symbol PDCCH CORESET, adopt the following additional REG-to-CCE mapping option:
  - (Option 2) Support of frequency-first mapping such that:
    - REG-to-CCE mapping is exactly same as the case where a CORESET with 1 symbol
    - A PDCCH candidate can be mapped across OFDM symbols.

Decision: The document is noted.

R1-1711708 WF on REG bundle size in a CORESET with interleaving LG Electronics, ETRI, NTT DOCOMO, Ericsson, InterDigital

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- The REG bundle size in a CORESET with interleaving is
  - [2 or 3] for 1-symbol CORESET
  - 2 for 2-symbol CORESET when time-first REG-to-CCE mapping is applied
  - 3 for 3-symbol CORESET when time-first REG-to-CCE mapping is applied

Decision: The document is noted.

Proposed agreement
- The REG bundle size in a CORESET with interleaving is
  - Configurable between 2 and 6 for 1-symbol CORESET
  - Configurable between 2 and 6 for 2-symbol CORESET when time-first REG-to-CCE mapping is applied
  - Configurable between 3 and 6 for 3-symbol CORESET when time-first REG-to-CCE mapping is applied

For 2 and 3 symbols CORESET
- Option 1 REG bundle size = CORESET length
  - Supported by Sansung, LGE, Panasonic, NTT DOCOMO, Ericsson, ETRI, OPPO, ZTE, InterDigital
- Option 2 REG bundle size = 6
  - Nokia, ASB, Qualcomm

Agreements:
For a 1-symbol CORESET with interleaving,
- At least REG bundle size = 2 is supported
- Working assumption:
  - REG bundle size = 6 is also supported
  - FFS whether configuration between 2 and 6 is explicit or implicit
  - Precoder granularity in frequency domain is equal to the REG bundle size in the frequency domain

For a 2 or 3 symbol CORESET with interleaving,
- At least REG bundle size = CORESET length is supported
- Working assumption:
  - REG bundle size = 6 is also supported
  - FFS whether configuration between CORESET length and 6 is explicit or implicit
  - Precoder granularity in frequency domain is equal to the REG bundle size in the frequency domain

(Note: REG bundle size = REGs in frequency domain x symbols in time domain)

Not treated.

R1-1710011	Overview of PDCCH-CCE-REG mapping and REG bundling	Huawei, HiSilicon
R1-1710074	NR-PDCCH mapping structure	CATT
R1-1710104	CCE mapping with REG bundling	ZTE
R1-1710148	NR-PDCCH CCE-to-REG mapping with REG bundling	Guangdong OPPO Mobile Telecom.
R1-1710303	Discussion on NR-PDCCH structure	LG Electronics
R1-1710366	Discussion on NR-REG to NR-CCE time-/frequency mapping	Spreadtrum Communications
R1-1710390	Discussion on REG bundling size/structure	vivo
R1-1710614	NR-PDCCH mapping structure and REG bundle size	ETRI
R1-1710691	Resource Mapping for PDCCH	Samsung
R1-1710788	Discussions on NR-PDCCH Structure	MediaTek Inc.
R1-1710903	PDCCH structure for NR	NEC
R1-1710944	On the impact of multi-beam operation on PDCCH structure	InterDigital, Inc.
R1-1710973	Discussion on REG bundle size	ITRI
R1-1710978	On the PDCCH construction for NR	Nokia, Alcatel-Lucent Shanghai Bell
R1-1711088	Views on remaining issues of resource mapping for NR-PDCCH	NTT DOCOMO, INC.
R1-1711235	REG bundling for NR PDCCH	Sharp
R1-1711273	Design of resource mapping and NR-PDCCH	HTC Corporation
R1-1711280	On CCE and PDCCH mapping	Motorola Mobility, Lenovo
R1-1711327	The relation among REG, CCE, and CORESET	Panasonic
R1-1711475	Views on CCE-to-REG mapping	KT Corp.
R1-1711477	On NR-PDCCH Structure	Ericsson
R1-1711633	PDCCH structure	Qualcomm Incorporated

5.1.3.1.1.2 RS structure/mapping

Including possible wideband RS.

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DMRS mapping

- Option 1: DMRS is mapped on all REGs on all the OFDM symbols of a given PDCCH candidate
  - Supported by Ericsson, Nokia, ASB, ITRI, Huawei, HiSilicon, OPPO, Intel, ETRI, KT, Lenovo, MotM, Panasonic, NTT DOCOMO, CATT, MediaTek, CMCC, Sony, Spectrum
- Option 2 DMRS is mapped on all REGs on the first OFDM symbol of a given PDCCH candidate
  - Samsung, ZTE, Huawei, HiSilicon, vivo, InterDigital, LGE, Qualcomm, Sharp, Intel, NEC, Panasonic
- Option 3 DMRS is mapped on all REGs on the first and last OFDM symbols of a given PDCCH candidate
  - DOCOMO, CATT, MediaTek, CMCC, vivo, Sony, Spectrum

Agreement

- DMRS is mapped on all REGs on all the OFDM symbols of a given PDCCH candidate
  - The DMRS density is the same on all REGs

Not treated.

R1-1709950	DMRS for NR-PDCCH	Huawei, HiSilicon
R1-1710075	Further details of NR-PDCCH RS structure	CATT
R1-1710105	Issues regarding DMRS structure and mapping	ZTE
R1-1710149	On NR PDCCH RS design	Guangdong OPPO Mobile Telecom.
R1-1710304	Discussion on reference signal for NR-PDCCH	LG Electronics
R1-1710389	DMRS design for NR-PDCCH	vivo
R1-1710542	On DM-RS design for NR PDCCH	Intel Corporation
R1-1710615	DMRS design for NR-PDCCH	ETRI
R1-1710778	On DMRS Design for NR-PDCCH	CMCC
R1-1710789	RS structures for NR-PDCCH	MediaTek Inc.
R1-1710945	On REG bundling and associated DMRS	InterDigital, Inc.
R1-1710979	On the remaining details of PDCCH reference signal structure	Nokia, Alcatel-Lucent Shanghai Bell
R1-1711089	Views on DM-RS design for NR-PDCCH	NTT DOCOMO, INC.
R1-1711328	RS mapping of NR-PDCCH	Panasonic
R1-1711478	On DM-RS for NR-PDCCH	Ericsson
R1-1711583	DMRS Structure for PDCCH	Samsung
R1-1711634	RS for DL control channel	Qualcomm Incorporated

5.1.3.1.2 Search space

5.1.3.1.2.1 CORESET configuration

Including relationship between CORESET and search space.

From offline discussion…

Agreements:

- For a CORESET which is configured by UE-specific higher-layer signalling, at least following are configured.
  - Frequency-domain resources, which may or may not be contiguous
    - Each contiguous part of a CORESET is equal to or more than the size of REG-bundle in frequency
      - FFS: exact size and number of contiguous parts for a CORESET
  - Starting OFDM symbol
  - Time duration
  - REG bundle size if the configuration is explicit
  - Transmission type (i.e., interleaved or non-interleaved)
  - More parameters may be added if agreed
- For a CORESET which is configured by UE-specific higher-layer signalling, at least following is configured.
  - Monitoring periodicity
    - FFS: it is a configuration per CORESET or per one or a set of PDCCH candidates
    - FFS: relation with DRX
    - FFS: default/fallback value

Not treated.

R1-1709951	Configuration of control resource set	Huawei, HiSilicon
R1-1710076	Configuration aspects of the NR-PDCCH	CATT
R1-1710106	NR-PDCCH CORESET configuration	ZTE
R1-1710150	PDCCH CORESET configuration and UE procedure on NR-PDCCH monitoring	Guangdong OPPO Mobile Telecom.

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R1-1710305 Discussion on CORESET configuration LG Electronics
R1-1710543 CORESETs for NR PDCCH Intel Corporation
R1-1710693 CORESET Configurations Samsung
R1-1710779 Discussion on CORESET duration CMCC
R1-1710790 Discussions on CORESET configurations MediaTek Inc.
R1-1710872 CORESET Monitoring Under Dynamic Change of BWP InterDigital, Inc.
R1-1710980 On the PDCCH control resource set and its connection to the search space for NR Nokia, Alcatel-Lucent Shanghai Bell
R1-1711090 Views on control resource set configuration for NR-PDCCH NTT DOCOMO, INC.
R1-1711179 Control resource set and search space Qualcomm Incorporated
R1-1711272 Configuration for control resource sets and search spaces HTC Corporation
R1-1711329 Configuration of CORESET Panasonic
R1-1711368 Discussion on the search space design Xiaomi technology
R1-1711479 On Configuration of Control Resource Sets Ericsson

5.1.3.1.2.2 Search space design

Including possible nested search space. Both common search space and UE-specific search space should be considered.

R1-1711754 WF on NR PDCCH Blind decodes vivo, Samsung

Agreements:

- For PDCCH blind decoding, at least for the non-initial access, at least the following can be configured:
  - Number of PDCCH candidates per CCE aggregation level, per DCI format size that the UE monitors
  - Set of aggregation levels
    - FFS explicit or implicit configuration
  - Set of DCI format sizes
    - FFS explicit or implicit configuration
  - FFS: per CORESET not used for initial access or search space
  - FFS: Signalling details
  - Note that the number of candidates can be zero
- UE blind decoding capability is known by NW
  - FFS: How the capability is derived

Possible proposals from offline:

- FFS: UE PDCCH blind decoding capability is defined in NR
  - FFS: The capability can be defined as the maximum number of blind decodes that a UE can support within a time unit.
  - FFS: the value of the time unit

Not treated.
R1-1709952 Search space design Huawei, HiSilicon
R1-1710077 Search space design for NR-PDCCH CATT
R1-1710107 Search space design for NR-PDCCH ZTE
R1-1710151 NR PDCCH search space design with nested structure Guangdong OPPO Mobile Telecom.
R1-1710306 Discussion on hierarchical search space structure LG Electronics
R1-1710393 Discussion on search space design supporting dynamic DCI size vivo
R1-1710544 NR PDCCH: Search spaces and monitoring behavior Intel Corporation
R1-1710694 Search Space Design Samsung
R1-1710780 Discussion on NR-PDCCH search space design CMCC
R1-1710946 Search space design for eMBB-URLLC Multiplexing InterDigital, Inc.
R1-1710981 On the search space design and UE blind detection Nokia, Alcatel-Lucent Shanghai Bell
R1-1711091 Views on search space design for NR-PDCCH NTT DOCOMO, INC.
R1-1711180 Nested search space design Qualcomm Incorporated
R1-1711321 PDCCH BD reduction Panasonic
R1-1711330 Search space design Panasonic
R1-1711480 On Search Space and Blind Decoding Design Ericsson

5.1.3.1.2.3 Multi-beam operation for PDCCH

R1-1710012 Multi-beam operation for PDCCH Huawei, HiSilicon
R1-1710078 Discussion on multi-beam operation for NR-PDCCH CATT
R1-1710108 Supporting Multi-beam in NR-PDCCH ZTE

R1-1710152 Search space design consideration for NR PDCCH with BF Guangdong OPPO Mobile Telecom.
R1-1710307 Discussion on multi-beam operation for NR-PDCCH LG Electronics
R1-1710437 Control channel configuration for multi-TRP and multi-panel transmission AT&T
R1-1710545 Multi-beam operation for NR PDCCH Intel Corporation
R1-1710616 NR-PDCCH for broadcast information delivery ETRI
R1-1710695 Multibeam Transmission for PDCCH Samsung
R1-1710982 PDCCH support for multi-beam system Nokia, Alcatel-Lucent Shanghai Bell
R1-1711092 Views on multi-beam based NR-PDCCH NTT DOCOMO, INC.
R1-1711395 Discussion on Multi-beam Operation for PDCCH Convida Wireless LLC
R1-1711481 On Multi-beam and Multi-TRP Operation for PDCCH Ericsson

5.1.3.1.3 Resource sharing between PDCCH and PDSCH

R1-1711921 WF on PDCCH /PDSCH resource sharing ZTE, Nokia, Ericsson, LG, Panasonic, Qualcomm, Sharp

- The following is supported for dynamic resource reuse for PDSCH
  - RRC signaling to indicate the time and frequency resources for which the dynamic signaling below indicates resources for which PDSCH may or may not be mapped
    - FFS whether the time and frequency resources can correspond to resources used for purposes other than CORESETs configured for monitoring PDCCH by the UE or by other UEs
  - Dynamic signaling that
    - Indicates which of the time and frequency resources configured by the RRC signaling can be mapped to PDSCH (Details FFS) and
    - Can additionally indicate which of the time and frequency resources not indicated by the above RRC signaling and that are part of the CORESETS configured to the UE for PDCCH monitoring are mapped to PDSCH (Details FFS)
    - Note: Dynamic signaling overhead will limit the number of resources that can be dynamically indicated for reuse of resources. FFS the limit on the overhead.
  - UE can assume that the reused resources shall be within the frequency domain spanned by the resources allocated for the PDSCH
  - UE assumes that resources used for reception of PDCCH scheduling PDSCH are not reused
    - FFS: Reuse of resources used for other control signaling, e.g., common search space, group common PDCCH, broadcast PDCCH, UL grant

Decision: The document is noted.

Not treated.
R1-1709956 Resource multiplexing of downlink control and data Huawei, HiSilicon
R1-1710079 Flexible reuse of DL control resources for data transmission CATT
R1-1710109 Resource sharing between PDCCH and PDSCH ZTE
R1-1710153 On resource sharing between PDCCH and PDSCH Guangdong OPPO Mobile Telecom.
R1-1710308 Discussion on multiplexing between control and data LG Electronics
R1-1710546 Dynamic resource sharing between control and data Intel Corporation
R1-1710617 Discussion on dynamic indication of PDSCH start symbol ETRI
R1-1710696 Multiplexing NR-PDCCH and PDSCH Samsung
R1-1710791 Resource sharing between PDCCH and PDSCH MediaTek Inc.
R1-1710873 PDSCH starting position in NR InterDigital, Inc.
R1-1710983 Resource sharing between PDCCH and PDSCH in NR Nokia, Alcatel-Lucent Shanghai Bell
R1-1711093 Resource sharing between data and control channels NTT DOCOMO, INC.
R1-1711182 Resource reuse for data in DL control region Qualcomm Incorporated
R1-1711236 Indication of PDSCH starting position for NR Sharp
R1-1711320 Resource sharing between PDCCH and PDSCH Panasonic
R1-1711354 PDSCH starting position indication for NR WILUS Inc.
R1-1711482 On Data Transmission in Control Resource Sets Ericsson

5.1.3.1.4 Group-common PDCCH

R1-1710968 Summary of [89-20] email discussion on Group-common PDCCH for NR CATT

Agreements:

- In ‘Slot format related information’, ‘Empty’ is not indicated explicitly.
- Note: RAN1 specification ensures that UE(s) is/are aware of which resources can be for ‘gap for DL-UL switching’ and/or ‘gap’
- Note: RAN1 specification ensures that UE(s) is/are aware of which resources are for ‘CSI/interference measurement’.

Agreements:

- UE is configured with a CORESET to monitor group-common PDCCH.
- When configured, the group-common PDCCH follows the same CORESET configuration (e.g., REG-to-CCE mapping) of the CORESET.
  - A group-common PDCCH is formed by an integer number of CCEs.
- The CORESET for the monitored group-common PDCCH carrying SFI can be the same or different from the CORESET for the monitored PDCCH for other types of control signalling.

Friday

R1-1711991 WF on contents of the group-common PDCCH CATT, NEC

Agreement: Prioritize discussion of SFI functionality of a group-common PDCCH.

- Further work will be on group-common PDCCH carrying the SFI at least in August meeting.

5.1.3.1.4.1 Structure of group-common PDCCH

R1-1709954	Structure of group-common PDCCH	Huawei, HiSilicon
R1-1710080	Channel structure for group-common PDCCH	CATT
R1-1710309	Discussion on the structure of group common PDCCH	LG Electronics
R1-1710438	Group common PDCCH Structure for NR	AT&T
R1-1710547	Group-common PDCCH: Physical structure	Intel Corporation
R1-1710697	UE-Group Common PDCCH Structure	Samsung
R1-1710792	Structure of group-common PDCCH	MediaTek Inc.
R1-1710857	On structure of group-common PDCCH	Sony
R1-1710947	Group-common PDCCH design considerations	InterDigital, Inc.
R1-1710984	On the structure of group common PDCCH in NR	Nokia, Alcatel-Lucent Shanghai Bell
R1-1711094	Views on structure of group-common PDCCH	NTT DOCOMO, INC.
R1-1711183	Structure of group common PDCCH	Qualcomm Incorporated
R1-1711237	Group common PDCCH structure for NR	Sharp
R1-1711331	Discussion on structure of group common PDCCH	Panasonic
R1-1711355	Discussion on structure for group-common PDCCH for NR	WILUS Inc.
R1-1711390	Discussion on the structure of group common PDCCH	Xiaomi Technology
R1-1711483	On Group-Common PDCCH Structure and Configuration	Ericsson

5.1.3.1.4.2 Contents of group-common PDCCH

R1-1709953	Contents of group-common PDCCH	Huawei, HiSilicon
R1-1710081	Contents of the group-common PDCCH	CATT
R1-1710110	Group-common PDCCH design consideration	ZTE
R1-1710310	Discussion on the contents of group common PDCCH	LG Electronics
R1-1710391	Discussion on group common PDCCH and BD	vivo
R1-1710439	On the contents of group common PDCCH	AT&T
R1-1710548	Group-common PDCCH: Contents	Intel Corporation
R1-1710698	Functionalities of UE-Common PDCCH	Samsung
R1-1710793	Contents of group-common PDCCH	MediaTek Inc.
R1-1710856	On contents of group-common PDCCH	Sony
R1-1710907	Control indicator in group-common PDCCH for UE power saving	Apple Inc.
R1-1710985	On the contents of group common PDCCH in NR	Nokia, Alcatel-Lucent Shanghai Bell
R1-1711095	Views on contents of group-common PDCCH	NTT DOCOMO, INC.
R1-1711238	Group common PDCCH contents for NR	Sharp
R1-1711247	Contents of group common PDCCH	Qualcomm Incorporated
R1-1711281	NR Group-common PDCCH contents and structure	Motorola Mobility, Lenovo
R1-1711332	Discussion on contents of group common PDCCH	Panasonic
R1-1711356	Discussion on contents for group-common PDCCH for NR	WILUS Inc.
R1-1711369	Discussion on the content of group common PDCCH	Xiaomi technology
R1-1711484	On the Content of Group-Common PDCCH	Ericsson
R1-1711809	WF on slot format indication with group common PDCCH	LG Electronics, InterDigital, …

5.1.3.1.4.3 UE behaviour related to group-common PDCCH

R1-1710082	Configuration and monitoring of the group-common PDCCH	CATT
R1-1710154	Impact on common channel reception to PDCCH design	Guangdong OPPO Mobile Telecom.
R1-1710311	Discussion on UE behavior for the group common PDCCH	LG Electronics
R1-1710368	The relation among UE-specific DCI, GC-PDCCH, and semi-static signaling	Spreadtrum Communications

R1-1710440 UE behaviour for group common PDCCH AT&T
R1-1710476 UE behavior related to group-common PDCCH Huawei, HiSilicon
R1-1710549 Group-common PDCCH: UE behavior Intel Corporation
R1-1710699 UE Behavior for UE-Group Common PDCCH Detection Samsung
R1-1710781 UE behaviour related to dynamic and semi-static configured resources CMCC
R1-1710794 UE behaviour for group-common PDCCH MediaTek Inc.
R1-1710906 UE behavior on UL/DL transmission direction determination in NR TDD Apple Inc.
R1-1710948 UE behaviour related to CORESET(s) configured by PBCH InterDigital, Inc.
R1-1710986 On the UE behaviour related to group common PDCCH in NR Nokia, Alcatel-Lucent Shanghai Bell
R1-1711096 Views on UE behavior for group-common PDCCH NTT DOCOMO, INC.
R1-1711185 UE behaviour related to group common PDCCH Qualcomm Incorporated
R1-1711239 Group common PDCCH monitoring for NR Sharp
R1-1711333 Discussion on DL/UL transmission direction Panasonic
R1-1711357 Discussion on UE behavior for group-common PDCCH for NR WILUS Inc.
R1-1711485 On UE Procedures Related to Group-Common PDCCH Ericsson

5.1.3.1.5 Ultra-reliable part of URLLC for DL control

Identify necessary techniques for physical downlink control channel to meet the URLLC requirements set forth by TR38.913.

R1-1709993 UE procedure of PDCCH monitoring for URLLC Huawei, HiSilicon
R1-1710111 NR-PDCCH for supporting URLLC ZTE
R1-1710155 DL control channel design for URLLC Guangdong OPPO Mobile Telecom.
R1-1710312 Discussion on DL control with ultra-reliability LG Electronics
R1-1710550 Satisfying ultra-reliability targets for NR PDCCH Intel Corporation
R1-1710700 PDCCH Design for URLLC Samsung
R1-1710862 Reliable PDCCH operation for URLLC Sony
R1-1710874 Considerations for ultra-reliable DCI transmission InterDigital, Inc.
R1-1710949 On Ultra-reliable and low-latency PDCCH InterDigital, Inc.
R1-1710987 On the URLLC specific aspects for DL control channel Nokia, Alcatel-Lucent Shanghai Bell
R1-1711097 DL control channel design for URLLC NTT DOCOMO, INC.
R1-1711338 Consideration on physical downlink control channel for URLLC CATR
R1-1711486 On PDCCH for Ultra-Reliable Transmission Ericsson
R1-1711487 On the Performance Evaluation of PDCCH for Ultra-Reliable Transmission Ericsson
R1-1711552 Management of URLLC DL control channel efficiency and reliability Qualcomm Incorporated

5.1.3.1.6 Other

R1-1709955 UE-specific DCI contents in NR Huawei, HiSilicon
R1-1709957 Dynamic and semi-static DL/UL resource partition Huawei, HiSilicon
R1-1709986 PDCCH reliability for URLLC Huawei, HiSilicon
R1-1710395 DCI content size and compression vivo
R1-1710460 Resource sharing between NR-PDCCH and data Huawei, HiSilicon
R1-1710467 DCI design for URLLC Huawei, HiSilicon
R1-1710701 Transmit Diversity for PDCCH Samsung
R1-1710702 Bandwidth Part Hopping for CORESETS Samsung
R1-1710988 On the usage of PDCCH DMRS as a complementary synchronization signal in DL Nokia, Alcatel-Lucent Shanghai Bell
R1-1711186 Common control resource set signaling in MIB Qualcomm Incorporated
R1-1711187 Advanced Grant Indication for UE Power Saving Qualcomm Incorporated
R1-1711413 CCE-to-REG mapping Huawei, HiSilicon
R1-1711414 PDCCH-to-CCE mapping Huawei, HiSilicon
R1-1711415 NR DL control capacity and blocking probability Huawei, HiSilicon
R1-1711423 PDCCH monitoring for slot-aggregation and cross-slot scheduling Huawei, HiSilicon
R1-1711431 HARQ feedback indication design for UL grant-free transmission Huawei, HiSilicon
R1-1711433 Discussion on remaining frequency resources on symbol carrying CORESET Huawei, HiSilicon
R1-1711453 DL and UL Assignment for NR TDD Samsung
R1-1711454 Slot Reconfiguration for Low Latency in TDD Samsung
R1-1711455 Indication of Reserved Resources Samsung
R1-1711994 WF on UE power saving with PDCCH monitoring in CDRX Qualcomm

5.1.3.2 Physical uplink control channel

5.1.3.2.1 PUCCH in short-duration

Wednesday offline summary:

Samsung Exhibit 1016, Page 108 of 399

Discussions:

- Companies supporting option 4 (sequence selection)
  - Qualcomm, Ericsson, MediaTek, ZTE, LG, Interdigital, Motorola mobility, Lenovo, DOCOMO
  - For SR only case: Intel, ZTE
- Companies supporting option 1 (FDM RS and UCI)
  - Option 1-1: FDM two sequences, one sequence is modulated with UCI
  - Option 1-2: based on single sequence, modulate even tone of a single sequence.
  - Modulate can be BPSK or QPSK
  - Samsung(Option 1-1), ZTE (option 1-2), Huawei, HiSilicon (Option 1-2), intel(option 1-1), Nokia (option 1-1), CATT (?)
- Advantages of option 4 (sequence selection)
  - Lower PAPR than option 1
  - With 2 bits payload, better link level performance for 1 UE
    - For 3 UEs, one company provided link level simulation showing option 4 has better performance than option 1. (R1-1711649)
  - MUX capacity is 6 UEs for 1 bit UCI, MUX capacity 3 UEs for 2 bits UCI
  - If multiplex with DMRS other UEs short PUCCH, can achieve flexible PUCCH allocation and higher multiplexing capacity.
  - Better MUX capacity for SR than 1-2.
- Advantages of option 1 (FDM RS and UCI)
  - Lower PAPR than LTE is only for option 1-2, but with worse cross-correlation than LTE.
  - MUX capacity of 6 UEs for 1 bit
  - Potential MUX capacity of 6 UEs for 2 bits

Qualcomm and Ericsson comment maximizing UE MUX capacity is not main design target for short PUCCH. Single UE performance is more important.

Thursday

Agreements:

- Working assumption:
  - For short-PUCCH with UCI of up to 2 bits (with/without SR), option 4 is supported.
- No more short-PUCCH format is supported for short-PUCCH in the WID scope.

5.1.3.2.1.1 Short-PUCCH for UCI of up to 2 bits

R1-1709958	Short PUCCH for up to 2 UCI bits	Huawei, HiSilicon
R1-1710112	On short PUCCH for up to 2 bits UCI	ZTE
R1-1710156	Discussion on short PUCCH for up to 2 UCI bits	Guangdong OPPO Mobile Telecom.
R1-1710313	Design of short NR-PUCCH for up to 2 UCI bits	LG Electronics
R1-1710551	Performance of short PUCCH format for 1~2 bits HARQ-ACK	Intel Corporation
R1-1710588	Results for short PUCCH for UCI of up to 2 bits	IITH
R1-1710618	Short-PUCCH for UCI of up to 2 bits	ETRI
R1-1710703	Short PUCCH for UCI of 1 or 2 Bits	Samsung
R1-1710819	Performance evaluation on channel structure of short PUCCH for 1 or 2 bits UCI	MediaTek Inc.
R1-1710893	On the short PUCCH design for small UCI payloads	Nokia, Alcatel-Lucent Shanghai Bell
R1-1710950	Evaluations of 1-symbol short-PUCCH with 1 or 2 bit(s)	InterDigital, Inc.
R1-1711098	Sequence-based PUCCH for UCI of up to 2 bits	NTT DOCOMO, INC.
R1-1711188	Channelization of 1-symbol short PUCCH with 1 or 2 bits payload	Qualcomm Incorporated
R1-1711242	Short PUCCH structure for UCI of up to 2 bits	Sharp
R1-1711282	Short PUCCH for up to 2 bit UCI	Motorola Mobility, Lenovo
R1-1711358	Short PUCCH structure for UCI of up to 2 bits	WILUS Inc.
R1-1711488	On the Design of Short PUCCH for 1-2 UCI bits	Ericsson
R1-1711603	Short PUCCH for small UCI payloads	CATT
R1-1711649	Discussion on 1-symbol NR-PUCCH for UCI of up to 2 bits	Panasonic Corporation
R1-1711796	1-symbol short PUCCH with 1 or 2 bits UCI	Qualcomm

5.1.3.2.1.2 Short-PUCCH for UCI of more than 2 bits

R1-1709959	Short PUCCH with more than 2 UCI bits	Huawei, HiSilicon
R1-1710084	Short PUCCH for moderate and large UCI payloads	CATT
R1-1710113	On short-PUCCH for more than 2 bits	ZTE
R1-1710157	Discussion on short PUCCH for more than 2 UCI bits	Guangdong OPPO Mobile Telecom.
R1-1710226	Discussion on 2-symbol Short PUCCH with More Than 2 Bits	Beijing Xinwei Telecom Techn.
R1-1710314	Design of short NR-PUCCH for more than 2 UCI bits	LG Electronics
R1-1710367	Discussion on 1-symbol PUCCH design	Spreadtrum Communications

R1-1710408 On pre-DFT RS/UCI multiplexing for PUCCH in short duration Mitsubishi Electric RCE
R1-1710552 2-symbol NR PUCCH Intel Corporation
R1-1710589 Further discussion on pre-DFT multiplexing for short PUCCH IITH
R1-1710619 Short-PUCCH for UCI of more than 2 bits ETRI
R1-1710704 Short PUCCH for UCI of more than 2 Bits Samsung
R1-1710894 Short PUCCH design for UCI of more than 2 bits Nokia, Alcatel-Lucent Shanghai Bell
R1-1711099 FDM-based PUCCH for UCI of more than 2 bits NTT DOCOMO, INC.
R1-1711189 Channelization of 1-symbol short PUCCH with more than 2 bits payload Qualcomm Incorporated
R1-1711243 Short PUCCH structure for UCI of more than 2 bits Sharp
R1-1711489 On the Design of Short PUCCH for more than 2 UCI bits Ericsson
R1-1711655 Discussion on short-PUCCH more than 2-bitvivo
R1-1711832 WF on Pre-DFT Multiplexing of RS and UCI in short duration PUCCH IITH
R1-1711887 WF on 2-symbol NR-PUCCH LG Electronics

5.1.3.2.2 PUCCH in long-duration

R1-1711677 Summary of the E-mail Discussion [89-21]: On Long PUCCH for NR Ericsson

R1-1711834 WF on Long PUCCH Format with 1-2 UCI bits Ericsson, Huawei, HiSilicon, LG, ZTE, MediaTek, Panasonic, WILUS Inc., Intel, Vivo,Cohere Technologies, ETRI, Motorola mobility, Lenovo, CATT

Possible agreements:

- For a long PUCCH with up to 2 bits UCI:
  - For location of DMRS select from one of the following alternative in the next meeting:
    - Alt 1: DMRS always occurs in even [or odd] symbols in the long PUCCH
    - Alt 2: DMRS always occurs in even [or odd] symbols in the slot
    - Alt 3: DMRS occurs in one or more sets of consecutive symbols within the long PUCCH. The occasion of DMRS symbols depends on the duration of long PUCCH.
    - Alt 4: DMRS occurs in one or more sets of consecutive symbols within the long PUCCH. The occasion of DMRS symbols depends on the duration of long PUCCH but fixed within the slot

Possible agreements:

- For a long PUCCH with up to 2 bits UCI:
  - The DM-RS symbol(s) are formed as follows:
    - DMRS for a PUCCH is a cyclic shift of a base sequence (e.g. a CAZAC or computer generated sequence) in frequency domain with Orthogonal Cover Code (OCC) in time.
  - The data symbols are formed as the following:
    - The modulated UCI bit(s) is multiplied with a cyclic shift of a base sequence (e.g. a CAZAC or computer generated sequence) in frequency domain with Orthogonal Cover Code (OCC) in time.
      - Note: BPSK and QPSK modulations for 1 and 2 UCI bits, respectively.

Thursday (offline)

R1-1711912 WF on Long PUCCH Format with 1-2 UCI bits Ericsson, Huawei, HiSilicon, LG, ZTE, MediaTek, Panasonic, WILUS Inc., Intel, Vivo,Cohere Technologies, ETRI, Motorola mobility, Lenovo, CATT, Qualcomm

Agreements:

- For a long PUCCH with up to 2 bits UCI:
  - Working assumption:
    - DMRS always occurs in every other symbols in the long PUCCH
      - FFS: even or odd symbols
    - The working assumption can be revisited if an issue is found in terms of transient period.

Agreements:

  - The DMRS symbol(s) are formed as follows:
    - DMRS for a PUCCH is a sequence (e.g. a cyclic shift of a CAZAC or computer generated sequence) in frequency domain with Orthogonal Cover Code (OCC) in time.
  - Note: The data symbols are formed as the following:
    - The modulated UCI bit(s) is multiplied with a sequence (e.g. a cyclic shift of a CAZAC or computer generated sequence) in frequency domain with Orthogonal Cover Code (OCC) in time.
      - BPSK and QPSK modulations for 1 and 2 UCI bits, respectively.
  - Note: The usage of OCC for DMRS and UCI symbols is effectively disabled for differentiation of the users that are assigned with the same OCC.

R1-1711835 WF on Frequency Hopping for Long PUCCH Ericsson, MediaTek, Qualcomm, Panasonic, Intel, LG, NTT DOCOMO, Cohere Technologies, WILUS Inc., Huawei, HiSilicon, Samsung

Possible agreements:

- For a long PUCCH with N symbols in a slot
  - At most one hop within a slot is supported.
    - FFS on how to enable or disable frequency hopping
  - In case of frequency hopping, the hop occurs at the end of the X-th symbol where
    - FFS between X=floor(N/2) or ceil(N/2)

Friday offline

Agreements:

- For a PUCCH format for UCI with large payload with no multiplexing capacity within a slot:
  - The DMRS and UCI are mapped to different symbols.
  - For intra-slot frequency-hopping, one or two DMRS symbol(s) is/are mapped on each frequency-hop of the long-PUCCH.
    - Opt.1: one DMRS per frequency-hop
      - The location is around the middle of the frequency-hop
    - Opt.2: one or two DMRS per frequency-hop
      - FFS: the location of the DMRS symbol(s)
  - The DMRS symbol(s) are formed as follows:
    - DMRS for a PUCCH is a sequence (e.g. a cyclic shift of a CAZAC or computer generated sequence) in frequency domain.
  - **Working assumption:**
    - The symbols carrying UCI are formed as follows:
      - The UCI bits are encoded and scrambled, QPSK modulated and DFT pre-coded and mapped to the REs for the symbols carrying UCI of the long PUCCH

Friday: IITH commented during offline“Pi/2 BPSK modulation should be used for long duration PUCCH “, not captured due to concern from others

R1-1711996 WF on Long PUCCH Format for more than 2 UCI bits with Multi-user Multiplexing Ericsson

R1-1709960 Overview of long PUCCH design Huawei, HiSilicon
R1-1710590 Views on long-duration PUCCH IITH
R1-1711201 Uplink Resource for SR Qualcomm Incorporated

5.1.3.2.2.1 Long-PUCCH for UCI of up to 2 bits

Focus on long-PUCCH within a slot.

R1-1709961 Long PUCCH structure for up to 2 bits with high multiplexing capacity Huawei, HiSilicon
R1-1710085 Long PUCCH for small UCI payloads CATT
R1-1710114 On long-PUCCH for up to 2 bits ZTE
R1-1710158 Discussion on long PUCCH for up to 2 UCI bits Guangdong OPPO Mobile Telecom.
R1-1710315 Design of long NR-PUCCH for up to 2 UCI bits LG Electronics
R1-1710553 Structure of 1~2 bits HARQ-ACK long PUCCH with TDM DMRS Intel Corporation
R1-1710598 Long PUCCH design for UCI of up to 2 bits Lenovo, Motorola Mobility
R1-1710705 Long PUCCH for UCI of 1 or 2 Bits Samsung
R1-1710895 On long PUCCH design for small payloads Nokia, Alcatel-Lucent Shanghai Bell
R1-1710932 Discussion on channel structure of long-duration NR-PUCCH for UCI of up to 2 bits Panasonic Corporation
R1-1711100 Long-PUCCH for UCI of up to 2 bits NTT DOCOMO, INC.
R1-1711190 Long PUCCH design with 1 or 2 bits UCI payload Qualcomm Incorporated
R1-1711490 On the Design of Long PUCCH for 1-2 UCI bits Ericsson

5.1.3.2.2.2 Long-PUCCH for UCI of more than 2 bits

Focus on long-PUCCH within a slot.

R1-1709962 Long PUCCH structure for moderate payload with some multiplexing capacity Huawei, HiSilicon
R1-1710086 Long PUCCH for moderate and large UCI payloads CATT
R1-1710115 On long-PUCCH for more than 2 bits ZTE
R1-1710316 Design of long NR-PUCCH for more than 2 UCI bits LG Electronics
R1-1710554 Long PUCCH for moderate and large payload Intel Corporation
R1-1710599 Long PUCCH design for UCI of more than 2 bits Lenovo, Motorola Mobility
R1-1710706 Long PUCCH for UCI of more than 2 Bits Samsung

R1-1710896 Long PUCCH design for UCI more than 2 bits Nokia, Alcatel-Lucent Shanghai Bell
R1-1710934 Discussion on channel design of long-duration NR-PUCCH for UCI of more than 2 bits Panasonic Corporation
R1-1711101 Long-PUCCH for UCI of more than 2 bits NTT DOCOMO, INC.
R1-1711191 Long PUCCH design with more than 2 bits UCI payload Qualcomm Incorporated
R1-1711240 Slot structure of NR long PUCCH for more than 2 bits Sharp
R1-1711251 Design of Long-PUCCH for UCI of more than 2 bits Cohere Technologies
R1-1711491 On the Design of Long PUCCH for more than 2 UCI bits Ericsson
R1-1711833 WF on waveform for long duration PUCCH IITH, ATT, Deutsche Telekom, IITM, Reliance Jio, DISH, Thales, CEWiT, Tejas Networks, Sony, INL

5.1.3.2.2.3 Support of long-PUCCH over multiple slots

R1-1710013 Support of long-PUCCH over multiple slots Huawei, HiSilicon
R1-1710087 Design of multi-slot PUCCH transmission CATT
R1-1710116 Consideration on long-PUCCH over slots ZTE
R1-1710159 Slot aggregation and configuration for NR long PUCCH Guangdong OPPO Mobile Telecom.
R1-1710317 Support of long NR-PUCCH over multiple slots LG Electronics
R1-1710555 Long PUCCH over multiple slots Intel Corporation
R1-1710600 Long PUCCH over multiple slots Lenovo, Motorola Mobility
R1-1710620 Long-PUCCH over multiple slots ETRI
R1-1710707 Multi-Slot Long PUCCH Transmission Samsung
R1-1710935 Discussion on support of long-duration NR-PUCCH over multiple slots Panasonic Corporation
R1-1710976 NR Long PUCCH Requirements CMCC
R1-1711102 Long-PUCCH for more than one slot NTT DOCOMO, INC.
R1-1711192 Long PUCCH over multiple slots Qualcomm Incorporated
R1-1711241 Structure of NR long PUCCH over multiple slots Sharp
R1-1711252 Support of long-PUCCH over multiple slots Cohere Technologies
R1-1711492 On support of Long PUCCH over multiple slots Ericsson
R1-1711840 WF on Frequency Hopping for Multi-slot Long PUCCH LG Electronics

5.1.3.2.3 Transmit diversity for PUCCH

R1-1710160 Design of NR PUCCH with long duration Guangdong OPPO Mobile Telecom.
R1-1710222 Transmit diversity for DFTsOFDM-based PUCCH in long duration Mitsubishi Electric RCE
R1-1710318 Consideration on transmit diversity for NR-PUCCH LG Electronics
R1-1710463 Transmit diversity for PUCCH Huawei, HiSilicon
R1-1710556 Transmit diversity for PUCCH Intel Corporation
R1-1710708 Transmit Diversity for PUCCH Samsung
R1-1710897 Transmit Diversity for PUCCH Nokia, Alcatel-Lucent Shanghai Bell
R1-1710951 On transmit diversity for Long PUCCH InterDigital, Inc.
R1-1711193 Transmit diversity for PUCCH Qualcomm Incorporated
R1-1711493 On Transmit Diversity Schemes for PUCCH Ericsson

5.1.3.2.4 Resource allocation for PUCCH

R1-1710088 Further discussion on PUCCH resource allocation CATT
R1-1710117 NR PUCCH resource allocation ZTE
R1-1710161 Resource indication for UL control channel Guangdong OPPO Mobile Telecom.
R1-1710237 PUCCH resource allocation Fujitsu
R1-1710319 Consideration on resource allocation for NR-PUCCH LG Electronics
R1-1710461 PUCCH resource allocation for HARQ-ACK and SR Huawei, HiSilicon
R1-1710557 Resource allocation for PUCCH during initial access Intel Corporation
R1-1710709 Resource Allocation for PUCCH with HARQ-ACK Samsung
R1-1710782 Discussion on subband-based PUCCH resource allocation and indication CMCC
R1-1710898 On the resource allocation for PUCCH Nokia, Alcatel-Lucent Shanghai Bell
R1-1710937 Discussion on resource allocation for uplink control channel Panasonic Corporation
R1-1711103 PUCCH resource allocation NTT DOCOMO, INC.
R1-1711194 Resource allocation for PUCCH Qualcomm Incorporated
R1-1711283 PUCCH resource allocation for HARQ-ACK feedback to Msg4 Motorola Mobility, Lenovo
R1-1711494 On Resource Allocation for PUCCH and Multiplexing PUCCH Formats Ericsson
R1-1711776 WF on PUCCH resource allocation LG Electronics
R1-1711995 WF on the content of the long PUCCH resource configuration Ericsson

5.1.3.2.5 UCI multiplexing

R1-1709989 Discussion on UCI feedback for URLLC Huawei, HiSilicon

5.1.3.2.5.1 UCI piggyback on PUSCH

For both PUSCH with CP-OFDM waveform and PUSCH with DFT-s-OFDM waveform

R1-1709963 UCI piggyback on PUSCH Huawei, HiSilicon
R1-1710089 Multiplexing of UCI and UL data on PUSCH CATT
R1-1710118 UCI multiplexing on PUSCH ZTE
R1-1710162 On UCI and data multiplexing in PUSCH Guangdong OPPO Mobile Telecom.
R1-1710320 Support of UCI piggyback on PUSCH for NR LG Electronics
R1-1710558 UCI multiplexing onto PUSCH Intel Corporation
R1-1710710 On UCI Multiplexing in PUSCH Samsung
R1-1710820 Discussion on UCI on PUSCH MediaTek Inc.
R1-1710899 UCI multiplexing on PUSCH Nokia, Alcatel-Lucent Shanghai Bell
R1-1710939 Discussion on UCI on PUSCH Panasonic Corporation
R1-1710952 Considerations on UCI transmission on PUSCH InterDigital, Inc.
R1-1711104 UCI on PUSCH NTT DOCOMO, INC.
R1-1711195 UCI piggyback on PUSCH Qualcomm Incorporated
R1-1711359 Discussion on UCI piggyback on PUSCH WILUS Inc.
R1-1711495 On UCI on PUSCH Ericsson

5.1.3.2.5.2 PUCCH-PUSCH multiplexing

R1-1710090 Simultaneous PUCCH-PUSCH transmission in NR CATT
R1-1710119 Multiplexing of PUSCH and short PUCCH ZTE
R1-1710163 Multiplexing of short PUCCH and long PUCCH Guangdong OPPO Mobile Telecom.
R1-1710321 Support of uplink channel multiplexing for NR LG Electronics
R1-1710464 Multiplexing of PUCCH and PUSCH Huawei, HiSilicon
R1-1710559 PUCCH-PUSCH multiplexing Intel Corporation
R1-1710711 On Simultaneous PUSCH and PUCCH Transmissions Samsung
R1-1710821 Discussion on PUCCH and PUSCH multiplexing MediaTek Inc.
R1-1710900 On the multiplexing between PUCCHs and PUSCH Nokia, Alcatel-Lucent Shanghai Bell
R1-1710940 Discussion on UCI and data multiplexing Panasonic Corporation
R1-1711105 Multiplexing of PUCCH and PUSCH NTT DOCOMO, INC.
R1-1711196 Multiplexing of PUCCH and PUSCH Qualcomm Incorporated
R1-1711244 PUCCH and PUSCH multiplexing methods Sharp
R1-1711360 Simultaneous transmission for long-PUCCH and PUSCH WILUS Inc.
R1-1711496 On Simultaneous Transmission of PUSCH and PUCCH Ericsson

5.1.3.2.6 Ultra-reliable part of URLLC for UL control

Identify necessary techniques for physical uplink control channel to meet the URLLC requirements set forth by TR38.913.

R1-1710120 Analysis of URLLC reliability for uplink control channel ZTE
R1-1710322 Discussion on UL control with ultra-reliability LG Electronics
R1-1710560 On UL control channel design aspects for URLLC Intel Corporation
R1-1710597 Enhanced SR carried in UL control channel Lenovo, Motorola Mobility
R1-1710712 PUCCH Design for URLLC Samsung
R1-1710875 Considerations for ultra-reliable UCI transmission InterDigital, Inc.
R1-1710901 On URLLC UCI transmission Nokia, Alcatel-Lucent Shanghai Bell
R1-1710942 Discussion on SR for URLLC and multiplexing with HARQ-ACK Panasonic Corporation
R1-1711106 UL control channel design for URLLC NTT DOCOMO, INC.
R1-1711497 On PUCCH for Ultra-Reliable Transmission Ericsson
R1-1711498 On the Performance Evaluation of PUCCH for Ultra-Reliable Transmission Ericsson
R1-1711548 Resource allocation for PUCCH to support URLLC Sequans Communications
R1-1711553 The necessity of reliable SR design for GF/GB UL URLLC transmission Qualcomm Incorporated

5.1.3.2.7 Other

R1-1710561 Configurations of various long PUCCH lengths Intel Corporation
R1-1710562 Short PUCCH formats for 1~2 bits UCI Intel Corporation
R1-1710563 Cyclic shift assignment and CM for FDM DMRS and UCI Intel Corporation
R1-1710564 Short UL control channel early in a slot Intel Corporation
R1-1710713 Performance Results for Long PUCCH Samsung
R1-1710714 Performance Results for UCI and Data Multiplexing Samsung
R1-1710716 Multiplexing PUSCH with Short PUCCH or SRS Samsung
R1-1710717 BSI/CSI Transmission on PUCCH Samsung

R1-1710902 CP-OFDM waveform for NR long PUCCH Nokia, Alcatel-Lucent Shanghai Bell
R1-1711416 Performance evaluations on 1-symbol PUCCH for up to 2 UCI bits Huawei, HiSilicon
R1-1711417 Long PUCCH structure for large payload with no multiplexing capacity Huawei, HiSilicon
R1-1711418 On CSI feedback in NR Huawei, HiSilicon
R1-1711419 Transmit diversity for short duration PUCCH Huawei, HiSilicon
R1-1711420 Multiplexing between PUCCHs Huawei, HiSilicon
R1-1711421 Multiplexing of UL control channel and SRS in NR Huawei, HiSilicon

5.1.3.3 DL/UL data scheduling and HARQ procedure

From Thursday offline…

Agreements:

- RAN1 advises based on the current understanding that RAN2 can make progress without taking into account the progress of CBG retransmissions and pre-emption indication.
- RAN1 will strive for making CBG retransmissions and pre-emption indication being not be visible in the MAC spec.

Agreements:

- For HARQ,
  - The retransmissions can occupy a different frequency allocation than the initial transmission (Note, this is supported in LTE)
  - For downlink, the transmission durations for a given TB may not be the same in some cases.
    - Among initial transmission and retransmissions for a data having fixed DMRS position relative to the start of the slot
    - Among initial transmission and retransmissions for a data having fixed DMRS position relative to the start of the data
    - FFS: other cases
  - For uplink at least scheduled by a UL grant, the transmission durations for a given TB may not be the same in some cases.

Agreements:

- One TB is mapped to one DL/UL carrier.
- Re-transmission of a TB cannot take place on different carrier than the initial transmission.
- **Working assumption:**
  - Re-transmission of a TB cannot take place on different numerology than the initial transmission in Rel. 15.
- When uplink CBG-based (re)transmission is configured, the UL grant indicates which CBG(s) of a TB is/are retransmitted

Email approval of the LS capturing the above agreements/WA until 6th of July – Karri (Nokia)

R1-1711681 WF on the structure of a data channel including DMRS Panasonic, OPPO, NTT DOCOMO

5.1.3.3.1 DL/UL resource allocation

R1-1711322 Frequency/time resource assignment of the operation modes Panasonic

From Wednesday offline…

Agreements:

- For downlink, UE can be informed about the first DMRS position of the PDSCH between the following:
  - Fixed on the 3rd or 4th symbol of the slot (for, a.k.a, slot-based scheduling)
  - 1st symbol of the scheduled data (for a.k.a non-slot-based scheduling)
    - FFS: if special handling is needed for the case where some of the PRBs of the symbol of the scheduled data is overlapped with the other signals/channels
- FFS: When the UE is configured both slot-based scheduling and non-slot-based scheduling, the first DMRS position of the PDSCH can be changed between the 3rd or 4th symbol of the slot and 1st symbol of the scheduled data

Agreements:

- For uplink, the first DMRS position of the PUSCH is fixed relative to the start of the scheduled data.
  - FFS: Additional possibility of the another fixed position relative to the start of slot
  - The exact fixed position can be changed depending on the duration of the scheduled data

Conclusion:

- For both downlink and uplink, the second or later or additional DMRS is up to MIMO discussion.

5.1.3.3.1.1 Frequency-domain resource allocation

Including resource allocation for PDSCH/PUSCH with CP-OFDM waveform and PUSCH with DFT-s-OFDM waveform.

R1-1710164 Bandwidth part configuration and frequency resource allocation Guangdong OPPO Mobile Telecom.

R1-1711689 Outputs of offline discussion on RBG size/number determination OPPO

RBG size/number determination, following options are discussed:

- Option 1:
  - Semi-statically configure a size of Type0 RA bitmap in DCI.
  - Then determine the number and size of RBGs for a RA based on size of BWP and the size of the bitmap.
- Option 2:
  - RBG size can be semi-statically configured per BWP.
    - FFS: Dynamic switching of RBG size.
  - Then number of RBGs in the BWP is determined by size of the BWP and the configured/indicated RBG size.
- Option 3:
  - RBG size is determined by the BW of the BWP and/or PDCCH monitoring periodicity
    - FFS: Necessity of signaling

Friday

R1-1711843 Outputs of offline discussion on RBG size/number determination OPPO, Nokia, LGE, Samsung, vivo, ZTE, CATR

Agreements:

- For PDSCH/PUSCH, the RBG size/number can be changed along with the change of the BWP used for resource allocation.
- FFS: If one or multiple of following option(s) is/are also used for RBG size/number determination:
  - Opt. 1: Semi-statically configured size of Type0 RA bitmap.
    - Number and size of RBGs for a RA is determined based on size of BWP and the size of the bitmap.
  - Opt. 2: Semi-statically configured RBG size(s) per BWP for deriving number of RBGs.
    - Number of RBGs in the BWP is determined by size of the BWP and the configured/indicated RBG size(s).
    - FFS: Dynamic switching of RBG size(s).
  - Opt. 3: DCI format/DCI format size (e.g. a compact DCI may be with a larger RBG size than a normal DCI).
  - Opt. 4: Transmission durations (e.g. a shorter-duration transmission may be with a larger RBG size than a longer one).
  - Opt. 5: RBG size is determined depending on the size of the BWP.
  - Other options are not precluded.

R1-1711753 WF on UL Resource Allocation for PUSCH with DFT-s-OFDM waveform in NR NEC, NTT DOCOMO, Panasonic, OPPO, Ericsson, Nokia, ASB

Agreements:

- In frequency-domain, for PUSCH with DFT-s-OFDM waveform in NR, contiguous resource allocation scheme based on LTE UL RA Type 0 is adopted in Rel. 15.
  - FFS:
    - A coarser granularity (i.e. more than 1RB) of resource assignment in order to reduce the overhead further
    - BW parts
- In frequency-domain, for PDSCH in NR, a resource allocation scheme based on LTE DL RA Type 2 is supported in Rel. 15.
  - FFS:
    - A coarser granularity (i.e. more than 1RB) of resource assignment in order to reduce the overhead further
    - BW parts
- In frequency-domain, for PUSCH with CP-OFDM waveform in NR, contiguous resource allocation scheme based on LTE UL RA Type 0 is supported in Rel. 15
  - FFS:
    - A coarser granularity (i.e. more than 1RB) of resource assignment in order to reduce the overhead further
    - BW parts
- A DCI format with resource allocation based on LTE DL RA type 0 (i.e., bit-map) is supported for PDSCH.

- A DCI format with resource allocation based on LTE DL RA type 0 (i.e., bit-map) is supported for PUSCH with CP-OFDM waveform.
- A DCI format with resource allocation based on LTE DL RA type 2 is supported for PDSCH.
- A DCI format with resource allocation based on LTE UL RA type 0 is supported for PUSCH with CP-OFDM waveform and with DFT-s-OFDM waveform.
- FFS: some or all of the above DCI formats have the same DCI payload size.

Proposals from offline

- FFS: for PUSCH transmission, the waveform is either dynamically indicated by the scheduling DCI or is semi-statically configured by higher-layer signalling.
  - This will be discussed in scheduling/HARQ agenda.
- FFS: whether to conform the following working assumption
  - In frequency-domain, for PUSCH with DFT-s-OFDM waveform, only contiguous resource allocation is supported in Rel. 15.

Not treated

R1-1709974	Scheduling and resource allocation mechanism for active bandwidth parts	Huawei, HiSilicon
R1-1710091	NR DL/UL frequency domain resource allocation	CATT
R1-1710121	Resource allocation in frequency domain	ZTE
R1-1710164	Bandwidth part configuration and frequency resource allocation	Guangdong OPPO Mobile Telecom.
R1-1710245	Frequency-domain resource allocation schemes for NR	NEC
R1-1710323	Discussion on frequency-domain resource allocation	LG Electronics
R1-1710392	Discussion on downlink RA	vivo
R1-1710413	Further details on forward compatible resources in NR	AT&T
R1-1710565	DL/UL data frequency-domain resource allocation	Intel Corporation
R1-1710718	DL/UL Frequency Resource Allocation	Samsung
R1-1710787	On default bandwidth part	PANASONIC
R1-1710953	On frequency-domain resource allocation for NR	InterDigital, Inc.
R1-1710989	On resource allocation in frequency domain for PDSCH and PUSCH in NR	Nokia, Alcatel-Lucent Shanghai Bell
R1-1711107	Frequency-domain resource allocation	NTT DOCOMO, INC.
R1-1711197	MPR issue with distributed RB allocation in UL	Qualcomm Incorporated
R1-1711198	Short PUSCH transmission in UL short duration	Qualcomm Incorporated
R1-1711363	Two-step resource allocation for data channel in NR	ASUSTEK COMPUTER (SHANGHAI)
R1-1711499	On Resource Allocation in the Frequency Domain	Ericsson

5.1.3.3.1.2 Time-domain resource allocation

Timing/duration determination for symbol-level/slot-level/multi-slot-level scheduling.

R1-1709994	Discussion on data transmission duration	Huawei, HiSilicon
R1-1710092	NR DL/UL time domain resource allocation	CATT
R1-1710165	Time-domain resource allocation for NR	Guangdong OPPO Mobile Telecom.
R1-1710238	Discussion on time domain resource allocation	Fujitsu
R1-1710246	Time-domain resource allocation schemes for NR	NEC
R1-1710324	Discussion on time-domain resource allocation	LG Electronics
R1-1710397	Discussion on flexible length scheduling	vivo
R1-1710414	Transmission duration indication for symbol-level/slot-level/multi-slot-level scheduling	AT&T
R1-1710566	Time-domain resource allocation for DL and UL data	Intel Corporation
R1-1710719	DL/UL Time Resource Allocation	Samsung
R1-1710838	Cross-slot scheduling for UE power saving	MediaTek Inc.
R1-1710990	Time-domain resource allocation for NR	Nokia, Alcatel-Lucent Shanghai Bell
R1-1711108	Time-domain resource allocation	NTT DOCOMO, INC.
R1-1711471	Discussions on Transmission Duration	KT Corp.
R1-1711500	On Resource Allocation in the Time Domain	Ericsson

5.1.3.3.1.3 Transport block size determination

R1-1709978	TB mapping and TB size determination	Huawei, HiSilicon
R1-1710325	Discussion on TB size determination for NR	LG Electronics
R1-1710720	Transport Block Size Determination	Samsung
R1-1710991	Transport block size determination and the support of slot aggregation in NR	Nokia, Alcatel-Lucent Shanghai Bell

R1-1711109 Transport block size determination NTT DOCOMO, INC.
R1-1711199 Discussion TB size determination Qualcomm Incorporated
R1-1711501 On MCS/transport Block Size Determination Ericsson

5.1.3.3.2 UL data transmission procedure with grant

Including details for single/multiple SR configurations.

R1-1710021 Advantages of Underlay Scheduling Request method over PUCCH-based SR Idaho National Laboratory
R1-1710093 Further details of grant-based UL transmission CATT
R1-1710122 On scheduling request in NR ZTE
R1-1710166 Discussion on the UL waveform indication Guangdong OPPO Mobile Telecom.
R1-1710247 Frequency hopping for NR UL PUSCH NEC
R1-1710326 Discussion on scheduling request for UL transmission with grant LG Electronics
R1-1710465 On uplink data scheduling Huawei, HiSilicon
R1-1710567 SR configuration and UL data scheduling Intel Corporation
R1-1710721 SR Transmission for Multiple Configurations Samsung
R1-1710722 Procedures for Grant-Based UL Transmissions Samsung
R1-1710834 On support of Grant-free and Grant-based transmission for UL URLLC MediaTek Inc.
R1-1710992 Discussion on multiple SR configuration Nokia, Alcatel-Lucent Shanghai Bell
R1-1711110 Scheduling request design in NR system NTT DOCOMO, INC.
R1-1711200 Simultaneous UL SR channel Qualcomm Incorporated
R1-1711502 On UL Data Scheduling Grant in NR Ericsson
R1-1711503 On Scheduling Request Enhancements Ericsson
R1-1711836 WF on scheduling request for NR Idaho National Laboratory, KDDI, Lenovo, Motorola Mobility, IITH, CEWIT, IITM, Tejas Networks, Qualcomm

5.1.3.3.3 UL data transmission procedure without grant

Including HARQ/re-transmission, UE identification, relation b/w UL grant-free and UL SPS, etc.

R1-1710328 Summary of [89-22] Email discussion about UL data transmission without UL grant LG Electronics

Agreements:

- In addition to the RS parameters, time and frequency resource are configured in a UE-specific manner.
  - Note: it is common understanding that the time and frequency resources configured for a UE may or may not collide with those for another UE (to be captured in the LS).
- WA: Both DFT-S-OFDM and CP-OFDM are supported for UL transmission without grant.
- NR supports more than 1 HARQ process for UL transmission without grant

Offline summary (on-going):

R1-1711829 Offline discussions on UL data transmission without grant NTT DOCOMO

- Function of L1 signalling
  - At least following functionality of the L1 signalling is supported
    - Activation/Deactivation
    - Modification of parameters configured by RRC
      - For example at least following parameters are common in the RRC configuration and L1 signaling
        - One physical resource including following
          - Time domain resource allocation for one transmission
          - Frequency domain resource allocation in terms of RB(s) or RBG(s)
          - UE-specific DMRS configuration
      - MCS/TBS
  - Switch to grant-based re-transmission for the same TB
    - Companies are encouraged to provide detailed methods to determine the grant is for the same TB
  - Companies are encouraged to provide analysis to prove the benefits of supporting an acknowledgement/indication of successful receiving of that TB from gNB in next meeting
- Formats of L1 signalling
  - Select from following two options to achieve each of the L1 signalling functionalities in next meeting
    - Option 1: UE-specific DCI (UL grant)
    - Option 2: Group common DCI
  - FFS the monitoring occasions for the L1 signalling
- RRC configurations

- At least for UL transmission without UL grant and without L1 activation/deactivation signalling, the RRC (re-)configuration for a set of resource and parameters includes at least the following
- Transmission interval, where the minimum value can be one slot or one mini-slot
- One physical resource including following
  - Time domain resource allocation for one transmission
  - Frequency domain resource allocation in terms of RB(s) or RBG(s)
  - UE-specific DMRS configuration
- At least one physical resource can be configured for one UE within the transmission interval
- FFS multiple physical resources can be configured for one UE within the transmission interval
- Note:
  - At least repetition can be performed on the same physical resource defined above
  - FFS multiple physical resources can be configured for the K repetitions, where K>1
- Other transmission related parameters:
  - An MCS/TBS value
  - Number of repetitions K
  - Power control related parameters
  - FFS: HARQ process related parameters
  - FFS: Possible RVs related parameters for repetitions
  - FFS: Possible hopping related parameters including enable/disable configurability
  - FFS: Possible ACK feedback related parameters
  - FFS other parameters
- Multiple sets of resource and parameters can be (re-)configured for each UE

Friday

Agreements:

- The same TA adjustment procedure/mechanism (including expiration of TA timer) is applied to UL transmission with and without UL grant
- For UL transmission without UL grant,
  - Open-loop power control based on pathloss estimate is supported.
  - FFS: Closed-loop power control is supported, which is based on NW signaling.
- A UE shall not transmit anything on configured resources for UL transmission without UL grant when there is no transport block to transmit.
- FFS: UCI piggybacking with transport block is supported for UL transmission without UL grant.

Agreement: RAN1 considers that UE transmitting UL transmission without UL grant can be identified based on time/frequency resources and RS parameter(s).

R1-1711969 **Offline discussions on UL data transmission without grant NTT DOCOMO**

Agreements:

- Type of UL data transmission without grant
  - Type 1: UL data transmission without grant is only based on RRC (re)configuration without any L1 signalling
  - Type 2: UL data transmission without grant is based on both RRC configuration and L1 signalling to activation/deactivation for UL data transmission without grant
    - Note: functionality of modification is achieved the L1 signalling by activation
  - Type 3: UL data transmission without grant is based on RRC configuration, and allows L1 signalling to modify some parameters configured by RRC but no L1 signalling for activation
- For UL data transmission without grant, type 1 and type 2 have already been agreed, FFS type 3.
- FFS the reliability issues for L1 signalling.
- For Type 1 UL transmission without UL grant, the RRC (re-)configuration includes at least the following
  - Periodicity and offset of a resource with respect to SFN=0
  - Time domain resource allocation
  - Frequency domain resource allocation
  - UE-specific DMRS configuration
  - Note:
    - one TB is mapped to a resource at least consisting of time/frequency-domain resource
    - RAN1 will not introduce specific resource allocation and DMRS configuration for UL data transmission without grant separate from UL data transmission with UL grant within the Rel.15 WI
  - An MCS/TBS value
  - Number of repetitions K
  - Power control related parameters

- FFS HARQ related parameters
- FFS if multiple resources can be configured

- For Type 2 UL transmission without UL grant
  - The RRC (re-) configuration for resource and parameters includes at least the following
    - Periodicity of a resource
    - Power control related parameters
  - At least the following additional parameters for the resource are given by L1 signalling
    - Offset associated with the periodicity with respect to a timing reference indicated by L1 signalling for activation
      - FFS: the timing reference
    - Time domain resource allocation
    - Frequency domain resource allocation
    - UE-specific DMRS configuration
    - An MCS/TBS value
    - Note:
      - one TB is mapped to one resource
      - RAN1 will not introduce specific resource allocation and DMRS configuration for UL data transmission without grant separate from UL data transmission with UL grant within the Rel.15 WI
  - FFS multiple resources can be configured
  - FFS HARQ related parameters
  - FFS whether number of repetitions K is configured by RRC signalling and/or indicated by L1 signalling

Email approval of the LS to RAN2 until 6th of July to explain RAN1 understandings based on above agreements – Lihui (NTT DOCOMO)

Not treated.

R1-1709991	Resource configuration on UL transmission without grant	Huawei, HiSilicon
R1-1709992	UE identification and HARQ combining for grant-free transmissions	Huawei, HiSilicon
R1-1710014	Evaluation of UE identification for UL transmission without grant	ZTE
R1-1710015	Considerations on the procedures of UL data transmission without grant	ZTE
R1-1710094	Grant-free UL transmission procedure	CATT
R1-1710167	HARQ for uplink grant-free transmission	Guangdong OPPO Mobile Telecom.
R1-1710239	Discussions on HARQ for grant-free transmission	Fujitsu
R1-1710248	UL data transmission without grant	NEC
R1-1710327	Discussion on UL transmission without grant	LG Electronics
R1-1710328	Summary of [89-22] Email discussion about UL data transmission without UL grant	LG Electronics
R1-1710380	Discussion on UL grant-free transmission	vivo
R1-1710568	UL grant-free transmissions: Resource configuration	Intel Corporation
R1-1710601	UL grant-free transmission for URLLC	Lenovo, Motorola Mobility
R1-1710621	Resource allocation and transmission scheme for URLLC grant-free transmission	ETRI
R1-1710723	Procedures for Grant-Free UL Transmissions	Samsung
R1-1710724	Grant-Free and Grant-Based UL Transmissions	Samsung
R1-1710835	Grant-free Scheduling and retransmission schemes for UL URLLC	MediaTek Inc.
R1-1710836	On use of scrambling for UL Grant-free URLLC transmission	MediaTek Inc.
R1-1710861	Pre-emption in UL grant free resource	Sony
R1-1710863	Discussion on the retransmission of UL transmission without grant	Sony
R1-1710887	UL grant-free transmissions: Physical layer procedures	Intel Corporation
R1-1710963	On network resources and UE transmission configurations for grant-free access	NEC
R1-1710971	UL grant-free transmission for URLLC	China Telecommunications
R1-1710993	Unified framework for UL grant-free and UL SPS	Nokia, Alcatel-Lucent Shanghai Bell
R1-1710994	UE identification and HARQ for URLLC UL grant-free	Nokia, Alcatel-Lucent Shanghai Bell
R1-1711006	Issues and Control Design for UL Grant-free URLLC	III
R1-1711111	Overall solutions for UL grant free transmission	NTT DOCOMO, INC.
R1-1711253	Resource configuration for UL transmission without grant	NICT
R1-1711323	UL data transmission without grant	Panasonic
R1-1711504	On SPS/Grant-Free Transmission	Ericsson
R1-1711505	On HARQ Retransmission for SPS/Grant-free	Ericsson
R1-1711782	WF on UL transmission without grant	NEC

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5.1.3.3.4 CBG-based (re)transmission

R1-1711883 WF on CBG retransmission Samsung

Possible proposal from offline:

- CBG formation remains the same in retransmission as initial transmission

Possible agreement:

- Each CBG is the same set of CB(s) between initial transmission and retransmission

Friday

R1-1711958 WF on CBG retransmission Samsung, ZTE

Working assumption: For initial transmission and retransmission, each CBG of a TB has the same set of CB(s).

Agreement: For CBG-based (re)transmission, the DCI scheduling CBG-based (re)transmission carries single RV field for the transport block.

Email approval until July 13th for downselection between the fhe followings – Jeongho (Samsung)

- For the indicated number of CBGs per TB where "indicated" is realized by RRC, MAC, L1 signalling, the following options are considered for down-selection in RAN1#90.
  - Option 1. RRC signaling (for bit-field size)
  - Option 2. L1 signaling (for indication the number of CBGs per TB) + RRC signaling (for bit-field size)
  - Option 3. both Option 1 and Option 2
- To determine the number of CBG HARQ-ACK bits per TB, the following options are considered for down-selection in RAN1#90.
  - Option 1. A UE transmits HARQ-ACK bits only for scheduled CBGs.
    - "scheduled CBGs" means the CBGs scheduled in a (re)transmission
  - Option 2. A UE transmits HARQ-ACK bits for indicated CBGs.
    - FFS: "indicated" is realized by RRC, MAC, L1 signalling
  - Option 3. both Option 1 and Option 2 by configuration
- For DL CBG-based (re)transmission, when information on which CBG(s) is/are (re)transmitted is configured to be included in the DCI, the following options are considered for down-selection in RAN#90.
  - Option 1. TB-level NDI is jointly encoded with the information on which CBG(s) is/are (re)transmitted
  - Option 2. There is separate 1-bit bit-field for TB-level NDI.
- When CBG-based retransmission is configured, TB-level HARQ-A/N is supported and at least following options can be considered for down-selection in RAN1#90.
  - Option 1. Add 1 bit upon CBG-level HARQ-ACK bits
  - Option 2. Use all NACK of CBG-level HARQ-ACK bits
  - Option 3. Use different PUCCH format or PUCCH resource
- For HARQ-ACK codebook for CBG-based retransmission, the following options are considered for down-selection in RAN1#90.
  - Option 1. Dynamic codebook determination for multiple PDSCHs
  - Option 2. Semi-static codebook determination for multiple PDSCHs
  - Option 3. both Option 1 and Option 2 by configuration

5.1.3.3.4.1 CBG construction

R1-1709968 Discussion on CBG construction Huawei, HiSilicon
R1-1710017 CBG construction ZTE
R1-1710095 Details of CBG construction CATT
R1-1710329 Consideration on CBG construction for NR HARQ LG Electronics
R1-1710396 Discussion on CB grouping vivo
R1-1710442 On CBG construction for NR PDSCH and PUSCH AT&T
R1-1710569 On CBG construction Intel Corporation
R1-1710593 Discussion on CBG grouping Guangdong OPPO Mobile Telecom.
R1-1710602 CBG construction for CBG-based retransmission Lenovo, Motorola Mobility
R1-1710725 CBG Construction Samsung
R1-1710830 Discussion on CBG construction for CBG-based (re)transmission MediaTek Inc.
R1-1710876 CBG based HARQ for NR InterDigital, Inc.
R1-1710995 Mapping code blocks to code block groups Nokia, Alcatel-Lucent Shanghai Bell
R1-1711112 CBG construction NTT DOCOMO, INC.
R1-1711202 CBG Construction Principles for CBG-based Transmission with Multi-Bit HARQ feedback Qualcomm Incorporated
R1-1711506 On Code Block Group Formation and CRC Attachment Ericsson

R1-1711690 WF on the number of CBGs OPPO
R1-1711844 WF on the number of CBGs OPPO

5.1.3.3.4.2 DL control signalling for CBG-based (re)transmission

Including CBG information by the DCI.

R1-1709967 Scheduling mechanisms for CBG-based re-transmission Huawei, HiSilicon
R1-1710018 DL control for CBG ZTE
R1-1710096 DL control signaling design for CBG-based operation CATT
R1-1710168 Discussion on CBG indication in DCI Guangdong OPPO Mobile Telecom.
R1-1710240 Discussion on DL control signaling related to CBG based (re)-transmission Fujitsu
R1-1710330 Consideration on DCI signaling for CBG based HARQ LG Electronics
R1-1710443 DCI design for CBG based re transmision AT&T
R1-1710570 DCI design and scheduling of CBG-based (re)transmissions Intel Corporation
R1-1710603 DL control signalling for CBG-based retransmission Lenovo, Motorola Mobility
R1-1710726 Scheduling for CBG Retransmissions Samsung
R1-1710864 Discussion on the CBG index indication by DCI Sony
R1-1710908 DL control signal for CBG-based transmission Apple Inc.
R1-1710972 Control signalling for CBG-based (re)transmission China Telecommunications
R1-1710996 DL control signalling for CBG-based transmissions Nokia, Alcatel-Lucent Shanghai Bell
R1-1711113 DL control signalling for CBG-based (re)transmission NTT DOCOMO, INC.
R1-1711203 DCI considerations for CBG-based (re)-Transmissions Qualcomm Incorporated
R1-1711245 Pardon the Interruption: Downlink Control Signaling to Enable Preemption and CBG-based (Re) Transmission Sharp
R1-1711257 Discussion on DL control signalling for CBG-based retransmission HTC Corporation
R1-1711316 DL control signaling for CBG-based (re)transmission Shenzhen Coolpad Technologies
R1-1711324 DL control signalling for CBG-based (re)transmission Panasonic
R1-1711341 Discussions on the indication for CBG CATR
R1-1711507 On Retransmission Decoder Throughput Issues and CBG-based Retransmission Control Ericsson
R1-1711531 CBG based retransmission Sequans Communications

5.1.3.3.4.3 UL control signalling for CBG-based (re)transmission

Including CBG-level HARQ-ACK feedback.

R1-1709969 Discussion on CBG-based feedback Huawei, HiSilicon
R1-1710019 UL control for CBG ZTE
R1-1710097 UL control signaling design for CBG-based operation CATT
R1-1710169 Discussion on HARQ-ACK feedback for CBG-based transmission Guangdong OPPO Mobile Telecom.
R1-1710241 Discussion on CBG based HARQ-ACK Design Fujitsu
R1-1710331 Consideration on UCI signaling for CBG based HARQ LG Electronics
R1-1710444 Uplink control channel design for CBG based re transmission AT&T
R1-1710571 HARQ-ACK feedback for CBG-based (re)transmissions Intel Corporation
R1-1710604 UL HARQ-ACK feedback for CBG-based retransmission Lenovo, Motorola Mobility
R1-1710727 HARQ-ACK Feedback for CBG-Based Retransmissions Samsung
R1-1710954 HARQ feedback design considerations for CBG based transmission InterDigital, Inc.
R1-1710997 HARQ-ACK feedback for CBG-based (re-)transmission in NR Nokia, Alcatel-Lucent Shanghai Bell
R1-1711114 UL control signalling for CBG-based (re)transmission NTT DOCOMO, INC.
R1-1711204 UCI considerations for CBG-based (re)-Transmissions Qualcomm Incorporated
R1-1711258 Discussion on UL control signalling for CBG-based retransmission HTC Corporation
R1-1711361 Discussion on UL HARQ-ACK feedback for CBG-based retransmission WILUS Inc.
R1-1711472 Considerations on TB-CRC Failure KT Corp.
R1-1711508 On Design of CBG HARQ-ACK Feedback Schemes Ericsson
R1-1711530 CBG based HARQ-Ack/Nack Sequans Communications

5.1.3.3.5 HARQ-ACK feedback

5.1.3.3.5.1 HARQ-ACK feedback timing

R1-1709970 HARQ feedback timing for NR Huawei, HiSilicon
R1-1710332 Consideration on HARQ-ACK feedback timing for NR LG Electronics
R1-1710418 HARQ-ACK feedback timing for FDD, semi-static TDD and mini-slot based transmissions AT&T
R1-1710728 HARQ-ACK Feedback Timing Samsung
R1-1710783 Discussion on timing design for semi-static DL/UL assignment CMCC

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R1-1710795 Timing of HARQ-ACK for PDSCH MediaTek Inc.
R1-1710877 DL HARQ Feedback suppression InterDigital, Inc.
R1-1710998 Timing aspects for HARQ-ACK feedback Nokia, Alcatel-Lucent Shanghai Bell
R1-1711115 HARQ-ACK timing NTT DOCOMO, INC.
R1-1711205 Low latency impact analysis on user plane and control plane Qualcomm Incorporated
R1-1711509 On HARQ Feedback Timing Ericsson

5.1.3.3.5.2 HARQ-ACK multiplexing/bundling

Including solutions to address single/multiple TBs/CBGs over single/multiple carriers/TTIs.

R1-1710098 NR HARQ-ACK multiplexing CATT
R1-1710242 Discussion on HARQ-ACK codebook Fujitsu
R1-1710333 Support of HARQ-ACK multiplexing/bundling for NR LG Electronics
R1-1710462 On HARQ-ACK multiplexing and/or bundling Huawei, HiSilicon
R1-1710572 HARQ-ACK multiplexing and bundling Intel Corporation
R1-1710605 HARQ-ACK codebook design for CBG-based transmission Lenovo, Motorola Mobility
R1-1710729 HARQ-ACK Codeword Determination Samsung
R1-1710999 On HARQ feedback determination Nokia, Alcatel-Lucent Shanghai Bell
R1-1711116 HARQ-ACK multiplexing NTT DOCOMO, INC.
R1-1711259 Discussion on CBG-based HARQ feedback multiplexing HTC Corporation
R1-1711510 On HARQ Codebook Ericsson
R1-1711933 WF on HARQ-ACK multiplexing for NR LG Electronics
R1-1711934 WF on HARQ-ACK bundling for NR LG Electronics

5.1.3.3.6 Processing time and HARQ process number

R1-1711185 WF on Processing Time Requirements Qualcomm, ZTE, Deutsche Telekom, Vodafone, Panasonic, Ericsson

Agreements:

- For NR, RAN1 should consider the UE processing time(s) in terms of symbols (N1, N2) together with absolute time (in us), instead of slots (K)
  - N1: the number of OFDM symbols required for UE processing from the end of NR-PDSCH reception to the earliest possible start of the corresponding ACK/NACK transmission from UE perspective.
  - N2: the number of OFDM symbols required for UE processing from the end of NR-PDCCH containing the UL grant reception to the earliest possible start of the corresponding NR-PUSCH transmission from UE perspective.
  - Note the timing advance is not included in N1 and N2
    - FFS whether other aspects, e.g. UE UL/DL switching time, etc. are included in N1 and N2
  - FFS between the following for each combination defined in the next slide
    - Opt 1: UE reports N1 and N2 as UE capability
    - Opt 2: Fixed values of N1 and N2
  - UE is not expected transmit anything in uplink if the network set the values of K1 and/or K2 without leaving sufficient time for UE processing

Friday
R1-1711957 WF on Processing Time Requirements Qualcomm

Conclusions:

- Email discussion about followings – Joseph (Qualcomm)
  - Step 1: identify the candidate factors for processing time (until 4th Aug.)
  - Step 2: identify the table (until 4th Aug.)
- Based on the proponents' input for step 1 and step 2, following work will be done:
  - Step 3: fill-in the table
  - Targeting finishing step 3 until September meeting.
    - Note: companies are encouraged to bring up initial numbers for the table to the August meeting
  - Note: fill-in the table does not necessarily results in defining some UE capabilities or exact values of K1 and K2 in the specification.

5.1.3.3.6.1 Number of HARQ processes and HARQ RTT

R1-1709965 Number of HARQ processes and HARQ RTT Huawei, HiSilicon
R1-1710099 Discussion on number of HARQ processes and HARQ RTT CATT
R1-1710334 Discussion on HARQ process number for NR LG Electronics
R1-1710394 Discussion on NR UE supporting self-contained operation vivo

R1-1710415 Remaining details on the number of HARQ processes in NR AT&T
R1-1710573 On HARQ processes and HARQ RTT Intel Corporation
R1-1710730 On Number of HARQ Processes and HARQ RTT Samsung
R1-1710967 Number of HARQ processes for co-existence with TD-LTE NEC Corporation
R1-1711000 On the number of HARQ processes Nokia, Alcatel-Lucent Shanghai Bell
R1-1711117 Processing time and HARQ process number for NR NTT DOCOMO, INC.
R1-1711206 UE processing time Qualcomm Incorporated
R1-1711511 On Minimum Processing Time and Number of HARQ Processes in NR Ericsson

5.1.3.3.6.2 Soft-buffer management

R1-1709966 Soft buffer handling Huawei, HiSilicon
R1-1710020 Consideration about CBG soft-buffer management ZTE
R1-1710100 Soft buffer management for NR CATT
R1-1710335 Discussion on soft buffer management for NR LG Electronics
R1-1710574 Soft-buffer requirements in NR Intel Corporation
R1-1710731 Soft Buffer Partitioning Samsung
R1-1711001 On the HARQ soft buffer handling Nokia, Alcatel-Lucent Shanghai Bell
R1-1711118 Soft-buffer size and management NTT DOCOMO, INC.
R1-1711207 Considerations for soft buffer management Qualcomm Incorporated
R1-1711325 UE category modelling and soft buffer Panasonic
R1-1711512 On HARQ and Soft Buffer Handling Ericsson

5.1.3.3.7 Multiplexing data with different transmission durations

5.1.3.3.7.1 Pre-emption indication for downlink

Including signalling details and UE behaviour when it is indicated.

R1-1711342 Discussion on the granularity of preemption indication CATR

Offline summary (on-going):
R1-1711823 WF on pre-emption indication Huawei, HiSilicon, MediaTek, Sequans, NTT DOCOMO, Sony, vivo, ZTE, InterDigital, III
Proposals:

- For downlink preemption indication
  - It is transmitted using a group common DCI in PDCCH
    - Working Assumption: This group common DCI is separate from group common PDCCH for SFI
    - Group common DCI addresses a time duration and frequency band
  - Whether a UE needs to monitor preemption indication is configured by RRC signaling
  - The granularity of preemption indication in time domain can be configured
  - The granularity of preemption indication in frequency domain will be down selected from
    - Option 1: RBG(s) in a common frequency band addressed by group common DCI with a given numerology
    - Option 2: 1/N of a common frequency band addressed by group common DCI with a given numerology
      - FFS: the value of N.
  - Details of group common DCI for pre-emption indication
    - FFS CORESET configuration and monitoring interval for the group common DCI
    - FFS details of contents for the group common DCI (E.g. the time/freq of pre-emption, number of pre-emption)

Friday
R1-1711911 WF on pre-emption indication Huawei, HiSilicon, MediaTek, Sequans, NTT DOCOMO, Sony, vivo, ZTE, InterDigital, III, Intel, LGE, Samsung

Agreements:

- For downlink preemption indication
  - It is transmitted using a group common DCI in PDCCH
    - FFS: This group common DCI is transmitted separately from SFI
    - Whether a UE needs to monitor preemption indication is configured by RRC signaling
    - The granularity of preemption indication in time domain can be configured
      - Details of granularity are FFS

R1-1711981 WF on group common pre-emption indication Huawei, HiSilicon, Sharp, ZTE, LGE, Sony, Panasonic, MediaTek, InterDigital

Not treated.

R1-1709984	On pre-emption indication for DL multiplexing of URLLC and eMBB	Huawei, HiSilicon
R1-1710101	Further design considerations for DL pre-emption indication	CATT
R1-1710123	DL pre-emption indication	ZTE
R1-1710170	Symbol-level resource allocation and pre-emption indication	Guangdong OPPO Mobile Telecom.
R1-1710336	Discussion on pre-emption indication for downlink	LG Electronics
R1-1710382	Discussion on pre-emption indication for downlink	vivo
R1-1710575	Remaining details of DL pre-emption indication	Intel Corporation
R1-1710732	Indication of Preempted Resources in DL	Samsung
R1-1710865	Remaining issues on using pre-emption indicator for DL URLLC/eMBB multiplexing	Sony
R1-1710955	Signalling design considerations for DL pre-emption indication	InterDigital, Inc.
R1-1711002	On pre-emption indication	Nokia, Alcatel-Lucent Shanghai Bell
R1-1711119	Pre-emption indication for downlink	NTT DOCOMO, INC.
R1-1711362	Discussion on UE behavior by pre-emption indication	WILUS Inc.
R1-1711474	Views on preemption indication for DL	KT Corp.
R1-1711513	On Pre-emption Indication for Downlink	Ericsson
R1-1711551	Considerations on multiplexing with different transmission durations	KDDI Corporation
R1-1711554	URLLC DL pre-emption and UL suspension indication channel design	Qualcomm Incorporated

5.1.3.3.7.2 Possible enhancements for uplink

R1-1709988	Discussion on UL multiplexing of grant-based eMBB and grant-free URLLC	Huawei, HiSilicon
R1-1710124	Uplink multiplexing for different transmission durations	ZTE
R1-1710243	On eMBB and URLLC multiplexing for Uplink	Fujitsu
R1-1710337	Discussion on eMBB and URLLC multiplexing for uplink	LG Electronics
R1-1710383	Discussion on UL multiplexing data with different transmission durations	vivo
R1-1710576	Multiplexing of UL transmissions with different data durations and latency requirements	Intel Corporation
R1-1710606	On eMBB/URLLC multiplexing for uplink transmission	Lenovo, Motorola Mobility
R1-1710733	On Indication of Preempted Resources in UL	Samsung
R1-1710867	Multiplexing data with different transmission durations for Uplink	Sony
R1-1710956	Multiplexing of low-latency traffic and non-latency sensitive traffic in UL	InterDigital, Inc.
R1-1711003	Pause-Resume Scheduling for Low Latency Uplink Transmissions	Nokia, Alcatel-Lucent Shanghai Bell
R1-1711120	Multiplexing of different data durations for uplink	NTT DOCOMO, INC.
R1-1711208	Timing advance for different numerology	Qualcomm Incorporated
R1-1711514	On Pre-emption Indication for Uplink	Ericsson

5.1.3.3.8 Ultra-reliable part of URLLC for scheduling/HARQ procedure

Identify necessary techniques for scheduling/HARQ procedure to meet the URLLC requirements set forth by TR38.913.

R1-1709985	PDSCH reliability for URLLC	Huawei, HiSilicon
R1-1709987	Discussion on URLLC numerology	Huawei, HiSilicon
R1-1709990	Link adaption for URLLC transmission	Huawei, HiSilicon
R1-1710016	Repetition/hopping related design and reliablity evaluations for grant-free URLLC	ZTE
R1-1710125	Supporting Ultra reliability in scheduling	ZTE
R1-1710338	Discussion on scheduling and HARQ procedure for URLLC	LG Electronics
R1-1710381	Scheduling and HARQ aspects for URLLC reliability	vivo
R1-1710466	Consideration on subsequent transmission after pre-emption	Huawei, HiSilicon
R1-1710468	Discussion on Multi-TRP cooperation for URLLC	Huawei, HiSilicon
R1-1710469	Support of URLLC for TDD	Huawei, HiSilicon
R1-1710577	On link adaptation enhancements to support URLLC	Intel Corporation
R1-1710734	Scheduling/HARQ Procedures for URLLC	Samsung
R1-1710837	HARQ procedure for DL URLLC	MediaTek Inc.
R1-1710866	Feedback for improving URLLC reliability	Sony
R1-1711004	Discussion on scheduling based URLLC transmission	Nokia, Alcatel-Lucent Shanghai Bell
R1-1711005	CSI measuring and reporting procedure for URLLC	Nokia, Alcatel-Lucent Shanghai Bell
R1-1711121	Scheduling and HARQ procedures for URLLC	NTT DOCOMO, INC.
R1-1711343	Discussion on URLLC transmitted in same or different numerology resources	ASUSTEK COMPUTER (SHANGHAI)
R1-1711432	Discussion on over-the-air time synchronization for URLLC	Huawei, HiSilicon
R1-1711515	On Supporting High Reliability for Data Transmissions	Ericsson
R1-1711555	UL URLLC Capacity Based on URLLC and eMBB dynamic multiplexing	Qualcomm Incorporated
R1-1711556	Ultra reliable HARQ design with async CSI feedback	Qualcomm Incorporated

R1-1711560 Discussion on wireless time synchronization for URLLC SIA

5.1.3.3.9 Other

R1-1709964 HARQ processing time Huawei, HiSilicon
R1-1710735 Remaining Aspects for Short Scheduling Durations Samsung
R1-1710736 Triggered UCI Transmissions Samsung
R1-1710737 DL Resource Allocation for Multiplexing Data with Different Transmissions Durations Samsung
R1-1710738 Average User Plane Latency for Preemption based Multiplexing Samsung
R1-1711367 On UE processing time Ericsson LM
R1-1711422 Resource allocation for data channels Huawei, HiSilicon
R1-1711426 CBG-based transmission/retransmission for DL multiplexing of eMBB and URLLC Huawei, HiSilicon
R1-1711427 Discussion on group common pre-emption indication Huawei, HiSilicon
R1-1711428 Superposed transmission of pre-emption indication with eMBB data Huawei, HiSilicon
R1-1711429 Consideration on ACK/NACK error in CBG-based retransmission Huawei, HiSilicon
R1-1711430 Discussion on UL multiplexing of grant-based eMBB and URLLC Huawei, HiSilicon
R1-1711434 Discussion on TB size determination Huawei, HiSilicon
R1-1711435 Unified design for slot and mini-slot Huawei, HiSilicon
R1-1711456 HARQ Process Management in NR Samsung
R1-1711457 Indication of Preempted Resources Prior to HARQ-ACK Feedback Samsung
R1-1711458 Considerations on Signaling for Indicating Preempted Resources Samsung
R1-1711516 On Mixed Numerology Ericsson
R1-1711585 Partial pre-emption based multiplexing data with different transmission durations in DL Samsung
R1-1711596 Indication of Preempted Resources for TB-based re-transmission Samsung

5.1.3.4 Scheduling/HARQ aspects for carrier aggregation and dual connectivity

R1-1711425 Summary of LTE CA/DC and remaining issues for NR Huawei, HiSilicon

5.1.3.4.1 Carrier aggregation

R1-1711846 Way Forward on NR Carrier Aggregation Huawei, HiSilicon, KT, CATR, MediaTek, Nokia, ASB, Ericsson, Intel
Also supported by LGE

Conclusions:
Email approval on the following until July 10th – Zhenfei (Huawei):

- NR support Primary Component Carrier (PCC) and Secondary Component Carrier (SCC)
  - A UE monitors PDCCH candidates in common search space(s) and UE specific search space(s) on PCC
  - A UE monitors PDCCH candidates on UE-specific search space(s) for an SCC
- Support cross carrier scheduling with CIF
  - A carrier is scheduled by one and only one carrier
  - FFS: the number of CIF bits and possible connection to BWPs
- NR Supports at least 2 cell groups for PUCCH
  - Carrier transmitting the PUCCH can be configured within the cell group
    - FFS The PUCCH configuration can be done by the UL PCC reconfiguration or PUCCH reconfiguration
- For scheduling with different and the same numerologies:
  - For self-scheduling
    - PDCCH and the scheduled PDSCH have the same numerologies
    - PDCCH and the scheduled PUSCH can have the same or different numerologies
      - The time granularity indicated in the DCI for the timing relationship between DCI and the corresponding PUSCH follows the numerology of the PUSCH transmission
  - For cross-carrier scheduling
    - PDCCH and the scheduled PDSCH/PUSCH can have different or the same numerologies
      - The time granularity indicated in the DCI for the timing relationship between DCI and the corresponding PDSCH/PUSCH follows the numerology of the PDSCH/PUSCH transmission
    - UE is not expected to support faster processing for the case of cross-carrier scheduled PDSCH/PUSCH transmission scheduled by a DCI requiring than the case of self-scheduled PDSCH/PUSCH transmission scheduled by the DCI.
- UCI feedback related to multiple DL component carriers is supported for DL component carriers operating with the same and different numerology
  - The time granularity indicated in the DCI for PDSCH and the corresponding HARQ-ACK follows the numerology for HARQ-ACK transmission

- UE is not expected to support faster processing for the case when PDSCH and the corresponding HARQ-ACK use a different numerology than the case of the case when PDSCH and HARQ-ACK use the same numerology
- NR support 4 timing advance groups including Primary Timing Advance Group and Secondary Timing Advance Group(s)
  - Support PRACH transmission for timing advance acquisition on SCC

5.1.3.4.1.1 Self-/cross-carrier scheduling and joint/separate UCI feedback

For carriers with the same and different numerology

R1-1709975 On NR carrier aggregation Huawei, HiSilicon
R1-1710102 Scheduling and HARQ support for NR CA CATT
R1-1710171 Bandwidth part based resource scheduling for carrier aggregation Guangdong OPPO Mobile Telecom.
R1-1710339 Support of cross-CC DCI/UCI transmission for NR CA LG Electronics
R1-1710578 Scheduling and UCI feedback for carrier aggregation Intel Corporation
R1-1710739 Cross-Carrier Scheduling and HARQ-ACK Feedback Samsung
R1-1710885 On cross-carrier scheduling and joint UCI design Nokia, Alcatel-Lucent Shanghai Bell
R1-1710964 On UE-to-UE measurement for CLI management NEC
R1-1711122 NR carrier aggregation NTT DOCOMO, INC.
R1-1711209 CA with mixed numerology Qualcomm Incorporated
R1-1711517 On Scheduling and UCI Handling in Carrier Aggregation Ericsson

5.1.3.4.1.2 SRS fast switching

For carriers with the same and different numerology

R1-1711847 Way Forward on SRS Switching Huawei, HiSilicon, MediaTek, Intel

R1-1709976 SRS switching among CCs and bandwidth parts Huawei, HiSilicon
R1-1710579 On SRS fast switching Intel Corporation
R1-1710740 Fast Carrier Switcing for SRS Transmissions Samsung
R1-1711518 On SRS Fast Switching in NR Ericsson

5.1.3.4.2 Dual connectivity

R1-1709977 On NR dual connectivity Huawei, HiSilicon
R1-1710103 Scheduling and HARQ support for NR DC CATT
R1-1710340 Discussion on dual connectivity with single active UL at a given time LG Electronics
R1-1710580 On Dual Connectivity for NR Intel Corporation
R1-1710741 DC for UE with Single UL Carrier Capability Samsung
R1-1710884 On NR CA/DC configuration Nokia, Alcatel-Lucent Shanghai Bell
R1-1711123 LTE-NR Dual connectivity NTT DOCOMO, INC.
R1-1711519 On Dual Connectivity for NR Ericsson

5.1.4 Channel coding

R1-1711917 Chairman's notes of AI 5.1.4 Channel coding Ad-Hoc chair (Nokia)
The document was presented by Matthew Baker from Nokia.
Decision: The document is endorsed and the content is incorporated as below.

5.1.4.1 LDPC code

5.1.4.1.1 Coding chain

R1-1711344 LDPC Coding chain Intel Corporation
R1-1710844 Consideration on coding chain for eMBB data channel ZTE

5.1.4.1.1.1 CRC attachment

R1-1710482 Study of Number of CRC Bits for Small Transport Blocks Ericsson
R1-1711533 CRC attachment for Smaller TBs Nokia, Alcatel-Lucent Shanghai Bell
R1-1710827 On CRC attachment for TB and CB MediaTek Inc.
Note: proposal is for $L_{TB\text{-}CRC}$ =14 for TBs less than e.g. 512 (or higher?)
R1-1710957 Data channel processing and CRC attachment InterDigital, Inc.
R1-1711210 CRC attachment Qualcomm Incorporated

Proposal to be checked until RAN1#90 after LDPC design is complete:

Samsung Exhibit 1016, Page 126 of 399

- $L_{TB\text{-}CRC}$ = 16 bits for TBs smaller than e.g. 1008 or 8432 bits
- $L_{CB\text{-}CRC}$ = 8 bits
- Checking other values is not precluded

Agreement: CBG-level CRC is not adopted

Not treated.
R1-1710044 Consideration on CRC attachment for eMBB data CATT
R1-1710341 Discussion on CRC reduction and attachement for eMBB data LG Electronics
R1-1710480 CRC Attachment for Code Block Group Ericsson
R1-1710481 Study of Number of CRC Bits for Code Blocks Ericsson
R1-1711532 CRC attachment for CBG Nokia, Alcatel-Lucent Shanghai Bell
R1-1711728 WF on CRC Attachment for CBGs Ericsson

5.1.4.1.1.2 Segmentation

R1-1710342 Code block segmentation for eMBB LG Electronics
R1-1710742 CB segmentation on data channel Samsung
R1-1711534 Code block segmentation of eMBB Nokia, Alcatel-Lucent Shanghai Bell
R1-1711211 LDPC segmentation Qualcomm Incorporated
R1-1711439 Segmentation for eMBB data Huawei, HiSilicon

Agreement: Same value of Z for code blocks within a TB

R1-1711535 Padding for LDPC Nokia, Alcatel-Lucent Shanghai Bell

Agreement: Working assumption from RAN1-NRAH#1 is confirmed that filler bits F are attached at the end of info block B

Not treated.
R1-1710743 UE operation for two different base graphs Samsung
R1-1710958 Code block segmentation for eMBB data channel InterDigital, Inc.

5.1.4.1.1.3 Rate matching

R1-1710344 Discussion on bit level interleaver LG Electronics
R1-1710484 Bit Ordering for Circular Buffer of LDPC Codes Ericsson
R1-1711538 Interleaving for LDPC Nokia, Alcatel-Lucent Shanghai Bell
R1-1710828 On interleaver for NR LDPC code MediaTek Inc.
R1-1711212 LDPC rate matching Qualcomm Incorporated

Conclusion for bit-level interleaving: Revisit after the decision on modulation symbol interleaving in the MIMO session.

R1-1710045 IR-HARQ scheme for NR LDPC codes CATT
R1-1710485 Rate Matching for NR LDPC codes Ericsson
R1-1711438 Rate matching for LDPC codes Huawei, HiSilicon

Agreement:
- The number of RVs is 4.
- The RVs are at fixed locations in the circular buffer
- RV#0 is self-decodable
- Working assumption (to be confirmed after selection of the BGs): The first 2Z punctured systematic bits are not entered into the circular buffer

Not treated
R1-1711536 Rate matching for LDPC Nokia, Alcatel-Lucent Shanghai Bell
R1-1710343 On rate matching with LDPC code for eMBB LG Electronics
R1-1710483 LDPC Code Performance at High Code Rate Ericsson

5.1.4.1.1.4 Other

R1-1710486 Throughput Requirements of LDPC Decoder Ericsson

5.1.4.1.2 LDPC code design

Finalise number of base graphs, compact vs. extended design, and other design details

R1-1711944 Observations on LDPC Shift Coefficients Qualcomm, Intel, Ericsson
R1-1711692 WF on final parity check matrix selection Nokia

Agreements: Down selection of PCMs are facilitated as follows:

- Considering the priority given to certain merged proposals in BG1 and BG2, the following ranking is used to facilitate the selection of parity check matrices in more fairer manner.
- The proponent(s) who are not selected for BG1 or BG2 are ranked above.
- The proponent(s) who are only in one selected solution of BG1 and BG2 are ranked next.
- The proponent(s) who are selected for both BG1 and BG2 are ranked below.
- Any PCMs with significant overlaps with previous PCM designs are ranked below.
- If there are several proponents end up with the same rank, mutual understanding may use to rank the companies.
  - Previous proposals on BG1 and BG2 and the effort put in there shall be considered when ranking.
  - Higher ranking may provide to proponents who were not in the BG1.
- Ranking changes from top to bottom when the proponent's proposal selected for a shift coefficient design.

Selection of final parity check matrices for BG1 is facilitated as below.
For Set **i** = 1:8

- Step 1: Cross check BLER performance at 10-2 and 10-4 for the block sizes related to the Set **i** (within 512-to-8448) and code rates 8/9-to-1/3.
- Step 2: Identify the candidates which are within 0.1 dB BLER performance across most block sizes related to the Set **i** (within 512-to-8448) and code rates 8/9-to-1/3.
- Step 3: Higher ranked identified candidate which is proven to satisfy the selection criteria as below, the proposal is selected as shift coefficient design for Set **i**.
- Step 4: the selected proponent is ranked below others.

End

Selection criteria for a ranked high proposal as candidate X:

- A candidate among existing candidates which has better (>0.1dB) BLER performance for block sizes related to the Set **i** (within 512-to-8448) and code rates 8/9-to-1/3 is selected as candidate Y.
- Error floor should be checked by examining slope of BLER curves at BLER=10-4.
- Denote P1 as the number of simulation cases for which the required SNR of candidate X is smaller than the required SNR of candidate Y for more than 0.1dB
- Denote P2 as the number of simulation cases for which the required SNR of candidate Y is smaller than the required SNR of candidate X for more than 0.1dB
- If P2 – P1 <= 2% of all simulation cases (QPSK, block sizes related to the Set **i** (within 512-to-8448) and code rates 8/9-to-1/3, BLER targets), and satisfies the error floor requirement, candidate X is deemed to satisfy the selection criteria.

Selection of final parity check matrices for BG2 is facilitated as below.
For Set **i** = 1:8

- Step 1: Cross check BLER performance at 10-2 and 10-4 for the block sizes related to the Set **i** (within 40-to-2560) and code rates 2/3-to-1/5.
- Step 2: Identify the candidates which are within 0.1 dB BLER performance across most block sizes related to the Set **i** (within 40-to-2560) and code rates 2/3-to-1/5.
- Step 3: Higher ranked identified candidate which is proven to satisfy the selection criteria as below, the proposal is selected as shift coefficient design for Set **i**.
- Step 4: the selected proponent is ranked below others.

End

Selection criteria for a ranked high proposal as candidate X:

- A candidate among existing candidates which has better (>0.1dB) BLER performance for block sizes related to the Set **i** (within 40-to-2560) and code rates 2/3-to-1/5 is selected as candidate Y.
- Error floor should be checked by examining slope of BLER curves at BLER=10-4.
- Denote P1 as the number of simulation cases for which the required SNR of candidate X is smaller than the required SNR of candidate Y for more than 0.1dB

- Denote P2 as the number of simulation cases for which the required SNR of candidate Y is smaller than the required SNR of candidate X for more than 0.1dB
- If P2 – P1 <= 2% of all simulation cases (QPSK, block sizes related to the Set **i** (within 40-to-2560) and code rates 2/3-to-1/5, BLER targets), and satisfies the error floor requirement, candidate X is deemed to satisfy the selection criteria.

R1-1711545 Summary of [89-24] Email discussion LDPC code base graph #1 for NR Nokia, Alcatel-Lucent Shanghai Bell
R1-1711546 Summary of [89-25] Email discussion on LDPC code base graph #2 for NR Nokia, Alcatel-Lucent Shanghai Bell

Not treated.
R1-1710047 Offset optimization for NR LDPC CATT
R1-1710487 LDPC Code Design for Base Graph #1 Ericsson
R1-1710488 LDPC Code Design for Base Graph #2 Ericsson
R1-1710489 Application of Two Base Graphs for NR Data Channels Ericsson
R1-1710744 LDPC Code for BG#1 Samsung
R1-1710745 LDPC Code for BG#2 Samsung
R1-1710746 Modulo Lifting for Length-Flexible QC LDPC Codes Samsung
R1-1711437 LDPC design for base graph 2 Huawei, HiSilicon
R1-1711537 LDPC designs for base graph 1 and base graph 2 Nokia, Alcatel-Lucent Shanghai Bell
R1-1711627 LDPC shift coefficients design for BG1 Samsung
R1-1711628 LDPC shift coefficients design for BG2 Samsung
R1-1711629 Performance evaluation of LDPC shift coefficients design for BG1 Samsung
R1-1711630 Performance evaluation of LDPC shift coefficients design for BG2 Samsung
R1-1711693 Base Graph 1 lifting and evaluations Intel Corporation
R1-1711694 Base Graph 2 lifting and evaluations Intel Corporation
R1-1711711 LDPC design for eMBB data CATT
R1-1711727 LDPC design for base graph 1 Huawei, HiSilicon
R1-1711747 Shift coefficients design for base graph 1 ZTE
R1-1711748 Shift coefficients design for base graph 2 ZTE
R1-1711790 On NR LDPC design and performance MediaTek Inc.
R1-1711963 Crosscheck Results for PCM of BG1 Samsung
R1-1711964 Crosscheck Results for PCM of BG2 Samsung
R1-1711978 LDPC rate compatible design Qualcomm Incorporated

R1-1711731 WF on LDPC code usage scenarios MediaTek, Qualcomm, InterDigital, ZTE

R1-1711982 WF on LDPC parity check matrices Nokia

Agreement: Final parity check matrices for NR LDPC base graph #1 and #2 are agreed as in excel files R1-1711982_BG1.xlsx and R1-1711982_BG2.xlsx in R1-1711982.

Agreements:
- Base graph #1 is used for the initial transmission and subsequent re-transmissions of the same TB when
  - CBS > X or code rate of the initial transmission > Y
- Base graph #2 is used for the initial transmission and subsequent re-transmissions of the same TB when
  - CBS <= X and code rate of the initial transmission <= Y
- Working assumption: X = 2560 and Y = 0.67
  - FFS after PCM decisions if X can be extended to 3840 and/or Y can be extended to 0.75

To be checked how the receiver knows in each case the code rate of the initial transmission, and how exactly it is defined.
FFS whether some UE capabilities may be possible that do not require the implementation of both base graphs.

5.1.4.2 Polar code

5.1.4.2.1 Code construction

R1-1711443 Summary of [89-26] Polar code for NR -- alignment of latency/complexity calculation for early termination Huawei
The document was presented by Zukang Shen from Huawei.
Decision: The document is noted.
R1-1711442 Summary of [89-27] Polar code proposal for NR Huawei

Decision: The document is noted.

R1-1711644 Study of Split-CRC Polar Code Construction for Early Termination Tsofun Algorithm
(Revision of R1-1709883)
- Proposal 1: Use J+J'=n_{FAR} + 3 for polar code construction.
- Proposal 2: If some of the J+J' bits are distributed to allow ET, a relaxed requirement for FAR due to undetectable decoding errors should be agreed.

Decision: The document is noted.

R1-1711347 Simple distributed CRC design for Polar codes Intel Corporation
- Any assistance bits (if distributed) are based on CRC and are distributed in a controlled and simple way as proposed in the companion document [R1-1711348].

Decision: The document is noted.

R1-1711215 Evaluation of early termination for Polar codes Qualcomm Incorporated
- Proposal: Adopt CRC-aided successive-cancellation list decoding (CA-SCL) (with one long CRC) solution of Polar codes for control channel for robust performance, lower complexity and latency.

Decision: The document is noted.

R1-1710490 CRC-based Polar Code Construction Ericsson
- Proposal 1: Adopt CA-Polar for both DL and UL of NR.
- Proposal 2: Recursive and non-recursive distributed CRC (D-CRC) can be considered as alternative choices, if early termination is required to be supported via modified code construction.

Decision: The document is noted.

R1-1711764 WF on Polar codes construction NTT DOCOMO, Ericsson, Qualcomm, Intel, Tsofun Algorithm, CATT, AT&T
- Assume the input information sequence of channel coding is (u_1, u_2, …, u_K)
- If the ith assistant bit p_i of Polar codes are inserted after u_b (b=1,2,…,K), then p_i can only linearly generated from information bits (u_1, u_2, …, u_b) without any interleaving,
  - That is, no interleaver is used before the basic Polar encoder, and the information bits are mapped into the encoder by keeping the same input order and no de-interleaver is used after the basic Polar decoder
  - i.e., $p_i = a_1u_1 \oplus a_2u_2 \oplus \cdots \oplus a_bu_b \oplus \cdots \oplus a_Ku_K$, where
$$a_j = \begin{cases} 0 \text{ or } 1, & \text{if } j \le b \\ 0, & \text{if } j > b \end{cases}$$

Decision: The document is noted.

R1-1711730 WF on the Number of Assistant Bits for Polar Construction Ericsson, NTT DOCOMO, Qualcomm, Intel, Tsofun Algorithm, Samsung, LG, Fujitsu
- The number of assistant bits of Polar codes is
  - J+J' = n_{FAR} + 3

Decision: The document is noted.

Questions:
- J' = 3 or 6?
- How are the J+J' bits generated?
- Which bits are distributed (if any) and how?

Proposal for further consideration over lunch:
- For DL and UL for K>=22:
  - The number of assistant bits of Polar codes is
    - J+J' = n_{FAR} + 3
    - The J+J' bits are generated from a single CRC polynomial
    - Working assumption that 3 bits are distributed
      - 6 distributed bits can be further considered if 3 is shown to be insufficient
- (FFS?) For UL for K<22:
  - The number of assistant bits of Polar codes is
    - J' = 6
    - The J' bits comprise 3 CRC bits and 3 parity bits
    - 6 bits are distributed

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Alternative proposal (Nokia)
- The number of assistant bits of Polar codes is
  - $J+J' = n_{FAR} + 6$
- The J+J' bits are generated from a single CRC polynomial plus at least 3 parity bits
- 9 of the J+J' bits are distributed

Possible compromise:
- The number of assistant bits of Polar codes is
  - $J+J' = n_{FAR} + 6$
- The J+J' bits are generated from a single CRC polynomial
- Confirm working assumption that some (9?) of the J+J' bits are distributed

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Proposal:
- For DL & UL, at least for K>22:
  - The number of assistant bits of Polar codes is
    - $J+J' = n_{FAR} + 3$
    - The J+J' bits are generated from:
      - Working assumption a single CRC polynomial with no interleaver
        - If it turns out that the FAR target cannot be satisfied, then FFS between:
          - Single CRC with interleaver, or
          - Two CRCs
    - Working assumption that 3 bits are distributed
      - 6 distributed bits can be further considered if 3 is shown to be insufficient
- FFS: For UL for K<=22:
  - The number of assistant bits of Polar codes is
    - J' = 6
    - The J' bits comprise 3 CRC bits and 3 parity bits
    - 6 bits are distributed

Question: Can the FAR target be satisfied using a single CRC polynomial with no interleaver, while achieving early termination benefits?
Yes: Intel, NTT DOCOMO, Ericsson, CATT, Qualcomm, ~~Tsofun~~, ~~NEC~~
No: Nokia, LG, Huawei, CohLog, MediaTek, ZTE, Accelercomm, NEC, Tsofun

Question: Are the achievable early termination benefits (while achieving the FAR and BLER targets) worthwhile compared to the complexity of adding an interleaver?
Yes: LG, Nokia, MediaTek, Huawei, Accelercomm, ITRI, CohLog, NEC, Spreadtrum, InterDigital
No: Ericsson, NTT DOCOMO, Qualcomm, Intel, CATT, Fujitsu, Tsofun

Question: Should we work on a code construction based solution to deliver early termination benefits while achieving the FAR and BLER targets with acceptable complexity?
a) Downlink
Yes: Samsung, Nokia, LG, Huawei, MediaTek, Intel, InterDigital, ZTE, ITRI, Spreadtrum, Tsofun, Coherent Logix, Accelercomm, NEC, Qualcomm (if there is a plan B), NTT DOCOMO (if there is a plan B)
No: Ericsson
b) Uplink
Yes: Nokia, Huawei, Accelercomm, LG, NEC, Intel (if same scheme as for DL)
No: Ericsson, Qualcomm, Samsung, Fujitsu

Conclusion:
- RAN1 will work on a code construction based solution to deliver early termination benefits while achieving the FAR and BLER targets with acceptable complexity at least for the DL
- Revisit UL after designing the DL solution.

Possible solutions for code construction based solution to deliver early termination benefits while achieving the FAR and BLER targets with acceptable complexity for downselection:
- Single CRC + interleaver
  - LG, Huawei, HiSilicon, Nokia, ASB, Coherent Logix, ZTE, Accelercomm, Spreadtrum, MediaTek
- Multiple segment CRCs
  - Tsofun, NTT DOCOMO, Qualcomm, CATT, Intel, Ericsson

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Agreement:

- All companies work together to design for the DL a Single CRC polynomial + Interleaver scheme to deliver early termination benefits while achieving the FAR (in presence of AWGN, and in presence of random QPSK, and undetected errors in intended user's codeword), and BLER targets with acceptable complexity and latency.
  - Working assumption that the CRC length is 19 bits, to be finalised as part of the design, taking into account the number of blind decodes or hypotheses to be tested.
    - Longer CRCs will be considered if required to meet the FAR target
- For DL for K+nFAR>=12, and for UL where K+nFAR>22, J+J' = nFAR + 3
- For UL, where 12<=K+nFAR<=22, J+J' = nFAR + 6, comprising 3 parity bits and nFAR + 3 additional CRC bits

Note: K is the number of payload information bits without CRC or parity bits
Note: nFAR may be zero in some circumstances.
Note: UE specific scrambling is not precluded and will be considered separately.

From **R1-1708833** (submitted to RAN1#89):
Proposal: The interleaver is determined from the CRC generator matrix

R1-1711980 Performance with L1 CRC polynomial Qualcomm

R1-1709996 Parity check bits for Polar code Huawei, HiSilicon
R1-1709997 Early termination for Polar code Huawei, HiSilicon
R1-1710048 Polar codes construction for NR control channel CATT
R1-1711125 Performance evaluation of DSPC-Polar codes NTT DOCOMO, INC.
R1-1709998 Polar code for very small block length Huawei, HiSilicon
R1-1711216 Decoding and encoding latency for polar codes with PC frozen bits or distributed CRC bits Qualcomm Incorporated

R1-1711983 WF on Polar Code Construction With PC bits Huawei, Hilisicon, CATT, MTK,ZTE, Accelercomm, Coherent Logix, LG, Spreadtrum, Interdigital, Nokia

Agreement: For UL, where 12<=K+nFAR<=22, J+J' = nFAR + 6, 3 PC bits are generated according to the following steps:

1. Encode *K* info bits to *K+nFAR+3* CRC encoded bits,
   - *FFS the nFAR+3* CRC bit locations
2. Select K' = K+nFAR+6 most reliable bit positions
3. Select *3* PC bits from the *K'* reliable positions
   - *The most reliable n* positions with w_{min}, where
     - w_{min} is the minimum row weight (as defined in R1-1706193) of the *K+nFAR+3* most reliable positions within the K' reliable positions, where *n* is given by:
       - *n*=1 if *M-K-nFAR*>192
       - *n*=0 otherwise
   - 3-*n* positions selected *in least reliable positions within the K' reliable positions*.
4. Working Assumption: The value of the PC bits is obtained from a length-5 cycle shift register as in R1-1706193

Not treated.
R1-1709882 Enhancement of Early Termination of Polar Codes by placing UE-ID on Frozen Symbols Tsofun Algorithm
R1-1709902 Enhancements for Polar code construction Sequans Communications
R1-1709995 Polar code construction Huawei, HiSilicon
R1-1710346 Early termination effect of polar codes LG Electronics
R1-1710479 Evaluation of PM based early termination for Polar code Huawei, HiSilicon
R1-1710491 Study of Early Termination for DCI Ericsson
R1-1710587 Polar code construction for NR control channel NEC Corporation
R1-1710747 Polar code construction Samsung
R1-1710748 Scrambling for polar codes Samsung
R1-1710770 Discussion on Polar code construction Spreadtrum Communications
R1-1710847 Performance evaluations on Polar codes ZTE
R1-1711124 Distributed simple parity check Polar codes NTT DOCOMO, INC.
R1-1711214 Early termination scheme for Polar codes Qualcomm Incorporated
R1-1711217 Performance comparison between CA-polar and PC-polar Qualcomm Incorporated
R1-1711348 Evaluations of Polar code designs Intel Corporation

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R1-1711539 Distributed CRC Polar code construction Nokia, Alcatel-Lucent Shanghai Bell
R1-1711540 Early termination benefits of CRC distribution Nokia, Alcatel-Lucent Shanghai Bell
R1-1711541 Performance evaluation of polar code constructions Nokia, Alcatel-Lucent Shanghai Bell
R1-1711557 Performance of polar code for very small block length Qualcomm Incorporated
R1-1711570 UE_ID Insertion for Early Block Discrimination on DCI Blind Detection Coherent Logix
R1-1711571 Scrambling Sequence Design for Early Block Discrimination on DCI Blind Detection Coherent Logix
R1-1711573 Early Block Discrimination on DCI Blind Detection Coherent Logix
R1-1711582 Analysis of the benefits of PC bits for Polar code Huawei, HiSilicon

5.1.4.2.2 Sequence design

R1-1710470 Necessity of multiple sequence for Polar code Huawei, HiSilicon

Agreement:
- Channel bit interleaving is applied
  - The interleaving is either performed as part of the rate matching and/or after rate matching
    - To be confirmed after the rate matching discussion whether the interleaving is a separate function
  - FFS whether the interleaver is a function of the modulation
- The same sequence for each mother code size is used for all modulations
- The UL sequence for a given mother code size is also used for the DL

R1-1710348 Design of polar codes with high order modulations LG Electronics
R1-1710961 Interleaver design for polar codes with high order modulation InterDigital, Inc.

R1-1710000 Nested sequence for Polar code Huawei, HiSilicon
R1-1710843 On the storage of polar code sequences AccelerComm Ltd
R1-1711126 Sequence design of Polar codes NTT DOCOMO, INC.
R1-1711218 Sequence construction of Polar codes for control channel Qualcomm Incorporated
R1-1711542 Sequence design for Polar codes Nokia, Alcatel-Lucent Shanghai Bell
R1-1711822 Design of combined-and-Nested polar code sequences Samsung (Revision of R1-1710749)
R1-1711781 Performance comparison of sequences for Polar code Huawei

R1-1711794 WF on Polar Code Sequence evaluation criteria Samsung

Current support for each sequence:
- Polarization Weight (PW): Huawei, MediaTek, Nokia, LG, InterDigital, ZTE, Spreadtrum, CATT, Accel., Tsofun
- Optimized- combined-and-nested (CN): Samsung, Qualcomm, NTT DOCOMO, Ericsson, Tsofun
- mutual information density evolution (MI-DE): Qualcomm, Samsung, NTT DOCOMO, Ericsson, Tsofun,
- Intel: Intel, Samsung, Qualcomm, NTT DOCOMO, Ericsson, Tsofun
- Docomo: NTT DOCOMO, Ericsson, Samsung, Qualcomm, Tsofun

Proposal:
- PW is adopted up to N=512
- Companies work together to design the sequence for N>512

Objected by Samsung, Qualcomm, NTT DOCOMO, Ericsson, Tsofun

Agreement for Next Steps:
- Polar code sequence candidates, including any merged solutions, should be provided by Wed 2nd Aug – Zukang (Huawei)
- Identify candidates of polar code sequence according to the procedure below by Wed 9th Aug– Zukang (Huawei)
- Rate matching proposals for any sequence that has been selected as a winner by at least one company to be provided by Wed 16th Aug. – Zukang (Huawei)

Decision procedure:
Candidate sequences shall have the property of simple nestedness, i.e. one sequence of length N/2 is nested with the sequence of length N
- Presence or absence of any other property (including symmetry, arithmetic describability, down-nestedness (i.e. a sequence of length N/2 is nested within the lower half of the sequence of length N), up-and-down-nestedness (i.e. a sequence of length N/2 is nested in both the upper and lower halves of the sequence of length N)) shall not be used as a decision criterion.

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- Performance metric
  - SNR to achieve 10^{-2} and 10^{-3} BLER
- Simulation assumptions
  - Evaluate the block error rate (BLER) performance versus SNR

Channel	AWGN Channel
Modulation	QPSK
Info. Block length (=K bits w/o CRC)	K = 8:1:min $(200, K_{\max,N})$, where $K_{\max,N} = \lfloor 5N/6 - (J + J') \rfloor$ K = min $(200, K_{\max,N})$:24:$K_{\max,N}$, where $K_{\max,N} = \lfloor 5N/6 - (J + J') \rfloor$ excluding any code rates below 1/8
Codeword length (=N)	{64, 128, 256, 512, 1024}
Decoding algorithm	List-X with LLR-based min-sum
List sizes	1,2,4,8,16 (pruned to 8 best paths for CRC check)
Code construction for evaluation	CA polar
Number of (J+J') bits	19 bits (0b10100010101101111001 where the last bit is d19)

PerfThresh_K = 0.1dB for lower range of K, 0.3dB for higher range of K
PerfThresh_L = 0.4dB for L=1, 0.2dB for L=2, 0.1dB otherwise.
PerfThresh = max (PerfThresh_K, PerfThresh_L)

Each company selects a winning sequence by the following algorithm:

- For sequence A,
  - compare with sequence Bat each simulation case.
    - For each simulation case:
      - if A's performance is worse than B – PerfThresh, increment FailCount_AB
      - if A's performance is better than B + PerfThresh, increment WinCount_AB
    - If (FailCount_AB – WinCountAB) / Total number of simulation cases > 2%, increment OverallFail_A
  - compare with sequence Cat each simulation case.
    - For each simulation case:
      - if A's performance is worse than C – PerfThresh, increment FailCount_AC
      - if A's performance is better than C + PerfThresh, increment WinCount_AC
    - If (FailCount_AC – WinCountAC) / Total number of simulation cases > 2%, increment OverallFail_A
  - repeat for sequences D…N
- For sequence B,
  - compare with sequence A at each simulation case
  - etc
- …
- For sequence N,
  - compare with sequence A
  - etc
- Select sequence with smallest OverallFail

If multiple sequences A to M have the same smallest OverallFail,

- For sequence A,
  - compare with sequence Bat each simulation case.
    - For each simulation case, if A's performance is better than B + PerfThresh, increment WinCount_AB
  - compare with sequence C at each simulation case.
    - For each simulation case, if A's performance is better than C + PerfThresh, increment WinCount_AC
  - WinCount A = ∑WinCount_AB…AM
  - repeat for sequences up to M
- Repeat for sequences B to M.
- Select sequence with highest WinCount, referred to as sequence W.

- If any WinCount_xW > WinCount Wx, then sequence(s) x is/are also selected.

If more than 1 sequence is selected by at least one company, then the final sequence will be chosen from the sequences that were selected by at least one company according to the largest support in RAN1#90.

R1-1710496 Thresholds for Mother Code Size Determination Ericsson
R1-1711349 Discussion on Polar code rate-matching Intel Corporation

R1-1711697 WF on rate matching for Polar codes Qualcomm

Agreement: $R_{min} = 1/8$

R1-1711729 WF on Circular buffer of Polar Code Ericsson, Qualcomm, MediaTek, LGE

Agreement:

- To support repetition, puncturing, and shortening of Polar code:
  - The $N=2^n$ coded bits at the output of Polar encoder is written into a length-N circular buffer in an order that is predefined for a given value of N
  - To obtain M coded bits for transmission
    - Puncturing is realized by selecting bits from position (N-M) to position (N-1) from the circular buffer
    - Shortening is realized by selecting bits from position 0 to position M-1 from the circular buffer
    - Repetition is realized by selecting all bits from the circular buffer, and additionally repeat (M-N) consecutive bits from the circular buffer
      - Exact set of repeated bits FFS till RAN1#90



(a) No puncturing or shortening (b) puncturing (c) shortening

R1-1710751 Circular buffer management for polar code rate-matching Samsung

Not treated.
R1-1710591 Sequence design evaluation for rate-matched polar codes NEC Corporation
R1-1710750 Design of unfied rate-matching for polar codes Samsung
R1-1710825 Optimization and comparison of Polar code rate-matching design MediaTek Inc.
R1-1710848 Rate matching scheme of Polar codes ZTE
R1-1710959 Parameter selection for polar codes puncturing and shortening InterDigital, Inc.
R1-1710960 Parameter selection for polar codes repetition InterDigital, Inc.
R1-1711127 Rate matching of Polar codes NTT DOCOMO, INC.
R1-1711219 Determination of the values for the parameters in rate-matching for control channel Qualcomm Incorporated
R1-1711220 Rate-matching scheme for control channel Qualcomm Incorporated
R1-1711543 Rate matching for Polar codes Nokia, Alcatel-Lucent Shanghai Bell
R1-1711641 Repetition scheme of polar codes LG Electronics
R1-1711679 Impact of Puncturing on Bit-channel Capacities Ericsson
R1-1711751 On Bit Mapping Design for Polar Codes Ericsson
R1-1711752 Polar Code Performance in Fading Channel Ericsson
R1-1711757 Optimization and comparison of Polar code rate-matching design MediaTek Inc.

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5.1.4.2.3 Other

R1-1709999	Interleaver design for Polar code	Huawei, HiSilicon
R1-1710003	Channel coding chain for control channel	Huawei, HiSilicon
R1-1710752	Design of channel interleaver for polar codes	Samsung
R1-1710842	A flexible, low-latency, hardware-efficient SCL polar decoder	AccelerComm Ltd
R1-1711128	Interleaving design of Polar codes	NTT DOCOMO, INC.
R1-1711221	Design of Polar code for large UCI with segmentation	Qualcomm Incorporated
R1-1711222	Design and evaluation of Interleaver for Polar codes	Qualcomm Incorporated
R1-1711639	Performance comparison of interleaver designs	Qualcomm
R1-1711698	WF on interleaver design	Qualcomm
R1-1711702	Rate matching for Polar code	Huawei, HiSilicon
R1-1711749	Segmentation of Polar codes	ZTE

5.1.4.3 PBCH

R1-1710004	Channel coding for URLLC	Huawei, HiSilicon
R1-1710349	Details on PBCH coding	LG Electronics
R1-1710497	Study of Number of CRC Bits for PBCH	Ericsson
R1-1710498	Polar Code Design for NR-PBCH	Ericsson
R1-1710826	Polar coding design for NR-PBCH combining	MediaTek Inc.
R1-1710850	Considerations on Channel Coding for NR-PBCH	ZTE
R1-1711544	Implicit timing indication for PBCH	Nokia, Alcatel-Lucent Shanghai Bell
R1-1711575	Discussion on Polar codes for PBCH	CATT
R1-1711605	PBCH channel coding	Qualcomm Incorporated

5.1.4.4 Other

R1-1709903	Discussion of LTE-RM decoding ambiguity	Sequans Communications
R1-1710471	CRC polynomial for L1 control information and MIB	Huawei, HiSilicon
R1-1710499	LDPC Code Performance for High Reliability Use Cases	Ericsson

5.1.5 Modulation

R1-1711956 On Pi/2-BPSK with spectrum shaping Ericsson

- Proposed agreement: Spectrum shaping is supported without RAN1 impact

Decision: The document is noted.

R1-1711831 WF on pi/2 BPSK with spectrum shaping IITH, ATT, Qualcomm, Deutsche Telekom, IITM, Reliance Jio, Samsung, Thales, INL, CEWiT, Tejas Networks, DISH, Sony

- pi/2 BPSK DFT-s-OFDM supports spectrum shaping without spectrum expansion of pi/2 BPSK data at least for uplink data for carrier frequencies below 6GHz
  - The spectrum shaping function shall be specified in RAN1

Discussion: Also supported by Interdigital
Ericsson is OK with main bullet, commented that RAN4 was expecting information by end of June meeting – if we proceed now with proposal, RAN1 will delay RAN4 progress
Decision: The document is noted.

R1-1711909 [Draft] LS response on required NR parameters from RAN4 perspective Ericsson

Decision: The document is noted and final LS is approved in R1-1711975 with following typo corrections

Based on this, RAN1 would like ~~the~~ to inform RAN4 that the RAN1 specifications will support the following modulation schemes in the uplink transmission direction: π/2-BPSK, QPSK, 16QAM, 64QAM, and 256QAM.

RAN1 specifications will support both OFDM (without DFT precoding) and DFT-precoded OFDM (a.k.a. DFTS-OFDM) for the uplink transmission direction. All above modulation schemes are supported for both OFDM and DFTS-precoded OFDM.

Although indicated in the RAN4-sourced LS as information not being necessary until later, RAN1 would also like to inform RAN4 that the RAN1 specifications will support the following -modulation schemes in the downlink transmission direction: QPSK, 16QAM, 64QAM, and 256QAM.

Not treated.

R1-1710474	Further consideration on pi/2 BPSK with FDSS	Huawei, HiSilicon
R1-1710592	Next steps for pi/2 BPSK with spectrum shaping	IITH

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R1-1710753 Modulation Schemes for NR Samsung
R1-1710881 On pi/2-BPSK DFTS-OFDM with spectrum shaping Ericsson AB
R1-1711224 Consideration for MCS table Qualcomm Incorporated
R1-1711398 On spectrum shaping for uplink Pi/2 BPSK with DFT-S-OFDM Nokia, Alcatel-Lucent Shanghai Bell

5.1.6 Duplexing

Focus on cross-link interference management for duplexing flexibility

R1-1711918 Chairman's notes of AI 5.1.6 Duplexing Ad-Hoc chair (Qualcomm)
The document was presented by RAN1 chair on behalf of Wanshi Chen (Vice Chair).
Decision: The document is endorsed. Content incorporated below.

R1-1710127 Viewpoint on NR CLI Management for Duplexing Work Plan ZTE

5.1.6.1 Cross-link interference management

Note that potential schemes are listed in Section 10.1 of TR38.802

R1-1709982 UE-to-UE measurement for cross-link interference mitigation Huawei, HiSilicon
R1-1710039 Support of interference management schemes in duplexing flexbility CATT
R1-1710350 Discussion on CLI measurement for Duplexing Flexibility LG Electronics
R1-1710581 Details on cross-link interference measurement Intel Corporation
R1-1710755 Cross-link Interference Management based on Coordinated Beamforming Samsung
R1-1710771 Discussions on UE-to-UE interference measurement and report Panasonic
R1-1710784 Discussion on UE-to-UE cross-link interference management CMCC
R1-1710818 CLI measurements in NR MediaTek Inc.
R1-1710128 UE-to-UE measurement as an enabler for CLI mitigation schemes ZTE
R1-1711129 Discussion on cross-link interference mitigation for duplexing flexibility NTT DOCOMO, INC.
R1-1711314 On NR Cross-Link Symbol Alignment Scheme Nokia, Alcatel-Lucent Shanghai Bell
R1-1711562 On Hybrid TDD and Signaling for Cross-link Interference Mitigation Ericsson
Further revised in R1-1711706

R1-1711682 WF on UE-to-UE measurement as an enabler for CLI mitigation schemes ZTE

Agreements:
- For CLI management, support UE-to-UE interference measurement and reporting without the introduction of new RS(s)

Agreements:
- For UE-to-UE interference, support CLI measurement metrics which include at least one of
  - RSRP for the purpose of CLI
    - FFS the definition (e.g., based on SRS, DM-RS, etc.) and the corresponding reporting
  - RSSI for the purpose of CLI
    - FFS the definition (e.g., resources for the measurement) and the corresponding reporting
- For UE-to-UE interference, FFS additionally support CQI/CSI as the CLI measurement metrics and if so, its definition/reporting

R1-1711707 WF on inter-TRP signaling for UE-to-UE cross-link interference measurement LGE
R1-1711700 WF on CLI measurement MediaTek
R1-1711842 WF on UE-to-UE crosslink measurement CMCC, Spreadtrum
R1-1711830 WF on UE-UE CLI measurement Huawei, HiSilicon, ZTE, MediaTek, Intel, CMCC
R1-1711851 WF on inter-gNB signaling for cross-link interference management LGE

Not treated.
R1-1709981 TRP-to-TRP measurement for cross-link interference mitigation Huawei, HiSilicon
R1-1710129 Channel sensing based schemes for cross-link interference mitigation in NR ZTE
R1-1710351 Discussion on details of backhaul signaling for duplexing flexibility LG Electronics
R1-1710582 On RS transmission location for cross-link interference measurement for NR duplex flexibility Intel Corporation
R1-1710754 Cross-link Interference Management Based on UE Measurements Samsung
R1-1710772 Discussions on intended DL/UL direction configuration via Xn signalling Panasonic
R1-1710965 On cross-carrier scheduling and HARQ-ACK feedback for NR CA NEC

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R1-1711225 Dynamic TDD UE-to-UE measurement considerations Qualcomm Incorporated
R1-1711226 Dynamic TDD Cross-link interference management consideration Qualcomm Incorporated
R1-1711313 Cross-link interference management based on Xn support Nokia, Alcatel-Lucent Shanghai Bell
R1-1711561 On Hybrid TDD and Measurements for Cross-link Interference Mitigation Ericsson
R1-1711695 WF on cross-link interference aware UPLC Huawei

5.1.6.2 Other

R1-1709983 UL Power control for cross-link interference mitigation Huawei, HiSilicon
R1-1710130 TRP-to-TRP measurement as an enabler for CLI mitigation schemes ZTE
R1-1710756 Performance Evaluation of Cross-Link Interference Management Samsung
R1-1710757 Timing Alignment on Cross-Link for Dynamic TDD Samsung
R1-1710758 Cross-Link Interference Management based on Power Control Samsung
R1-1710759 Discussion on CLI Mitigation with Network Coordination Samsung
R1-1710760 Interference Measurement Table and Beam Coordination Samsung
R1-1711130 Discussion on prioritized scenarios for duplexing flexibility NTT DOCOMO, INC.
R1-1711315 LBT-based UL transmission for dynamic TDD Nokia, Alcatel-Lucent Shanghai Bell
R1-1711563 On Dynamic TDD Scenarios Ericsson
R1-1711564 On Duplexing in Paired Spectrum Ericsson

5.1.7 Wider bandwidth operations

Refer to R1-1709841 for work plan. Note that this agenda will be closed after this meeting.

R1-1711795 On bandwidth parts and "RF" requirements Ericsson

Possible observations (from Wednesday offline)
- Usage scenarios #1, and 2, and 3 are at least identified as usage scenarios for BW part
  - From UE perspective, usage scenarios #1 and 3 are the same
- Usage scenario #4 can be considered in the context of carrier aggregation

Observation:
- Usage scenarios #1, and 2, and 3 in R1-1711795 are at least identified as usage scenarios for BW part
  - From UE perspective, at least for single active BW part scenario, usage scenarios #1 and 3 are the same

Agreements:
- Usage scenario #4 in R1-1711795 is supported in the context of non-contiguous intra-band carrier aggregation
  - Carrier without SS block can be configured for some UEs
- Send LS to RAN2/4 to tell above agreement/observation in R1-1711824

R1-1711824 Draft LS on non-contiguous CA AT&T
Decision: The document is noted and final LS is approved in R1-1711825
MCC: to attach R1-1711795 to the LS

R1-1711788 Way forward on further details of bandwidth part operation Intel, AT&T, Huawei, HiSilicon

Possible agreements (from Wednesday offline)
- For a single carrier WB UE, multiple active bandwidth parts with different numerologies are considered for a UE simultaneously
  - One TB is mapped per each active BWP.
  - FFS: The multiple active BWPs may overlap in frequency domain.
  - FFS: Cross-BWP scheduling is supported.
- Primary focus is to complete the single active bandwidth part case

Agreements:
- Primary focus is to complete the single active bandwidth part case
- If time is available later after completing the single active bandwidth part case, following cases should be considered for UE
  - For a single carrier WB UE, multiple active bandwidth parts with different numerologies are configured for a UE simultaneously
    - One TB is mapped per each active BWP.
    - FFS: The multiple active BWPs may overlap in frequency domain.
    - FFS: Cross-BWP scheduling is supported.

Possible agreement (from Wednesday offline)

- For intra-band scenario, capability(capabilities) of time required for bandwidth adaptation is reported by UE.
  - FFS: Detailed reporting contents
  - Minimum requirement for RF retuning time is to be determined by RAN 4

R1-1711802 Way Forward on Further Details for Bandwidth Part MediaTek, Huawei, HiSilicon

Agreements:
- For FDD, separate sets of bandwidth part (BWP) configurations for DL & UL per component carrier
  - The numerology of DL BWP configuration is applied to at least PDCCH, PDSCH & corresponding DMRS
  - The numerology of UL BWP configuration is applied to at least PUCCH, PUSCH & corresponding DMRS
- For TDD, separate sets of BWP configurations for DL & UL per component carrier
  - The numerology of DL BWP configuration is applied to at least PDCCH, PDSCH & corresponding DMRS
  - The numerology of UL BWP configuration is applied to at least PUCCH, PUSCH & corresponding DMRS
  - For UE, if different active DL and UL BWPs are configured, UE is not expected to retune the center frequency of channel BW between DL and UL

Agreements:
- At least one of configured DL BWPs includes one CORESET with common search space at least in primary component carrier
- Each configured DL BWP includes at least one CORESET with UE-specific search space for the case of single active BWP at a given time
  - In case of single active BWP at a given time, if active DL BWP does not include common search space, then UE is not required to monitor the common search space

Possible agreement:
- For the indication of active DL/UL bandwidth part(s), support both DCI and time pattern schemes
  - FFS UE-specific DCI or group common DCI
  - FFS details of time pattern schemes

Thursday

R1-1711812 WF on configuration of a BWP in wider bandwidth operation LG Electronics, MediaTek

Agreement:
- In configuration of a BWP,
  - A UE is configured with BWP in terms of PRBs.
    - The offset between BWP and a reference point is implicitly or explicitly indicated to UE.
      - FFS for reference point, e.g., center/boundary of NR carrier, channel number used for sync. and/or channel raster, or center/boundary of RMSI BW, center/boundary of SS block accessed during the initial access, etc.
- NR supports MU-MIMO between UEs in different (but overlapping) BWPs

R1-1711855 Way forward on PRB indexing Intel, Sharp, Ericsson, MediaTek, NTT DOCOMO, Panasonic, Nokia, ASB, NEC, KT, ETRI

Agreements:
- Common PRB indexing is supported
  - The indexing is common to all the UEs sharing a wideband CC from network perspective, regardless of whether they are NB, CA, or WB UEs.
  - The indexing is with respect to the reference point
  - The indexing is with respect to a given numerology
  - Note: Example usage of common PRB indexing is for scheduling group common PDSCH, RS sequences, BWP configuration, etc.
- UE-specific PRB indexing is supported
  - It is indexed per BWP with respect to the configured SCS for the BWP
  - Note: Example usage of UE-specific indexing is for scheduling UE-specific PDSCH

R1-1711853 Activation/deactivation of bandwidth partEricsson

Agreements:
- Activation/deactivation of DL and UL bandwidth parts can be
  - by means of dedicated RRC signaling

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- Possibility to activate in the bandwidth part configuration
- by means of DCI (explicitly and/or implicitly) or MAC CE [one to be selected]
  - by means of DCI could mean
    - Explicit: Indication in DCI (FFS: scheduling assignment/grant or a separate DCI) triggers activation/deactivation
      - Separate DCI means DCI not carrying scheduling assignment/grant
    - Implicit: Presence of DCI (scheduling assignment/grant) in itself triggers activation/deactivation
    - This does not imply that all these alternatives are to be supported.
- FFS: by means of timer
- FFS: according to configured time pattern

Prepare draft LS to RAN2/4 until Friday – Pei-Kai (Mediatek), Intel
Friday
R1-1711948 [Draft] LS on bandwidth part operation in NR MediaTek
Further revised in **R1-1711989** [Draft] LS on Bandwidth Part Operation in NR Mediatek
Decision: The document is noted and final LS is approved in R1-1711998.

R1-1711913 WF on introduction indication in SS block for cell update CMCC

R1-1711873 WF on initial bandwidth part LG Electronics, Ericsson, MediaTek

Not treated.
R1-1709972 Overview of wider bandwidth operations Huawei, HiSilicon
R1-1710040 NR wider bandwidth operation CATT
R1-1710126 Resource allocation for wideband operation ZTE
R1-1710172 Discussion on UE specific RF bandwidth adaptation in NR Guangdong OPPO Mobile Telecom.
R1-1710249 PRB and RBG indexing within wider channel BW for NR NEC
R1-1710352 Remaining details on wider bandwith operation LG Electronics
R1-1710398 NR transmission on anchor bandwidth part vivo
R1-1710416 Design considerations for NR operation with wide bandwidths AT&T
R1-1710583 Open issues for wider bandwidth operations Intel Corporation
R1-1710622 UE bandwidth configuration during initial access ETRI
R1-1710761 Wider Bandwidth Operations Samsung
R1-1710785 Discussion on the change of SS block frequency position CMCC
R1-1710796 Further Details on Wider Bandwidth Operations in NR MediaTek Inc.
R1-1710878 Bandwidth Adaptation via BWP Selection in NR InterDigital, Inc.
R1-1710883 On wider band aspects of NR Nokia, Alcatel-Lucent Shanghai Bell
R1-1710943 Discussion on PRB grid and PRB indexing Panasonic Corporation
R1-1711131 Remaing issues on wider bandwidth operations for NR NTT DOCOMO, INC.
R1-1711227 UE Power Saving during Active State Qualcomm Incorporated
R1-1711565 On bandwidth parties Ericsson AB
R1-1711885 WF on change of SS block frequency position CMCC

5.1.8 NR-LTE co-existence

Refer to R1-1709844 for work plan.

R1-1711919 Chairman's notes of AI 5.1.8 NR-LTE co-existence Ad-Hoc chair (Qualcomm)
The document was presented by RAN1 chair on behalf of Wanshi Chen (Vice Chair).
Decision: The document is endorsed. Content incorporated below.

R1-1709980 Subcarrier mapping for LTE-NR coexistence Huawei, HiSilicon
R1-1710173 Discussion on the NR-LTE self-interference issue Guangdong OPPO Mobile Telecom.
R1-1710250 Discussion on UL sharing of NR and LTE NEC
R1-1710384 Interference analysis for LTE-NR co-existence vivo
R1-1710417 Remaining details of NR-LTE coexistence in overlapping spectrum AT&T

Proposals:
- Send an LS to RAN3 that specifications of Xn interface and enhanced X2 interface shall include messages to enable coordination between LTE MCG and NR SCG of:

- SCell activation/deactivation/reconfiguration
- MBSFN subframe configuration
- Signaling needed for timing synchronization and SFN alignment between LTE and NR
- TDD UL/DL configuration
- Indication of semi-statically reserved resources reserved of LTE

Continue discussion offline – Ralf (AT&T)

Thursday

R1-1711710 **WF on NR-LTE coexistence** **AT&T, Nokia, Ericsson, Vodafone**

Agreements:

- For LTE-NR coexistence in overlapping spectrum, support on the Xn interface and enhanced X2 interface messages
  - FFS details, e.g., SCell ON/OFF, LTE MBSFN subframe configuration, synchronization aspects between LTE and NR, indication of semi-statically reserved resources in frequency domain, Indication of semi-statically reserved resources in time domain, etc.
- For LTE-NR coexistence in adjacent spectrum, support on the Xn interface and enhanced X2 interface messages
  - FFS details, e.g., synchronization aspects between LTE and NR, TDD UL/DL configuration, etc.
  - FFS the case of multi-operator scenarios
- Aim to conclude the FFS parts for the above and send an LS to RAN3 in the next meeting

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R1-1710584 **Open issues for LTE-NR coexistence** **Intel Corporation**
R1-1710763 **LTE-NR coexistence for UL** **Samsung**
R1-1710840 **Discussion on Uplink TDM Operation for NR NSA** **China Telecommunications**
R1-1710880 **On uplink half-tone shift** **Ericsson AB**
R1-1710904 **Uplink transmission in NR NSA mode** **Apple Inc.**
R1-1711701 **Considerations of NR-LTE coexistence in uplink** **ZTE** (Revision of R1-1710910)
R1-1711132 **Views on single UL transmission and UL sharing** **NTT DOCOMO, INC.**
R1-1711229 **NR-LTE Co-channel Coexistence Considerations** **Qualcomm Incorporated**
R1-1711337 **On NR-LTE coexistence for NSA and SA** **China Unicom**
R1-1711584 **On UL coverage extension of TDD @3.5GHz** **ORANGE** (Revision of R1-1711365)
R1-1711400 **On 1Tx only UE in LTE-NR Dual Connectivity** **Nokia, Alcatel-Lucent Shanghai Bell**

R1-1711709 **WF on NR-LTE coexistence in overlapping spectrum** **AT&T, Deutsche Telekom, Vodafone, Intel, Ericsson, Samsung, Orange, China Unicom, Huawei, HiSilicon, China Telecom**

Agreements:

- In NR, support configuration between the following for paired spectrum (support of scheme 2 below is conditioned on the assumption that 100kHz is adopted as a supported UL channel raster in NR to support LTE/NR co-existence with LTE FDD)
  - Scheme 1: Do nothing to allow subcarrier alignment between NR UL (15 kHz) and LTE UL
  - Scheme 2: Allow subcarrier alignment between NR UL (15 kHz) and LTE UL, where NR UL raster is with a 7.5 kHz shift to the LTE UL raster
- Send an LS to RAN4 - Ralf (AT&T)

Wednesday

R1-1711779 **[DRAFT] LS on subcarrier alignment and channel raster** **AT&T, Sprint, T-Mobile USA, Huawei, HiSilicon, Samsung, Deutsche Telekom, Ericsson, Intel, China Telecom**

The document was presented by Ralf Bendlin from AT&T.

Discussion: .Qualcomm: let's delete "to support configuration of subcarrier alignment between NR UL (15 kHz) and LTE UL in paired spectrum".

AT&T compromise: RAN1 kindly requests RAN4 to take the above RAN1 agreement into account ensuring scheme 1 and scheme 2 are possible

Qualcomm: Scheme 2 is conditioned to RAN4 decision

Decision: The document is noted and final LS is approved in R1-1711839 with the following updates:

Action to RAN4 WG:

RAN1 kindly requests RAN4 to take the above RAN1 agreement ~~to support configuration of subcarrier alignment between NR UL (15 kHz) and LTE UL in paired spectrum~~ into account when discussing NR channel raster.

Dates of next TSG-RAN WG1 Meetings:

RAN1 #90	21st – 25th August 2017	Prague, Czech Republic
RAN1 NR Ad-Hoc#3~~2~~	18th – 21th September 2017	Nagoya, Japan

Thursday

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R1-1711675 Way forward on UE self-interference Vivo, OPPO, Coolpad, China Telecom, Xiaomi, Huawei, HiSilicon, China Unicom

Agreements:
- RAN1 to continue study the solution(s) to mitigate UE self-interference due to the simultaneous transmission and reception at the same time
  - Note: the issue is particular applicable for specific band combination(s) (e.g. harmonics related issues)
  - Note: the issue can be addressed if UE is not mandated to transmit on one carrier (F1) and receive on another carrier (F2) at the same time
- Send an LS to RAN4 regarding the above agreements – Xueming (Vivo), which is approved in R1-1711872

R1-1711705 Way forward on handling of single UL transmission NTT DoCoMo
R1-1711848 Way forward on handling of single UL transmission NTT DoCoMo, Apple

Agreements:
- Support the following solution to single UL transmission where NW synchronization between eNodeB and gNodeB is assumed (where there is at least one LTE carrier and at least one NR carrier of a different carrier frequency)
  - When UE is activated with multiple UL carriers on different frequencies, time-switching of LTE UL carrier and NR UL carrier is used
    - UL transmission timing pattern of LTE carrier and NR carrier is semi-statically shared between eNodeB and gNodeB
    - FFS: Signaling to UE of UL transmission timing pattern
  - UE simultaneously receives signals/channels from both NR DL carrier and LTE DL carrier
    - For scheduling/HARQ timing of LTE FDD carrier, the following timing can be considered, e.g., for LTE:
      - DL-reference UL/DL configuration for TDD
      - DL-reference UL/DL configuration defined for FDD-SCell in TDD-FDD CA with TDD-PCell
      - Up to NW implementation (i.e., no RAN1 spec. impact)
    - For scheduling/HARQ timing of NR carrier, no special handling would be necessary
  - Other solutions are not precluded
- Send an LS to RAN2, RAN3, and RAN4 – Kazuaki (DCM), which is drafted and endorsed in R1-1711877. Final LS approved in R1-1711878.

R1-1711817 WF on LTE/NR DC deployment scenarios to extend NR UL coverage Orange, Deutsche Telekom, Ericsson, China Unicom, OPPO, Huawei, China Telecom, Nokia, ZTE

Agreements:
- RAN1 should consider the following scenarios as listed in R1-1711817 in the future work especially in terms of UL coverage
  - Scenario 1
  - Scenario 2 where UL sharing is from network perspective
    - FFS where UL sharing from UE perspective
      - Aim to conclude in the next meeting; if no consensus, consider sending an LS to RANP for clarification
  - Scenario 3

Not treated.
R1-1709979 Overview of NR UL for LTE-NR coexistence Huawei, HiSilicon
R1-1710041 Support of UL carrier sharing between NR-LTE CATT
R1-1710353 Remaining details on DL sharing between LTE and NR LG Electronics
R1-1710354 Remaining details on UL sharing between LTE and NR LG Electronics
R1-1710385 Issues on UL transmission for LTE-NR co-existence vivo
R1-1710762 LTE-NR coexistence for DL Samsung
R1-1710909 Discussion of NR-LTE coexistence on DL ZTE
R1-1710912 Reserved resources supporting NR co-existence with LTE and NB-IoT Ericsson AB
R1-1711228 NR LTE Adjacent Channel Coexistence Consideration Qualcomm Incorporated
R1-1711399 LTE and NR performance in NR-LTE UL sharing Nokia, Alcatel-Lucent Shanghai Bell

5.1.9 UL power control

R1-1711947 Chairman's notes of AI 5.1.9 UL Power Control Ad-Hoc chair (Qualcomm)

The document was presented by RAN1 chair on behalf of Wanshi Chen (Vice Chair).
Decision: The document is endorsed. Content incorporated below.

5.1.9.1 Power sharing mechanism

Including power sharing mechanism for LTE-NR dual connectivity, NR carrier aggregation and dual connectivity

R1-1709949 **Power control for CA and DC** **Huawei, HiSilicon**
R1-1710042 **Power Sharing Mechanism** **CATT**
R1-1710839 **UL Power Sharing for LTE-NR Dual Connectivity** **MediaTek Inc.**
R1-1710879 **Power Sharing Mechanisms with LTE-NR DC and NR DC** **InterDigital, Inc.**
R1-1711526 **Power Sharing for LTE-NR Dual Connectivity** **Ericsson**

Agreements:

- Regarding power sharing for LTE-NR dual connectivity, support at least semi-static power sharing between LTE and NR
  - FFS details
  - Discuss further whether or not to support dynamic power sharing between LTE and NR
  - Discuss further impacts due to other factors, e.g., different TTI lengths, channel/service types, synchronous vs. asynchronous, different processing latency for LTE vs. NR, assumption regarding communication between NR vs. LTE at UE, specification impact to LTE (if any) and/or NR, etc.

Send an LS to RAN4 to inform the above agreements – Ravi (Ericsson)
Friday
R1-1711898 **[DRAFT] LS on power sharing for LTE-NR Dual Connectivity** **Ericsson**
Discussion: Nokia → should RAN2 be informed as well?
AT&T → WI code is incorrect
Decision: The document is noted and final LS is approved in R1-1711999 by adding RAN2 in CC part and updating work item code to "NR_newRAT".

R1-1711862 **WF on LTE-NR power sharing mechanism** **NTT DoCoMo, InterDigital**

Not treated.
R1-1710355 Discussion on power sharing for LTE-NR dual connectivity LG Electronics
R1-1710585 Power sharing mechanism for NR dual connectivity Intel Corporation
R1-1710764 On UL Power Sharing for Multi-Cell Transmissions Samsung
R1-1710911 Power Control for CA and DC in NR ZTE
R1-1711133 LTE-NR power sharing mechanism NTT DOCOMO, INC.
R1-1711396 On power sharing between LTE and NR in DC Nokia, Alcatel-Lucent Shanghai Bell

5.1.9.2 NR power control framework

Including power control for PUSCH/PUCCH/SRS/DMRS, PHR calculation

R1-1710174 **Uplink power control for NR** **Guangdong OPPO Mobile Telecom.**
R1-1710356 **Discussion on uplink power control for NR** **LG Electronics**
R1-1711818 **WF on UL power control** **LGE, Ericsson, InterDigital**

Agreements:

- In NR, PUSCH and at least some type(s) of SRS can share same closed loop power control command from gNB
  - FFS details, e.g., the type(s) of SRS, beam related aspects, etc.
- In NR, PUSCH and PUCCH rely on independent closed loop power control commands from gNB
- Study aspects related SRS carrier switching

R1-1711134 **Power control framework for PUSCH** **NTT DOCOMO, INC.**
R1-1711230 **Power control and PHR for NR** **Qualcomm Incorporated**
R1-1711397 **UL Power Control for MIMO** **Nokia, Alcatel-Lucent Shanghai Bell**
R1-1711724 **Summary of power control** **ZTE**
R1-1711721 **WF on UL power control** **ZTE, NTT DoCoMo**
R1-1711863 **WF on NR power control framework** **NTT DOCOMO, Nokia, Intel, InterDigital**
R1-1711819 **WF on PHR for different waveforms** **LG Electronics, NTT DOCOMO, InterDigital**

Agreement: UE's power headroom report is based on the corresponding PUSCH transmission(s)

- FFS details

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Not treated.
R1-1709948 General considerations on UL power control design Huawei, HiSilicon
R1-1710043 NR Power Control Framework CATT
R1-1710209 On NR power control ZTE
R1-1710210 On NR PHR calculation ZTE
R1-1710219 UL transmission power control Mitsubishi Electric Co.
R1-1710357 Discussion on uplink power headroom report for NR LG Electronics
R1-1710404 UL multi-beam power control vivo
R1-1710475 Discussion on PHR calculation Huawei, HiSilicon
R1-1710586 PUSCH and PUCCH power control Intel Corporation
R1-1710765 Power Control Framework Samsung
R1-1710766 On PHR Requirements and Calculation Samsung
R1-1710786 Discussion on NR power control and sharing CMCC
R1-1711602 Common and Beam Specific Power Control Parameters InterDigital, Inc.
R1-1711054 On the NR UL power control framework Ericsson
R1-1711335 UL power control in multi-beam based approaches ASUSTEK COMPUTER (SHANGHAI)

5.1.10 Channel model

R1-1711623 Correction on the formula of AnnexA ZTE, Ericsson (Revision of R1-1711255)
Decision: Agreed in R1-1711758 as 38.901CR0016 with latest version of cover sheet (v11.2).

R1-1711624 Correction on Procedure A of spatially-consistency UT mobility modeling ZTE, Ericsson (Revision of R1-1711256)
Decision: Agreed in R1-1711760 as 38.901CR0017 with latest version of cover sheet (v11.2).

5.1.11 Other

R1-1709971 Remaining issues on ECP Huawei, HiSilicon
R1-1710358 Multiplexing NCP and ECP LG Electronics
R1-1710405 Feasibility study on subband constellation rotation for uplink PAPR reduction for CP-OFDM waveform vivo
R1-1710406 PAE consideration on supporting CP-OFDM and DFT-S-OFDM vivo
R1-1710407 Forward compatibility consideration for ECP design and NR-MBMS vivo
R1-1710767 ECP Aspects for 60kHz SCS Samsung
R1-1710768 On PAPR of DMRS for p/2-BPSK DFT-s-OFDM with Spectrum Shaping Samsung
R1-1710769 RACH Aspects for CA and DC Samsung
R1-1710966 Flexible subcarrier spacing in the uplink for NR use cases including mMTC ATR
R1-1711326 Comment on NR specification Panasonic
R1-1711389 Further details on scrambling Ericsson
R1-1711424 On bandwidth adaptation Huawei, HiSilicon
R1-1711459 Modulation Scheme for URLLC with Preemption Multiplexing Samsung
R1-1711460 On Transparency of Spectrum Shaping for p/2-BPSK DFT-s-OFDM Samsung
R1-1711461 On Spectrum Shaping Methods for p/2-BPSK DFT-s-OFDM Samsung
R1-1711462 On Modulation Schemes for High Spectral Efficiency Samsung
R1-1711463 Transmission and Reception for High-Order Modulation with MIMO Samsung
R1-1711528 Extended Range Considerations for mMTC HUGHES Network Systems Ltd
R1-1711529 Channel Model for Non-Terrestrial Networks HUGHES Network Systems Ltd
R1-1711574 Discussion on bandwidth part configuration LG Electronics Inc.
R1-1711595 Impact of channel estimation error on the performance of high spectral efficiency MIMO schemes Samsung
R1-1711597 Remaining Issues on RB Grid Samsung
R1-1711908 Reserved resource for forward compatibility Ericsson

5.2 Other

R1-1711317 Discussion on NR Operating in Unlicensed Spectrum ASUSTEK COMPUTER (SHANGHAI)
R1-1711464 High level consideration on NR unlicensed band operation Huawei, HiSilicon
R1-1711465 NR Numerology on unlicensed bands Huawei, HiSilicon
R1-1711466 NR Frame structure on unlicensed bands Huawei, HiSilicon
R1-1711467 Coexistence and Channel access for NR unlicensed band operations Huawei, HiSilicon
R1-1711469 NR standalone operation on unlicensed bands Huawei, HiSilicon
R1-1711470 Discussion on NoMA study for Rel-15 SI Huawei, HiSilicon
R1-1711520 Discussion of Multi-Antenna and Highly Directional Beam-Forming for Operation in Unlicensed Spectrum Ericsson
R1-1711521 On Autonomous UL Transmissions for NR in Unlicensed Spectrum Ericsson

R1-1711522	On Channel Access Mechanisms for NR in Unlicensed Spectrum	Ericsson
R1-1711523	On NR Operation in the 60 GHz Unlicensed Band	Ericsson
R1-1711524	On Physical Layer Design Policies for Unlicensed Operation of NR	Ericsson
R1-1711525	Technology Components for Unlicensed Operation	Ericsson
R1-1711549	Considerations on Satellite channel model	THALES
R1-1711550	NTN Bentpipe payload architecture and characteristics	THALES
R1-1711568	Considerations on HAPS channel model	CNES, Thales
R1-1711614	Dynamic resource allocation for Integrated Access and Backhaul	Samsung
R1-1711615	Deployment scenarios for Integrated Access and Backhaul	Samsung
R1-1711616	Evaluation assumptions for Integrated Access and Backhaul	Samsung
R1-1711637	Discussion on NTN Deployment Scenarios	Samsung
R1-1711652	Summary of the 2nd NOMA Workshop	ZTE

6 Closing of the meeting

Mr Chair thanked all for the progress achieved during this second ad-hoc meeting on NR.
Special thanks to the Vice chairmen, especially at the start of the meeting and for chairing their respective sessions.
Mr Chair thanked the host ZTE for the organization and facilities. Although meeting's start was a bit challenging, with inadequate number of seats, no power to all seats… during the first 1,5 hours of day one, the number of meeting rooms (5 all together) were really appreciated.

Then Mr chair warned the delegates that organizing the RAN1 chair and vice chair election at the next meeting could also be a challenge (due to the number of voting companies – likely to be around 300 – and the potential number of round of voting. August will be last meeting chaired by Satoshi-san.

Meeting was closed at 20:15.
See you all in Prague.

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Annex A: List of Tdocs at RAN1 #AH_NR2

Please see excel file attached to this report

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Annex B: List of CRs agreed at RAN1 #AH_NR2

TS/TR	CR	Rev	Rel	Title	Cat	Vsn	@ Mtg	TD#	Source to WG	Work Item
38.901	16	-	Rel-14	Correction on the fomula of Annex A	F	14.1.0	R1#AH_NR2	R1-1711758	ZTE, Ericsson	NR_newRAT-Core
38.901	17	-	Rel-14	Correction on Procedure A of spatially-consistency UT mobility modeling	F	14.1.0	R1#AH_NR2	R1-1711760	ZTE, Ericsson	NR_newRAT-Core

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Annex C-1: List of Outgoing LSs from RAN1 #AH_NR2

TDoc #	Title	Source	Release	Related WIs	Reply to	To	Cc	Original LS	Reply in
R1-1711686	LS on NR UL SPS / UL transmission without UL grant	RAN1, NTT DOCOMO	Rel-15	NR_newRAT-Core		RAN2			
R1-1711825	LS on non-contiguous CA	RAN1, AT&T	Rel-15	NR_newRAT-Core		RAN2, RAN4			
R1-1711839	LS on subcarrier alignment and channel raster	RAN1, AT&T	Rel-15	NR_newRAT-Core		RAN4			
R1-1711872	LS on UE self-interference	RAN1, vivo	Rel-15	NR_newRAT-Core		RAN4			
R1-1711878	LS on single UL transmission	RAN1, NTT DOCOMO	Rel-15	NR_newRAT-Core		RAN2, RAN3, RAN4			
R1-1711880	LS on Beam Aspects of NR RACH	RAN1, Huawei	Rel-15	NR_newRAT-Core		RAN2			
R1-1711966	Reply LS on reading time index indication for RRM measurements	RAN1, Intel	Rel-15	NR_newRAT-Core	R2-1706160	RAN2			
R1-1711975	LS response on required parameters from RAN4 perspective	RAN1, Ericsson	Rel-15	NR_newRAT-Core	R4-1704216	RAN4			
R1-1711987	Reply LS response on NR basic handover	RAN1, Samsung	Rel-15	NR_newRAT-Core	R2-1707503	RAN2			
R1-1711997	Response LS on Support for fake gNB detection mechanisms	RAN1, Nokia	Rel-15	NR_newRAT-Core	S3-171568	SA3	RAN2, RAN4		
R1-1711998	LS on bandwidth part operation in NR	RAN1, MediaTek	Rel-15	NR_newRAT-Core		RAN2, RAN4			
R1-1711999	LS on power sharing for LTE-NR Dual Connectivity	RAN1, Ericsson	Rel-15	NR_newRAT-Core		RAN4	RAN2		
R1-1712000	LS on support of multi-TRP transmission in NR	RAN1, Intel	Rel-15	NR_newRAT-Core		RAN2	RAN3		
R1-1712001	LS on NR initial access and mobility	RAN1, NTT DOCOMO	Rel-15	NR_newRAT-Core		RAN2			
R1-1712002	LS on NR initial access and mobility	RAN1, NTT DOCOMO	Rel-15	NR_newRAT-Core		RAN4			
R1-1712005	Reply LS on PDCCH design	RAN1, Ericsson, CATT	Rel-15	NR_newRAT-Core		RAN2			
R1-1712007	LS on NR Beam Management	RAN1, Qualcomm	Rel-15	NR_newRAT-Core		RAN2			
R1-1712008	LS on HARQ operation	RAN1, Nokia	Rel-15	NR_newRAT-Core		RAN2			
R1-1712009	Reply LS on CSI-RS design for beam management	RAN1, NTT DOCOMO	Rel-15	NR_newRAT-Core	R4-1704216	RAN4	RAN2		
R1-1712010	LS on a correction to the applicable UL modulation schemes	RAN1, Huawei	Rel-15	NR_newRAT-Core		RAN4			

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Annex C-2: List of Incoming LSs from RAN1 #AH_NR2

TDoc #	Title	Source	Release	Related WIs	Reply to	To	Cc	Original LS	Reply in
R1-1710211	LS on SR design principles in NR	RAN2, Samsung	Rel-15	NR_newRAT-Core		RAN1		R2-1705867	
R1-1710212	LS on UE measurement capabilities across LTE and NR	RAN2, NTT DOCOMO	Rel-15	NR_newRAT-Core		RAN4	RAN1	R2-1706140	
R1-1710213	LS on UE categories for NR and LTE-NR Dual Connectivity	RAN2, NTT DOCOMO	Rel-15	NR_newRAT-Core		RAN, RAN1	RAN4	R2-1706141	
R1-1710214	LS reply to SA2 on maximum data rate	RAN2, MediaTek	Rel-15	NR_newRAT-Core	S2-172398, R1-1706857	SA2, RAN1	RAN3, SA1, CT1, CT4	R2-1706155	
R1-1710215	Response LS on reading time index indication for RRM measurements	RAN2, Intel	Rel-15	NR_newRAT-Core	R1-1706707	RAN1		R2-1706160	
R1-1710216	LS on Emergency Support in NR	SA2, Nokia	Rel-15	NR_newRAT-Core		RAN	SA, RAN1, RAN2, RAN3	S2-173700	
R1-1710217	LS on Support for fake gNB detection mechanisms	SA3, Nokia	Rel-15	NR_newRAT-Core		RAN1, RAN2, RAN4		S3-171568	
R1-1710220	Reply LS on Emergency Support in NR	RAN, T-Mobile	Rel-15	NR_newRAT-Core	S2-173700	SA2	SA, RAN1, RAN2, RAN3	RP-171434	
R1-1710221	Reply LS on UE categories for NR and LTE-NR Dual Connectivity	RAN, NTT DOCOMO	Rel-15	NR_newRAT-Core	R2-1706141	RAN2, RAN1	RAN4	RP-171480	
R1-1711892	Reply LS on PBCH content	RAN2, Huawei	Rel-15	NR_newRAT-Core	R1-1709789	RAN1		R2-1707490	
R1-1711940	LS to RAN1 on NR basic handover	RAN2, Ericsson	Rel-15	NR_newRAT-Core		RAN1		R2-1707503	
R1-1711949	Reply LS to RAN1 on UL data transmission without UL grant for NR	RAN2, Huawei	Rel-15	NR_newRAT-Core	R1-1709805	RAN1		R2-1707499	
R1-1711950	LS to RAN1 on Random Access	RAN2, Samsung	Rel-15	NR_newRAT-Core		RAN1		R2-1707504	

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Annex D: List of Approved updated WIDs

None

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Annex E: List of draft TSs/TRs agreed at RAN1 #AH_NR2

Tdoc Number	Title	Source	Conclusion/Decision
R1-1712004	TS38.211 v0.1.0 NR; Physical channels and modulation	Ericsson LM	Endorsed

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Annex F: List of actions

- **Outgoing LS**

[NRAH2-01] Sundar (Qualcomm)
R1-1711683 [DRAFT LS] on NR Beam Management Qualcomm
Email approval until July 10th
Done: According to email posted on July 13th by Mr Chair, final LS is approved in R1-1712007.

[NRAH2-02] Karri (Nokia)
R1-1711685 [DRAFT] LS on HARQ operation Nokia
Email approval until July 6th
Done: According to email posted on July 10th by Mr Chair, final LS is approved in R1-1712008.

[NRAH2-06] Yuichi (NTT DOCOMO)
R1-1712003 [DRAFT] Reply LS on CSI-RS design for beam management NTT DOCOMO
Email approval until July 7th
Done: According to email posted on July 10th by Mr Chair, final LS is approved in R1-1712009.

[NRAH2-07] Lihui (NTT DOCOMO)
R1-1711686 LS on NR UL SPS / UL transmission without UL grant RAN1, NTT DOCOMO
Email approval until July 6th
Done: According to email posted on July 10th by Mr Chair, the LS is approved.

[NRAH2-13] Yi (Huawei)
LS on a correction to the applicable UL modulation schemes
The agreed LS (to RAN4) related to modulation in R1-1711975, incorrectly stated that pi/2 BPSK is supported for OFDM (without DFT precoding).
Email approval until July 10th to clarify that pi/2 BPSK is only supported for DFT-S-OFDM.
Done: According to email posted on July 11th by Mr Chair, final LS is approved in R1-1712010.

- **CR approval**

None

- **Text proposal for TS and TR**

[NRAH2-03] Editors
Email discussion until August meeting about all specs

- 1st step: All spec editors will provide new draft specs (including all agreements and WA) until July 14th
- 2nd step: All spec editors will provide further updated specs (including all agreements and WA) until August 4th
- All companies are recommended checking these specs and comment via the reflector
- All spec editors will update specs via the reflector and submit them to the August meeting (RAN1#90)
- Objective is to get the updated specs endorsed on Monday on Monday (day 1 of RAN1#90)

Done: Step 1, namely draft versions to capture decisions up to and including RAN1 NR AdHoc #2 were provided as follows:
R1-1712011 TS38.211 v0.1.1 NR; Physical channels and modulation Ericsson LM
R1-1712012 TS38.201 v0.0.1 NR; Physical layer; General description NTT DOCOMO
R1-1712013 TS38.202 v0.0.1 NR; Physical layer services provided by the physical layer Qualcomm
R1-1712014 TS38.212 v0.0.1 NR; Multiplexing and channel coding Huawei
R1-1712015 TS38.213 v0.0.1 NR; Physical layer procedures for control Samsung
R1-1712016 TS38.214 v0.0.1 NR; Physical layer procedures for data Nokia
R1-1712017 TS38.215 v0.0.1 NR; Physical layer measurements Intel

- **Miscellaneous**

[NRAH2-04] Daniel (Ericsson)
Email discussion until the August meeting w.r.t the RRC parameters list for NR
- Daniel (Ericsson) will provide an initial RRC parameters list until August 9th
- All companies are recommended checking it and comment via the reflector
- Daniel (Ericsson) will update it via the reflector and submit it to the August meeting (RAN1#90)
- Objective is to get the (updated) RRC parameters list agreed on Monday (day 1 of RAN1#90)

Done: Draft version of the xls-sheet summarizing RRC parameters was distributed. Status to be check in RAN1#90.

[NRAH2-05] Daewon (Intel)
DMRS sequence for NR PBCH
Companies are encouraged to provide the information on NR PBCH DMRS sequence until July 28th in order to finalize the design
Done: Summary to be provided in RAN1#90.

[NRAH2-08] Jeongho (Samsung)
Email approval until July 13th to down select CBG-based (re)transmission
Done: On July 14th, the following list of options is confirmed for down selection:
- **For the indicated number of CBGs per TB where "indicated" is realized by RRC, MAC, L1 signalling, the following options are considered for down-selection in RAN1#90.**
  - **Option 1. RRC signaling (for bit-field size)**
  - **Option 2. L1 signaling (for indication the number of CBGs per TB) + RRC signaling (for bit-field size)**
  - **Option 3. both Option 1 and Option 2**

- **To determine the number of CBG HARQ-ACK bits per TB, the following options are considered for down-selection in RAN1#90.**
  - **Option 1. A UE transmits HARQ-ACK bits only for scheduled CBGs.**
    - **"scheduled CBGs" means the CBGs scheduled in a (re)transmission**
  - **Option 2. A UE transmits HARQ-ACK bits for indicated CBGs.**
    - **FFS: "indicated" is realized by RRC, MAC, L1 signalling**
  - **Option 3. both Option 1 and Option 2 by configuration**
  - **Note: Option1 and Option2 are the basis for the scheme to determine the number of feedback bits. Overhead reduction schemes can be considered. The number of actually used feedback bits can be different from the number of scheduled CBGs (Option1) or indicated CBGs (Option2).**
- **For DL CBG-based (re)transmission, when information on which CBG(s) is/are (re)transmitted is configured to be included in the DCI, the following options are considered for down-selection in RAN#90.**
  - **Option 1. TB-level NDI is jointly encoded with the information on which CBG(s) is/are (re)transmitted**
  - **Option 2. There is separate 1-bit bit-field for TB-level NDI.**
  - **Option 3. TB-level NDI can be differently interpreted according to whether all CBGs of a TB is transmitted.**
- **When CBG-based retransmission is configured, TB-level HARQ-A/N is supported and at least following options can be considered for down-selection in RAN1#90.**
  - **Option 1. Add 1 bit upon CBG-level HARQ-ACK bits**
  - **Option 2. Use all NACK of CBG-level HARQ-ACK bits**
  - **Option 3. Use different PUCCH format or PUCCH resource**
- **For HARQ-ACK codebook for CBG-based retransmission, the following options are considered for down-selection in RAN1#90.**
  - **Option 1. Dynamic codebook determination for multiple PDSCHs**
  - **Option 2. Semi-static codebook determination for multiple PDSCHs**
  - **Option 3. both Option 1 and Option 2 by configuration**

Updated summary of CBG transmission shall be presented in RAN1#90.

[NRAH2-09] Joseph (Qualcomm)
Processing Time Requriements - Email discussion about the followings:
- Step 1: identify the candidate factors for processing time (until Aug.4th)
- Step 2: identify the table (until Aug.4th) l Based on the proponents' input for step 1 and step 2, following work will be done:
- Step 3: fill-in the table
- Targeting finishing step 3 until September meeting.
  ² Note: companies are encouraged to bring up initial numbers for the table to the August meeting
- Note: fill-in the table does not necessarily results in defining some UE capabilities or exact values of K1 and K2 in the specification.

Done: Summary to be provided in RAN1#90.

[NRAH2-10] Zhenfei (Huawei)
Scheduling/HARQ aspects for CA for email approval until July 10th
Done: According to email posted on July 15th by Mr Chair, the following is agreed:

Agreements

- **On the search space**
  - **A UE monitors PDCCH candidates in common search space(s) at least for RMSI and UE specific search space(s) on Primary Component Carrier (PCC)**
  - **A UE monitors PDCCH candidates at least on UE-specific search space(s) for an Secondary Component Carrier (SCC)**
- **Support cross carrier scheduling with CIF**
  - **NR at least support that a carrier is scheduled by one and only one carrier**
  - **FFS: the number of CIF bits**
  - **FFS: BWP aspects for cross carrier scheduling**
- **For cross-carrier scheduling, PDCCH and the scheduled PDSCH can have the same or different numerologies.**
- **For self-scheduling, PDCCH and the scheduled PDSCH have the same numerology**
  - **FFS whether for self-scheduling, PDCCH and the scheduled PDSCH can have different numerologies.**
- **For self and cross-carrier scheduling, PDCCH and the scheduled PUSCH can have the same or different numerologies.**
- **When numerology are different between PDCCH and the scheduled transmission, the time granularity indicated in the DCI for the timing relationship between the end of PDCCH and the corresponding scheduled transmission is based on the numerology of the scheduled transmission.**
- **For multiple timing advance groups**
  - **LTE timing difference requirement can be used as a starting point**
    - **FFS factors related to this requirement.**
  - **Support PRACH transmission for timing advance acquisition on SCC**
- **NR Supports 2 cell groups for PUCCH for NR DC**
  - **FFS: NR supports 2 cell groups for PUCCH for NR CA**

Working assumptions

- **HARQ-ACK transmission related to multiple DL component carriers is supported for DL component carriers operating with the same and different numerology**
  - **The time granularity of a HARQ-ACK transmission, indicated in the DCI scheduling the PDSCH, is based on the numerology of PUCCH transmission.**

Further discussion for the next meeting

- **NR supports at least the configuration of one carrier transmitting the PUCCH within the cell group**
  - **FFS The carrier transmitting the PUCCH is always PCC and/or carrier(s) transmitting the PUCCH can be SCC in a cell group containing PCC**
  - **FFS The possibility of the configuration of multiple carriers transmitting the PUCCH in a cell group**
  - **This does not preclude on PUCCH fast carrier switching**

[NRAH2-11] Zukang (Huawei)
Polar code sequence
- Polar code sequence candidates, including any merged solutions, should be provided by Wed 2nd Aug
- Identify candidates of polar code sequence according to the procedure below by Wed 9th Aug

- Rate matching proposals for any sequence that has been selected as a winner by at least one company to be provided by Wed 16th Aug.
Done: Summary to be provided in RAN1#90.

[NRAH2-12] Zukang (Huawei)
Polar code design on polynomial and interleaver for email discussion until August 7th
Main target is on gathering all proposals about detailed design on polynomial and interleaver.
Done: Summary to be provided in RAN1#90.

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Annex G: List of participants at RAN1 #AH_NR2

Please see excel file attached to this report

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Annex H: **TSG RAN WG1 meetings in 2017 – 2018**

TITLE	TYPE	DATES	LOCATION	CTRY
3GPPRAN1#90	WG	21 – 25 Aug 2017	Prague	Rep Czech
3GPPRAN1-NR3	AH	18 – 21 Sep 2017	Nagoya	Japan
3GPPRAN1#90bis	WG	09 – 13 Oct 2017	Prague	Rep Czech
3GPPRAN1#91	WG	27 Nov – 01 Dec 2017	Reno	US
3GPPRAN1-AH-1801	AH	22 – 26 Jan 2018	TBD	
3GPPRAN1#92	WG	26 Feb – 2 Mar 2018	Athens	Greece
3GPPRAN1#92bis	WG	16 – 20 Apr 2018	TBD	China
3GPPRAN1#93	WG	21 – 25 May 2018	TBD	Korea
3GPPRAN1#94	WG	20 – 24 Aug 2018	Gothenburg	Sweden
3GPPRAN1#94bis	WG	8 – 12 Oct 2018	TBD	China
3GPPRAN1#95	WG	12 – 16 Nov 2018	TBD	US

MEETING TYPES		
AH = Ad Hoc	ST = Startup Meeting	RG = Rapporteurs Group
JM = Joint	WG = Working Group	SG = Steering Group
PM = Preparatory Meeting	CM = Chairmen's meeting	TG = Task Group
RM = Resolution Meeting	OR = Ordinary	XO = Extraordinary

End of document

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Appendix C

TDoc	Title	Source	TDoc Status	Reservation date	Uploaded
R1-1709880	Draft Agenda of RAN1#AH_NR2 meeting	RAN1 Chair	revised	2017-06-08 07:56:05	2017-06-08 08:07:46
R1-1709881	Report of RAN1#89 meeting	ETSI	noted	2017-06-08 07:56:09	2017-06-22 14:16:07
R1-1709882	Enhancement of Early Termination of Polar Codes by placing UE-ID on Frozen Symbols	Tsofun Algorithm	available	2017-06-08 09:08:38	2017-06-19 17:58:35
R1-1709883	Study of Split-CRC Polar Code Construction for Early Termination	Tsofun Algorithm	revised	2017-06-08 09:13:04	2017-06-19 17:58:35
R1-1709884	NR-SS sequence design	ZTE	available	2017-06-08 11:12:14	2017-06-17 02:00:24
R1-1709885	The composition of SS burst sets	ZTE	available	2017-06-08 11:12:16	2017-06-17 02:00:24
R1-1709886	Timing indication based on SS blocks	ZTE	available	2017-06-08 11:12:16	2017-06-19 14:06:44
R1-1709887	Multiple SS blocks in wideband CC	ZTE	available	2017-06-08 11:12:16	2017-06-17 02:00:24
R1-1709888	NR-PBCH contents	ZTE	available	2017-06-08 11:12:16	2017-06-17 02:00:24
R1-1709889	NR-PBCH RE mapping and SS block composition	ZTE	available	2017-06-08 11:12:16	2017-06-19 14:06:44
R1-1709890	NR-PBCH DMRS design	ZTE	available	2017-06-08 11:12:16	2017-06-17 02:00:24
R1-1709891	RMSI delivery	ZTE	available	2017-06-08 11:12:16	2017-06-17 02:00:24
R1-1709892	Other SI delivery	ZTE	available	2017-06-08 11:12:16	2017-06-17 02:00:24
R1-1709893	Paging design in NR	ZTE	available	2017-06-08 11:12:16	2017-06-17 02:00:24
R1-1709894	NR-PRACH formats for long/short sequences	ZTE	available	2017-06-08 11:12:16	2017-06-17 02:00:24
R1-1709895	NR-PRACH formats: capacity enhancements and other use cases	ZTE	available	2017-06-08 11:12:16	2017-06-17 02:00:24
R1-1709896	Power control during random access procedure	ZTE	available	2017-06-08 11:12:16	2017-06-17 02:00:24
R1-1709897	4-step random access procedure	ZTE	available	2017-06-08 11:12:16	2017-06-17 02:00:24
R1-1709898	RRM measurements on IDLE mode RS	ZTE	available	2017-06-08 11:12:16	2017-06-17 02:00:24
R1-1709899	RRM measurements on CSI-RS for L3 mobility	ZTE	available	2017-06-08 11:12:16	2017-06-17 02:00:24
R1-1709900	Radio link monitoring in NR	ZTE	available	2017-06-08 11:12:16	2017-06-17 02:00:24
R1-1709901	Scrambling pattern for timing indication over PBCH	Sequans Communications	available	2017-06-08 12:35:54	2017-06-15 15:48:24
R1-1709902	Enhancements for Polar code construction	Sequans Communications	available	2017-06-08 12:37:26	2017-06-15 15:48:24
R1-1709903	Discussion of LTE-RM decoding ambiguity	Sequans Communications	available	2017-06-08 12:41:19	2017-06-15 19:15:08
R1-1709904	Discussion on Remaining Details of Codeword Mapping	Beijing Xinwei Telecom Techn.	available	2017-06-08 13:20:28	2017-06-16 09:52:57
R1-1709905	Further Discussion on DL PRB Bundling	Beijing Xinwei Telecom Techn.	noted	2017-06-08 13:20:33	2017-06-16 09:52:57
R1-1709906	Discussion on DL Beam Management	Beijing Xinwei Telecom Techn.	available	2017-06-08 13:20:33	2017-06-16 09:52:57
R1-1709907	Discussion on Beam Failure Recovery	Beijing Xinwei Telecom Techn.	available	2017-06-08 13:20:33	2017-06-16 09:52:56
R1-1709908	Discussion on CSI Framework and Semi-persistent CSI-RS Resources and Reports Activation	Beijing Xinwei Telecom Techn.	available	2017-06-08 13:20:33	2017-06-16 09:52:56

R1-1709909	Further Evaluation and Discussion on DMRS Design Details	Beijing Xinwei Telecom Techn.	noted	2017-06-08 13:20:33	2017-06-16 09:52:56
R1-1709910	NR MIMO System Level Phase 3 Calibration Results	Beijing Xinwei Telecom Techn.	available	2017-06-08 13:20:33	2017-06-16 09:52:56
R1-1709911	Finalization of the NR-SSS	Huawei, HiSilicon	available	2017-06-08 13:23:32	2017-06-17 02:50:38
R1-1709912	SS Burst Set and Block Composition	Huawei, HiSilicon	available	2017-06-08 13:23:32	2017-06-17 03:15:49
R1-1709913	Time Index Indication	Huawei, HiSilicon	available	2017-06-08 13:23:32	2017-06-17 02:50:38
R1-1709914	NR-PBCH contents and payload size	Huawei, HiSilicon	available	2017-06-08 13:23:32	2017-06-17 02:50:38
R1-1709915	Discussion on NR RMSI delivery	Huawei, HiSilicon	available	2017-06-08 13:23:32	2017-06-17 02:50:38
R1-1709916	Multi-beam Paging for NR	Huawei, HiSilicon	available	2017-06-08 13:23:32	2017-06-17 02:50:38
R1-1709917	PRACH preamble sequences and formats for capacity enhancement and beam management	Huawei, HiSilicon	revised	2017-06-08 13:23:32	2017-06-17 02:50:38
R1-1709918	Discussion on power ramping and power control during RA procedure	Huawei, HiSilicon	available	2017-06-08 13:23:32	2017-06-17 02:50:38
R1-1709919	SS Burst Periodicities and timing for UE RRM measurement	Huawei, HiSilicon	noted	2017-06-08 13:23:33	2017-06-17 02:50:38
R1-1709920	CSI-RS configuration parameters for L3 mobility	Huawei, HiSilicon	available	2017-06-08 13:23:33	2017-06-17 02:50:38
R1-1709921	Discussion on remaining issues of radio link monitoring	Huawei, HiSilicon	available	2017-06-08 13:23:33	2017-06-17 02:50:38
R1-1709922	On numerology determination during initial access	Huawei, HiSilicon	available	2017-06-08 13:23:33	2017-06-17 02:50:38
R1-1709923	Non-codebook based transmission for UL MIMO	Huawei, HiSilicon	noted	2017-06-08 13:23:33	2017-06-17 02:58:56
R1-1709924	Multiple NR-PDCCH for Multiple TRP transmission	Huawei, HiSilicon	available	2017-06-08 13:23:33	2017-06-17 02:58:56
R1-1709925	PRB bundling size for DL data precoding	Huawei, HiSilicon	available	2017-06-08 13:23:33	2017-06-17 02:58:56
R1-1709926	Discussion on transmission parameter sets	Huawei, HiSilicon	available	2017-06-08 13:23:33	2017-06-17 02:58:56
R1-1709927	Beam indication for DL control channel	Huawei, HiSilicon	available	2017-06-08 13:23:33	2017-06-17 02:58:56
R1-1709928	UL beam management	Huawei, HiSilicon	noted	2017-06-08 13:23:33	2017-06-17 02:58:56
R1-1709929	General views on beam failure recovery	Huawei, HiSilicon	available	2017-06-08 13:23:33	2017-06-17 02:58:56
R1-1709930	Procedure details for beam failure recovery	Huawei, HiSilicon	available	2017-06-08 13:23:33	2017-06-17 02:58:56
R1-1709931	Discussion on CSI Framework Design	Huawei, HiSilicon	noted	2017-06-08 13:23:33	2017-06-17 02:58:56
R1-1709932	Channel and interference measurement for CSI acquisition	Huawei, HiSilicon	revised	2017-06-08 13:23:33	2017-06-17 03:15:49
R1-1709933	Rate matching for data channel	Huawei, HiSilicon	available	2017-06-08 13:23:33	2017-06-17 02:58:56
R1-1709934	Reference signal for fine time and frequency tracking	Huawei, HiSilicon	noted	2017-06-08 13:23:33	2017-06-17 02:55:43
R1-1709935	Details of QCL assumptions and related RS design considerations	Huawei, HiSilicon	available	2017-06-08 13:23:33	2017-06-17 02:55:43
R1-1709936	UL SRS design for beam management and CSI acquisition	Huawei, HiSilicon	available	2017-06-08 13:23:33	2017-06-17 02:55:43
R1-1709937	UL SRS sequence design in NR	Huawei, HiSilicon	available	2017-06-08 13:23:33	2017-06-17 03:15:49
R1-1709938	SRS antenna switching	Huawei, HiSilicon	available	2017-06-08 13:23:33	2017-06-17 02:55:43
R1-1709939	PTRS for CP-OFDM	Huawei, HiSilicon	available	2017-06-08 13:23:33	2017-06-17 02:55:43
R1-1709940	PTRS for DFT-s-OFDM	Huawei, HiSilicon	noted	2017-06-08 13:23:34	2017-06-17 02:55:43
R1-1709941	Design of DL DMRS for data transmission	Huawei, HiSilicon	available	2017-06-08 13:23:34	2017-06-17 02:55:43
R1-1709942	Evaluation results of DMRS design for DL data channel	Huawei, HiSilicon	available	2017-06-08 13:23:34	2017-06-17 02:55:43
R1-1709943	UL DMRS design for data transmission	Huawei, HiSilicon	available	2017-06-08 13:23:34	2017-06-17 02:55:43
R1-1709944	Evaluation results of DMRS design for UL data channel	Huawei, HiSilicon	available	2017-06-08 13:23:34	2017-06-17 02:55:43
R1-1709945	Common UL/DL DMRS design	Huawei, HiSilicon	available	2017-06-08 13:23:34	2017-06-17 02:55:43
R1-1709946	CSI-RS design in NR	Huawei, HiSilicon	available	2017-06-08 13:23:34	2017-06-17 02:55:43
R1-1709947	CSI-RS design for beam management	Huawei, HiSilicon	available	2017-06-08 13:23:34	2017-06-17 02:55:43

R1-1709948	General considerations on UL power control design	Huawei, HiSilicon	available	2017-06-08 13:23:34	2017-06-17 03:15:49
R1-1709949	Power control for CA and DC	Huawei, HiSilicon	noted	2017-06-08 13:23:34	2017-06-17 02:55:43
R1-1709950	DMRS for NR-PDCCH	Huawei, HiSilicon	available	2017-06-08 13:23:34	2017-06-17 02:50:38
R1-1709951	Configuration of control resource set	Huawei, HiSilicon	available	2017-06-08 13:23:34	2017-06-17 02:50:38
R1-1709952	Search space design	Huawei, HiSilicon	available	2017-06-08 13:23:34	2017-06-17 02:50:38
R1-1709953	Contents of group-common PDCCH	Huawei, HiSilicon	available	2017-06-08 13:23:34	2017-06-17 02:50:38
R1-1709954	Structure of group-common PDCCH	Huawei, HiSilicon	available	2017-06-08 13:23:34	2017-06-17 02:50:38
R1-1709955	UE-specific DCI contents in NR	Huawei, HiSilicon	available	2017-06-08 13:23:34	2017-06-17 02:50:38
R1-1709956	Resource multiplexing of downlink control and data	Huawei, HiSilicon	available	2017-06-08 13:23:34	2017-06-17 02:50:38
R1-1709957	Dynamic and semi-static DL/UL resource partition	Huawei, HiSilicon	available	2017-06-08 13:23:34	2017-06-17 02:50:38
R1-1709958	Short PUCCH for up to 2 UCI bits	Huawei, HiSilicon	available	2017-06-08 13:23:34	2017-06-17 02:50:38
R1-1709959	Short PUCCH with more than 2 UCI bits	Huawei, HiSilicon	available	2017-06-08 13:23:34	2017-06-17 02:50:38
R1-1709960	Overview of long PUCCH design	Huawei, HiSilicon	available	2017-06-08 13:23:34	2017-06-17 02:50:38
R1-1709961	Long PUCCH structure for up to 2 bits with high multiplexing capacity	Huawei, HiSilicon	available	2017-06-08 13:23:34	2017-06-17 02:50:38
R1-1709962	Long PUCCH structure for moderate payload with some multiplexing capacity	Huawei, HiSilicon	available	2017-06-08 13:23:34	2017-06-17 02:50:38
R1-1709963	UCI piggyback on PUSCH	Huawei, HiSilicon	available	2017-06-08 13:23:34	2017-06-17 02:50:38
R1-1709964	HARQ processing time	Huawei, HiSilicon	available	2017-06-08 13:23:34	2017-06-17 02:55:43
R1-1709965	Number of HARQ processes and HARQ RTT	Huawei, HiSilicon	available	2017-06-08 13:23:34	2017-06-17 02:55:43
R1-1709966	Soft buffer handling	Huawei, HiSilicon	available	2017-06-08 13:23:34	2017-06-17 02:55:43
R1-1709967	Scheduling mechanisms for CBG-based re-transmission	Huawei, HiSilicon	available	2017-06-08 13:23:34	2017-06-17 02:50:38
R1-1709968	Discussion on CBG construction	Huawei, HiSilicon	available	2017-06-08 13:23:34	2017-06-17 02:50:38
R1-1709969	Discussion on CBG-based feedback	Huawei, HiSilicon	available	2017-06-08 13:23:34	2017-06-17 02:50:38
R1-1709970	HARQ feedback timing for NR	Huawei, HiSilicon	available	2017-06-08 13:23:34	2017-06-17 02:50:39
R1-1709971	Remaining issues on ECP	Huawei, HiSilicon	available	2017-06-08 13:23:34	2017-06-17 02:52:07
R1-1709972	Overview of wider bandwidth operations	Huawei, HiSilicon	available	2017-06-08 13:23:34	2017-06-17 02:52:07
R1-1709973	On initial access for wideband carrier	Huawei, HiSilicon	available	2017-06-08 13:23:34	2017-06-17 02:52:07
R1-1709974	Scheduling and resource allocation mechanism for active bandwidth parts	Huawei, HiSilicon	available	2017-06-08 13:23:34	2017-06-17 02:52:07
R1-1709975	On NR carrier aggregation	Huawei, HiSilicon	available	2017-06-08 13:23:34	2017-06-17 02:55:43
R1-1709976	SRS switching among CCs and bandwidth parts	Huawei, HiSilicon	available	2017-06-08 13:23:34	2017-06-17 02:55:43
R1-1709977	On NR dual connectivity	Huawei, HiSilicon	available	2017-06-08 13:23:34	2017-06-17 02:55:43
R1-1709978	TB mapping and TB size determination	Huawei, HiSilicon	available	2017-06-08 13:23:34	2017-06-17 02:52:07
R1-1709979	Overview of NR UL for LTE-NR coexistence	Huawei, HiSilicon	available	2017-06-08 13:23:34	2017-06-17 02:55:43
R1-1709980	Subcarrier mapping for LTE-NR coexistence	Huawei, HiSilicon	noted	2017-06-08 13:23:34	2017-06-17 02:55:43
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R1-1709986	PDCCH reliability for URLLC	Huawei, HiSilicon	available	2017-06-08 13:23:35	2017-06-17 02:52:07

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R1-1710150	PDCCH CORESET configuration and UE procedure on NR-PDCCH monitoring	Guangdong OPPO Mobile Telecom.	available	2017-06-11 13:52:20	2017-06-16 10:20:33
R1-1710151	NR PDCCH search space design with nested structure	Guangdong OPPO Mobile Telecom.	available	2017-06-11 13:52:20	2017-06-16 10:20:33
R1-1710152	Search space design consideration for NR PDCCH with BF	Guangdong OPPO Mobile Telecom.	available	2017-06-11 13:52:20	2017-06-16 10:20:33
R1-1710153	On resource sharing between PDCCH and PDSCH	Guangdong OPPO Mobile Telecom.	available	2017-06-11 13:52:20	2017-06-16 10:20:33
R1-1710154	Impact on common channel reception to PDCCH design	Guangdong OPPO Mobile Telecom.	available	2017-06-11 13:52:20	2017-06-16 10:20:33
R1-1710155	DL control channel design for URLLC	Guangdong OPPO Mobile Telecom.	available	2017-06-11 13:52:20	2017-06-16 10:20:33
R1-1710156	Discussion on short PUCCH for up to 2 UCI bits	Guangdong OPPO Mobile Telecom.	available	2017-06-11 13:52:20	2017-06-16 10:20:33
R1-1710157	Discussion on short PUCCH for more than 2 UCI bits	Guangdong OPPO Mobile Telecom.	available	2017-06-11 13:52:20	2017-06-16 10:20:33
R1-1710158	Discussion on long PUCCH for up to 2 UCI bits	Guangdong OPPO Mobile Telecom.	available	2017-06-11 13:52:20	2017-06-16 10:20:33
R1-1710159	Slot aggregation and configuration for NR long PUCCH	Guangdong OPPO Mobile Telecom.	available	2017-06-11 13:52:20	2017-06-16 10:20:33
R1-1710160	Design of NR PUCCH with long duration	Guangdong OPPO Mobile Telecom.	available	2017-06-11 13:52:20	2017-06-16 10:20:33

R1-1710161	Resource indication for UL control channel	Guangdong OPPO Mobile Telecom.	available	2017-06-11 13:52:20	2017-06-16 10:20:33
R1-1710162	On UCI and data multiplexing in PUSCH	Guangdong OPPO Mobile Telecom.	available	2017-06-11 13:52:20	2017-06-16 10:20:33
R1-1710163	Multiplexing of short PUCCH and long PUCCH	Guangdong OPPO Mobile Telecom.	available	2017-06-11 13:52:20	2017-06-16 10:20:33
R1-1710164	Bandwidth part configuration and frequency resource allocation	Guangdong OPPO Mobile Telecom.	available	2017-06-11 13:52:20	2017-06-16 10:20:33
R1-1710165	Time-domain resource allocation for NR	Guangdong OPPO Mobile Telecom.	available	2017-06-11 13:52:20	2017-06-16 10:20:33
R1-1710166	Discussion on the UL waveform indication	Guangdong OPPO Mobile Telecom.	available	2017-06-11 13:52:20	2017-06-16 10:20:33
R1-1710167	HARQ for uplink grant-free transmission	Guangdong OPPO Mobile Telecom.	available	2017-06-11 13:52:20	2017-06-16 10:20:33
R1-1710168	Discussion on CBG indication in DCI	Guangdong OPPO Mobile Telecom.	available	2017-06-11 13:52:20	2017-06-16 10:20:33
R1-1710169	Discussion on HARQ-ACK feedback for CBG-based transmission	Guangdong OPPO Mobile Telecom.	available	2017-06-11 13:52:20	2017-06-16 10:20:33
R1-1710170	Symbol-level resource allocation and pre-emption indication	Guangdong OPPO Mobile Telecom.	available	2017-06-11 13:52:20	2017-06-16 10:20:33
R1-1710171	Bandwidth part based resource scheduling for carrier aggregation	Guangdong OPPO Mobile Telecom.	available	2017-06-11 13:52:20	2017-06-16 10:20:33
R1-1710172	Discussion on UE specific RF bandwidth adaptation in NR	Guangdong OPPO Mobile Telecom.	available	2017-06-11 13:52:20	2017-06-16 10:20:33
R1-1710173	Discussion on the NR-LTE self-interference issue	Guangdong OPPO Mobile Telecom.	noted	2017-06-11 13:52:20	2017-06-16 10:20:33
R1-1710174	Uplink power control for NR	Guangdong OPPO Mobile Telecom.	noted	2017-06-11 13:52:20	2017-06-16 10:20:33
R1-1710175	Codeword mapping and interleaving	ZTE	revised	2017-06-12 04:53:25	2017-06-17 06:03:44
R1-1710176	Codebook based UL transmission	ZTE	available	2017-06-12 04:53:26	2017-06-17 06:03:44
R1-1710177	Non-Codebook based and Hybrid based UL transmission	ZTE	noted	2017-06-12 04:53:26	2017-06-17 07:34:50
R1-1710178	Diversity based uplink transmission schemes	ZTE	noted	2017-06-12 04:53:26	2017-06-17 07:59:10
R1-1710179	On PRB Bundling	ZTE	available	2017-06-12 04:53:26	2017-06-17 06:03:44
R1-1710180	Multi-TRP Transmission and interference coordination	ZTE	noted	2017-06-12 04:53:26	2017-06-17 06:03:45
R1-1710181	Discussion on rate matching	ZTE	available	2017-06-12 04:53:26	2017-06-17 09:49:27
R1-1710182	On transmission setting	ZTE	available	2017-06-12 04:53:26	2017-06-17 06:03:45
R1-1710183	DL beam management for NR MIMO	ZTE	noted	2017-06-12 04:53:26	2017-06-17 08:38:22
R1-1710184	UL beam management for NR MIMO	ZTE	available	2017-06-12 04:53:26	2017-06-17 06:03:45
R1-1710185	Discussion on beam recovery mechanism	ZTE	available	2017-06-12 04:53:26	2017-06-17 06:03:45
R1-1710186	Beam grouping evaluation for beam management	ZTE	noted	2017-06-12 04:53:26	2017-06-17 06:03:45
R1-1710187	On CSI framework details	ZTE	revised	2017-06-12 04:53:26	2017-06-17 06:03:45
R1-1710188	Details of CSI acquisition	ZTE	available	2017-06-12 04:53:26	2017-06-17 06:03:45
R1-1710189	On reciprocity based CSI acquisition	ZTE	revised	2017-06-12 04:53:26	2017-06-17 06:08:04
R1-1710190	CSI feedback mechanism on PUCCH	ZTE	noted	2017-06-12 04:53:26	2017-06-17 06:22:50

R1-1710191	CSI feedback mechanism on PUSCH	ZTE	available	2017-06-12 04:53:26	2017-06-17 06:27:05
R1-1710192	Overhead reduction for Type II CSI	ZTE	available	2017-06-12 04:53:26	2017-06-17 06:34:51
R1-1710193	Discussion on multiplexing of different RSs	ZTE	noted	2017-06-12 04:53:26	2017-06-17 06:37:44
R1-1710194	On CSI-RS for beam management	ZTE	available	2017-06-12 04:53:27	2017-06-17 09:31:38
R1-1710195	On CSI-RS for CSI acquisition	ZTE	available	2017-06-12 04:53:27	2017-06-17 06:42:11
R1-1710196	Discussion on downlink DMRS design	ZTE	noted	2017-06-12 04:53:27	2017-06-17 06:45:51
R1-1710197	Evaluation results on DL DMRS	ZTE	available	2017-06-12 04:53:27	2017-06-17 06:47:54
R1-1710198	Discussion on uplink DMRS design	ZTE	available	2017-06-12 04:53:27	2017-06-17 06:50:33
R1-1710199	Discussion on RS for phase tracking	ZTE	available	2017-06-12 04:53:27	2017-06-17 06:54:49
R1-1710200	Discussion on SRS design for NR	ZTE	available	2017-06-12 04:53:27	2017-06-17 06:56:23
R1-1710201	Discussion on fine time/frequency tracking of channel	ZTE	available	2017-06-12 04:53:27	2017-06-17 07:00:25
R1-1710202	QCL design for UL and DL MIMO	ZTE	noted	2017-06-12 04:53:27	2017-06-17 08:49:19
R1-1710203	Calibration results for Phase 1 NR MIMO link level calibration	ZTE	withdrawn	2017-06-12 04:53:27	
R1-1710204	Calibration results for Phase 1 NR MIMO system level calibration	ZTE	withdrawn	2017-06-12 04:53:27	
R1-1710205	Calibration results for Phase 2 NR MIMO link level calibration	ZTE	withdrawn	2017-06-12 04:53:27	
R1-1710206	Calibration results for Phase 2 NR MIMO system level calibration	ZTE	available	2017-06-12 04:53:27	2017-06-17 09:53:31
R1-1710207	Calibration results for Phase 3 NR MIMO calibration	ZTE	available	2017-06-12 04:53:27	2017-06-17 09:53:31
R1-1710208	Further clarification on Phase 3 NR MIMO calibration	ZTE	available	2017-06-12 04:53:27	2017-06-17 09:53:31
R1-1710209	On NR power control	ZTE	available	2017-06-12 04:53:27	2017-06-17 07:03:20
R1-1710210	On NR PHR calculation	ZTE	available	2017-06-12 05:00:17	2017-06-17 07:07:22
R1-1710211	LS on SR design principles in NR	RAN2, Samsung	treated	2017-06-12 06:44:17	2017-06-12 07:18:45
R1-1710212	LS on UE measurement capabilities across LTE and NR	RAN2, NTT DOCOMO	treated	2017-06-12 06:44:19	2017-06-12 07:18:45
R1-1710213	LS on UE categories for NR and LTE-NR Dual Connectivity	RAN2, NTT DOCOMO	treated	2017-06-12 06:44:19	2017-06-12 07:18:45
R1-1710214	LS reply to SA2 on maximum data rate	RAN2, MediaTek	treated	2017-06-12 06:44:19	2017-06-12 07:18:45
R1-1710215	Response LS on reading time index indication for RRM measurements	RAN2, Intel	treated	2017-06-12 06:44:19	2017-06-12 07:18:45
R1-1710216	LS on Emergency Support in NR	SA2, Nokia	treated	2017-06-12 06:44:19	2017-06-12 07:18:45
R1-1710217	LS on Support for fake gNB detection mechanisms	SA3, Nokia	treated	2017-06-12 06:44:19	2017-06-12 07:18:45
R1-1710218	RACH transmission count	Mitsubishi Electric Co.	available	2017-06-12 07:51:14	2017-06-16 00:23:55
R1-1710219	UL transmission power control	Mitsubishi Electric Co.	available	2017-06-12 07:52:49	2017-06-16 00:23:56
R1-1710220	Reply LS on Emergency Support in NR	RAN, T-Mobile	treated	2017-06-12 09:48:20	2017-06-12 09:57:25
R1-1710221	Reply LS on UE categories for NR and LTE-NR Dual Connectivity	RAN, NTT DOCOMO	treated	2017-06-12 09:48:20	2017-06-12 09:57:25
R1-1710222	Transmit diversity for DFTsOFDM-based PUCCH in long duration	Mitsubishi Electric RCE	available	2017-06-12 14:29:33	2017-06-16 14:58:34
R1-1710223	Discussion on timing indication based on SS block	Beijing Xinwei Telecom Techn.	available	2017-06-13 06:18:38	2017-06-16 09:52:57
R1-1710224	Discussion and evaluation on SS block composition	Beijing Xinwei Telecom Techn.	available	2017-06-13 06:18:39	2017-06-16 09:52:57

R1-1710225	Discussion and evaluation on DMRS design for NR-PBCH	Beijing Xinwei Telecom Techn.	available	2017-06-13 06:18:39	2017-06-16 09:52:57
R1-1710226	Discussion on 2-symbol Short PUCCH with More Than 2 Bits	Beijing Xinwei Telecom Techn.	available	2017-06-13 06:18:39	2017-06-16 09:52:57
R1-1710227	Further Discussion on PTRS Design Details	Beijing Xinwei Telecom Techn.	withdrawn	2017-06-13 06:18:39	
R1-1710228	Further discussion on channel reciprocity and beam correspondence	MTI	available	2017-06-13 10:38:10	2017-06-16 09:18:05
R1-1710229	[89-16] Email discussion on NR-PRACH preamble formats based on short sequence length	ZTE Corporation	revised	2017-06-13 11:51:50	2017-06-13 11:58:10
R1-1710230	UL PTRS for DFTsOFDM waveform	Mitsubishi Electric RCE	noted	2017-06-13 15:34:41	2017-06-16 14:58:34
R1-1710231	Consideration on timing indication based on SS block	Fujitsu	available	2017-06-13 16:37:38	2017-06-16 16:40:53
R1-1710232	Discussion on DMRS for NR-PBCH	Fujitsu	available	2017-06-13 16:37:38	2017-06-16 16:40:54
R1-1710233	Discussion on the CORESET for RMSI delivery	Fujitsu	available	2017-06-13 16:37:38	2017-06-16 16:40:55
R1-1710234	Discussion on 4-step RA procedure	Fujitsu	available	2017-06-13 16:37:38	2017-06-16 16:40:55
R1-1710235	Discussion on multiple NR-PDCCHs in NC-JT scheme	Fujitsu	available	2017-06-13 16:37:38	2017-06-16 16:40:56
R1-1710236	Discussion on beam failure recovery procedure	Fujitsu	available	2017-06-13 16:37:38	2017-06-16 16:40:57
R1-1710237	PUCCH resource allocation	Fujitsu	available	2017-06-13 16:37:38	2017-06-16 16:40:58
R1-1710238	Discussion on time domain resource allocation	Fujitsu	available	2017-06-13 16:37:38	2017-06-16 16:41:00
R1-1710239	Discussions on HARQ for grant-free transmission	Fujitsu	available	2017-06-13 16:37:38	2017-06-16 16:41:02
R1-1710240	Discussion on DL control signaling related to CBG based (re)-transmission	Fujitsu	available	2017-06-13 16:37:38	2017-06-16 16:41:02
R1-1710241	Discussion on CBG based HARQ-ACK Design	Fujitsu	available	2017-06-13 16:37:38	2017-06-16 16:41:04
R1-1710242	Discussion on HARQ-ACK codebook	Fujitsu	available	2017-06-13 16:37:38	2017-06-16 16:41:04
R1-1710243	On eMBB and URLLC multiplexing for Uplink	Fujitsu	available	2017-06-13 16:37:38	2017-06-16 16:41:04
R1-1710244	PRB indexing for RMSI in NR	NEC	available	2017-06-13 17:48:57	2017-06-17 05:46:17
R1-1710245	Frequency-domain resource allocation schemes for NR	NEC	available	2017-06-13 17:48:57	2017-06-17 05:46:17
R1-1710246	Time-domain resource allocation schemes for NR	NEC	available	2017-06-13 17:48:57	2017-06-17 05:46:17
R1-1710247	Frequency hopping for NR UL PUSCH	NEC	available	2017-06-13 17:48:57	2017-06-17 05:46:17
R1-1710248	UL data transmission without grant	NEC	available	2017-06-13 17:48:57	2017-06-17 05:46:17
R1-1710249	PRB and RBG indexing within wider channel BW for NR	NEC	available	2017-06-13 17:48:57	2017-06-17 05:46:17
R1-1710250	Discussion on UL sharing of NR and LTE	NEC	noted	2017-06-13 17:48:57	2017-06-17 05:46:17
R1-1710251	Discussion on beam failure recovery request	NEC Corporation	available	2017-06-14 03:06:13	2017-06-16 08:51:56
R1-1710252	Discussion on preamble transmitting power	NEC Corporation	withdrawn	2017-06-14 03:07:23	
R1-1710253	Discussion on extending of scheduling request	NEC Corporation	withdrawn	2017-06-14 03:08:16	
R1-1710254	Discussion on beam sweeping or beam changing of SR	NEC Corporation	withdrawn	2017-06-14 03:08:59	
R1-1710255	Remaining details on DMRS ports and number of layers indication	NEC Corporation	available	2017-06-14 03:09:46	2017-06-16 08:51:56
R1-1710256	CSI-RS design for beam management and interference measurement	NEC Corporation	available	2017-06-14 03:11:05	2017-06-16 08:51:56
R1-1710257	Considerations on the design of DMRS	NEC Corporation	available	2017-06-14 03:11:40	2017-06-16 08:51:56
R1-1710258	Remaining issue on SS Sequence Design	LG Electronics	available	2017-06-14 07:52:45	2017-06-17 05:30:17
R1-1710259	Discussion on SS burst set composition	LG Electronics	available	2017-06-14 07:52:45	2017-06-17 05:30:17

R1-1710260	Discussion on SS block time index indication	LG Electronics	available	2017-06-14 07:52:45	2017-06-17 05:30:17
R1-1710261	Remaining issues on Multiple SS block transmissions in wideband CC	LG Electronics	available	2017-06-14 07:52:45	2017-06-17 05:30:17
R1-1710262	Consideration on NR-PBCH contents and payload size	LG Electronics	available	2017-06-14 07:52:45	2017-06-17 05:30:17
R1-1710263	Discussion on NR-PBCH RE mapping and SS block composition	LG Electronics	available	2017-06-14 07:52:45	2017-06-17 05:30:17
R1-1710264	Discussion on DMRS design for NR-PBCH	LG Electronics	available	2017-06-14 07:52:45	2017-06-17 05:30:17
R1-1710265	Remaining minimum system information delivery	LG Electronics	available	2017-06-14 07:52:45	2017-06-17 05:30:17
R1-1710266	Other system information delivery	LG Electronics	withdrawn	2017-06-14 07:52:45	
R1-1710267	Paging design in NR	LG Electronics	available	2017-06-14 07:52:45	2017-06-17 05:30:17
R1-1710268	Discussion on PRACH preamble format details	LG Electronics	available	2017-06-14 07:52:45	2017-06-17 05:30:17
R1-1710269	Discussion on PRACH preamble for capacity enhancement	LG Electronics	available	2017-06-14 07:52:45	2017-06-17 05:30:17
R1-1710270	Discussion on Power Control issue for Message 1 and 3	LG Electronics	available	2017-06-14 07:52:45	2017-06-17 05:30:17
R1-1710271	RACH Procedure	LG Electronics	available	2017-06-14 07:52:45	2017-06-17 05:30:17
R1-1710272	SS block based RRM Measurement	LG Electronics	available	2017-06-14 07:52:45	2017-06-17 05:30:17
R1-1710273	CSI-RS based RRM Measurement for L3 Mobility	LG Electronics	noted	2017-06-14 07:52:45	2017-06-17 05:30:17
R1-1710274	Discussion on Radio Link Monitoring in NR	LG Electronics	available	2017-06-14 07:52:45	2017-06-17 05:30:17
R1-1710275	Discussion on codeword mapping	LG Electronics	available	2017-06-14 07:52:45	2017-06-17 05:30:17
R1-1710276	Discussion on codebook based transmission for UL	LG Electronics	available	2017-06-14 07:52:45	2017-06-17 05:30:17
R1-1710277	Discussion on non-codebook based transmission for UL	LG Electronics	available	2017-06-14 07:52:45	2017-06-17 05:32:05
R1-1710278	Discussion on diversity transmission for UL	LG Electronics	available	2017-06-14 07:52:45	2017-06-17 05:32:05
R1-1710279	Discussion on cooperative transmission	LG Electronics	available	2017-06-14 07:52:45	2017-06-17 05:32:05
R1-1710280	Discussion on rate matching	LG Electronics	available	2017-06-14 07:52:45	2017-06-17 05:32:05
R1-1710281	Discussion on DL beam management	LG Electronics	available	2017-06-14 07:52:45	2017-06-17 05:32:05
R1-1710282	Discussion on UL beam management	LG Electronics	available	2017-06-14 07:52:45	2017-06-17 05:32:05
R1-1710283	Discussion on beam failure recovery	LG Electronics	noted	2017-06-14 07:52:45	2017-06-17 05:32:05
R1-1710284	Discussion on CSI framework	LG Electronics	available	2017-06-14 07:52:45	2017-06-17 05:32:05
R1-1710285	Discussion on interference measurement	LG Electronics	available	2017-06-14 07:52:45	2017-06-17 05:32:05
R1-1710286	Discussion on CSI acquisition for reciprocity based operation	LG Electronics	available	2017-06-14 07:52:45	2017-06-17 05:32:06
R1-1710287	Discussion on overhead reduction for Type II codebook	LG Electronics	available	2017-06-14 07:52:45	2017-06-17 05:32:06
R1-1710288	Discussions on CSI reporting contents	LG Electronics	available	2017-06-14 07:52:45	2017-06-17 05:32:06
R1-1710289	CSI feedback for OL and semi-OL MIMO	LG Electronics	available	2017-06-14 07:52:45	2017-06-17 05:32:06
R1-1710290	UL channel utilization for CSI reporting	LG Electronics	available	2017-06-14 07:52:45	2017-06-17 05:32:06
R1-1710291	On collision avoidance for PTRS and other RSs	LG Electronics	available	2017-06-14 07:52:45	2017-06-17 05:32:06
R1-1710292	On CSI-RS design for beam management	LG Electronics	available	2017-06-14 07:52:45	2017-06-17 05:32:06
R1-1710293	On CSI-RS design for CSI acquisition	LG Electronics	available	2017-06-14 07:52:45	2017-06-17 05:32:06
R1-1710294	On DL DMRS design	LG Electronics	available	2017-06-14 07:52:45	2017-06-17 05:32:06
R1-1710295	On UL DMRS design	LG Electronics	available	2017-06-14 07:52:45	2017-06-17 05:32:06
R1-1710296	On DL PT-RS design	LG Electronics	noted	2017-06-14 07:52:45	2017-06-17 05:32:06
R1-1710297	On UL PT-RS design	LG Electronics	revised	2017-06-14 07:52:45	2017-06-17 05:32:06
R1-1710298	On SRS design and related operations	LG Electronics	available	2017-06-14 07:52:45	2017-06-17 05:32:06
R1-1710299	Discussion on fine time/frequency tracking of channel	LG Electronics	available	2017-06-14 07:52:45	2017-06-17 05:32:06
R1-1710300	Discussion on QCL for NR	LG Electronics	available	2017-06-14 07:52:45	2017-06-17 05:32:06
R1-1710301	Phase 3 SLS Calibration Results for NR MIMO	LG Electronics	available	2017-06-14 07:52:46	2017-06-17 05:33:41

R1-1710302	Phase 2 LLS Calibration Results for NR MIMO	LG Electronics	available	2017-06-14 07:52:46	2017-06-17 05:33:41
R1-1710303	Discussion on NR-PDCCH structure	LG Electronics	available	2017-06-14 07:52:46	2017-06-17 05:33:41
R1-1710304	Discussion on reference signal for NR-PDCCH	LG Electronics	available	2017-06-14 07:52:46	2017-06-17 05:33:41
R1-1710305	Discussion on CORESET configuration	LG Electronics	available	2017-06-14 07:52:46	2017-06-17 05:33:41
R1-1710306	Discussion on hierarchical search space structure	LG Electronics	available	2017-06-14 07:52:46	2017-06-17 05:33:41
R1-1710307	Discussion on multi-beam operation for NR-PDCCH	LG Electronics	available	2017-06-14 07:52:46	2017-06-17 05:33:41
R1-1710308	Discussion on multiplexing between control and data	LG Electronics	available	2017-06-14 07:52:46	2017-06-17 05:33:41
R1-1710309	Discussion on the structure of group common PDCCH	LG Electronics	available	2017-06-14 07:52:46	2017-06-17 05:33:41
R1-1710310	Discussion on the contents of group common PDCCH	LG Electronics	available	2017-06-14 07:52:46	2017-06-17 05:33:41
R1-1710311	Discussion on UE behavior for the group common PDCCH	LG Electronics	available	2017-06-14 07:52:46	2017-06-17 05:33:41
R1-1710312	Discussion on DL control with ultra-reliability	LG Electronics	available	2017-06-14 07:52:46	2017-06-17 05:33:41
R1-1710313	Design of short NR-PUCCH for up to 2 UCI bits	LG Electronics	available	2017-06-14 07:52:46	2017-06-17 05:33:41
R1-1710314	Design of short NR-PUCCH for more than 2 UCI bits	LG Electronics	available	2017-06-14 07:52:46	2017-06-17 05:33:41
R1-1710315	Design of long NR-PUCCH for up to 2 UCI bits	LG Electronics	available	2017-06-14 07:52:46	2017-06-17 05:33:41
R1-1710316	Design of long NR-PUCCH for more than 2 UCI bits	LG Electronics	available	2017-06-14 07:52:46	2017-06-17 05:33:41
R1-1710317	Support of long NR-PUCCH over multiple slots	LG Electronics	available	2017-06-14 07:52:46	2017-06-17 05:33:41
R1-1710318	Consideration on transmit diversity for NR-PUCCH	LG Electronics	available	2017-06-14 07:52:46	2017-06-17 05:33:41
R1-1710319	Consideration on resource allocation for NR-PUCCH	LG Electronics	available	2017-06-14 07:52:46	2017-06-17 05:33:41
R1-1710320	Support of UCI piggyback on PUSCH for NR	LG Electronics	available	2017-06-14 07:52:46	2017-06-17 05:33:41
R1-1710321	Support of uplink channel multiplexing for NR	LG Electronics	available	2017-06-14 07:52:46	2017-06-17 05:45:28
R1-1710322	Discussion on UL control with ultra-reliability	LG Electronics	available	2017-06-14 07:52:46	2017-06-17 05:45:28
R1-1710323	Discussion on frequency-domain resource allocation	LG Electronics	available	2017-06-14 07:52:46	2017-06-17 05:45:28
R1-1710324	Discussion on time-domain resource allocation	LG Electronics	available	2017-06-14 07:52:46	2017-06-17 05:45:28
R1-1710325	Discussion on TB size determination for NR	LG Electronics	available	2017-06-14 07:52:46	2017-06-17 05:45:28
R1-1710326	Discussion on scheduling request for UL transmission with grant	LG Electronics	available	2017-06-14 07:52:46	2017-06-17 05:45:28
R1-1710327	Discussion on UL transmission without grant	LG Electronics	available	2017-06-14 07:52:46	2017-06-17 05:45:28
R1-1710328	Summary of [89-22] Email discussion about UL data transmission without UL grant	LG Electronics	noted	2017-06-14 07:52:46	2017-06-27 15:27:51
R1-1710329	Consideration on CBG construction for NR HARQ	LG Electronics	available	2017-06-14 07:52:46	2017-06-17 05:45:28
R1-1710330	Consideration on DCI signaling for CBG based HARQ	LG Electronics	available	2017-06-14 07:52:46	2017-06-17 05:45:28
R1-1710331	Consideration on UCI signaling for CBG based HARQ	LG Electronics	available	2017-06-14 07:52:46	2017-06-17 05:45:28
R1-1710332	Consideration on HARQ-ACK feedback timing for NR	LG Electronics	available	2017-06-14 07:52:46	2017-06-17 05:45:28
R1-1710333	Support of HARQ-ACK multiplexing/bundling for NR	LG Electronics	available	2017-06-14 07:52:46	2017-06-17 05:45:28
R1-1710334	Discussion on HARQ process number for NR	LG Electronics	available	2017-06-14 07:52:46	2017-06-17 05:45:28
R1-1710335	Discussion on soft buffer management for NR	LG Electronics	available	2017-06-14 07:52:46	2017-06-17 05:45:28
R1-1710336	Discussion on pre-emption indication for downlink	LG Electronics	available	2017-06-14 07:52:46	2017-06-17 05:45:28
R1-1710337	Discussion on eMBB and URLLC multiplexing for uplink	LG Electronics	available	2017-06-14 07:52:46	2017-06-17 05:45:28
R1-1710338	Discussion on scheduling and HARQ procedure for URLLC	LG Electronics	available	2017-06-14 07:52:46	2017-06-17 05:45:28
R1-1710339	Support of cross-CC DCI/UCI transmission for NR CA	LG Electronics	available	2017-06-14 07:52:46	2017-06-17 05:45:28
R1-1710340	Discussion on dual connectivity with single active UL at a given time	LG Electronics	available	2017-06-14 07:52:46	2017-06-17 05:45:28
R1-1710341	Discussion on CRC reduction and attachement for eMBB data	LG Electronics	available	2017-06-14 07:52:46	2017-06-20 05:34:16
R1-1710342	Code block segmentation for eMBB	LG Electronics	noted	2017-06-14 07:52:46	2017-06-20 05:34:16

R1-1710343	On rate matching with LDPC code for eMBB	LG Electronics	available	2017-06-14 07:52:46	2017-06-20 05:34:16
R1-1710344	Discussion on bit level interleaver	LG Electronics	noted	2017-06-14 07:52:47	2017-06-20 05:34:16
R1-1710345	Circulant permutation matrix design for LDPC codes	LG Electronics	revised	2017-06-14 07:52:47	2017-06-27 15:17:52
R1-1710346	Early termination effect of polar codes	LG Electronics	available	2017-06-14 07:52:47	2017-06-20 05:34:16
R1-1710347	Repetition scheme of polar codes	LG Electronics	revised	2017-06-14 07:52:47	2017-06-20 05:34:16
R1-1710348	Design of polar codes with high order modulations	LG Electronics	available	2017-06-14 07:52:47	2017-06-20 05:34:16
R1-1710349	Details on PBCH coding	LG Electronics	available	2017-06-14 07:52:47	2017-06-20 05:34:16
R1-1710350	Discussion on CLI measurement for Duplexing Flexibility	LG Electronics	noted	2017-06-14 07:52:47	2017-06-17 05:45:28
R1-1710351	Discussion on details of backhaul signaling for duplexing flexibility	LG Electronics	available	2017-06-14 07:52:47	2017-06-17 05:46:07
R1-1710352	Remaining details on wider bandwith operation	LG Electronics	available	2017-06-14 07:52:47	2017-06-17 05:46:07
R1-1710353	Remaining details on DL sharing between LTE and NR	LG Electronics	available	2017-06-14 07:52:47	2017-06-17 05:46:07
R1-1710354	Remaining details on UL sharing between LTE and NR	LG Electronics	available	2017-06-14 07:52:47	2017-06-17 05:46:07
R1-1710355	Discussion on power sharing for LTE-NR dual connectivity	LG Electronics	available	2017-06-14 07:52:47	2017-06-17 05:46:07
R1-1710356	Discussion on uplink power control for NR	LG Electronics	noted	2017-06-14 07:52:47	2017-06-17 05:46:07
R1-1710357	Discussion on uplink power headroom report for NR	LG Electronics	available	2017-06-14 07:52:47	2017-06-17 05:46:07
R1-1710358	Multiplexing NCP and ECP	LG Electronics	available	2017-06-14 07:52:47	2017-06-17 05:46:07
R1-1710359	PT-RS design	Panasonic Corporation	available	2017-06-14 08:59:05	2017-06-16 08:17:09
R1-1710360	Discussion on PRB bundling size for NR DL	Spreadtrum Communications	available	2017-06-14 09:08:41	2017-06-16 10:31:12
R1-1710361	Differential RSRP report for beam management	Spreadtrum Communications	available	2017-06-14 09:08:41	2017-06-16 10:31:12
R1-1710362	DMRS configurations for CP-OFDM.	Spreadtrum Communications	available	2017-06-14 09:08:41	2017-06-16 10:31:12
R1-1710363	Considerations on PT-RS for CP-OFDM	Spreadtrum Communications	available	2017-06-14 09:08:41	2017-06-16 10:31:12
R1-1710364	Discussion on beam failure recovery	Spreadtrum Communications	available	2017-06-14 09:08:41	2017-06-16 10:31:12
R1-1710365	Discussion on CSI-RS design for CSI acquisition	Spreadtrum Communications	available	2017-06-14 09:08:41	2017-06-16 10:31:12
R1-1710366	Discussion on NR-REG to NR-CCE time-/frequency mapping	Spreadtrum Communications	available	2017-06-14 09:08:41	2017-06-16 10:31:12
R1-1710367	Discussion on 1-symbol PUCCH design	Spreadtrum Communications	available	2017-06-14 09:08:41	2017-06-16 10:31:12
R1-1710368	The relation among UE-specific DCI, GC-PDCCH, and semi-static signaling	Spreadtrum Communications	available	2017-06-14 09:08:41	2017-06-16 10:31:12
R1-1710369	NR-PBCH RE mapping and SS block composition	Spreadtrum Communications	noted	2017-06-14 09:08:41	2017-06-16 10:31:12
R1-1710370	Discussion on time index indication	Spreadtrum Communications	available	2017-06-14 09:08:41	2017-06-19 14:13:21
R1-1710371	Remaining issues on the subcarrier spacing of SS block	Spreadtrum Communications	available	2017-06-14 09:08:41	2017-06-16 10:31:12
R1-1710372	Remaining issues on SS block and SS burst set composition	vivo	available	2017-06-14 12:28:06	2017-06-17 06:44:33
R1-1710373	Discussion on SS block time index indication	vivo	available	2017-06-14 12:28:06	2017-06-20 05:37:40

R1-1710374	SS block transmissions and RRM measurement in wideband CC	vivo	available	2017-06-14 12:28:06	2017-06-17 06:44:33
R1-1710375	Views on NR-PBCH contents and payload size	vivo	available	2017-06-14 12:28:06	2017-06-17 06:44:33
R1-1710376	NR-PBCH RE mapping and evaluation	vivo	noted	2017-06-14 12:28:06	2017-06-20 05:37:40
R1-1710377	SS block time index for idle/inactive measurement	vivo	withdrawn	2017-06-14 12:28:06	
R1-1710378	CSI-RS configuration for L3 mobility	vivo	available	2017-06-14 12:28:06	2017-06-17 06:44:33
R1-1710379	Identification NSA mode during initial access	vivo	available	2017-06-14 12:28:06	2017-06-17 06:44:33
R1-1710380	Discussion on UL grant-free transmission	vivo	available	2017-06-14 12:28:06	2017-06-17 06:44:33
R1-1710381	Scheduling and HARQ aspects for URLLC reliability	vivo	available	2017-06-14 12:28:06	2017-06-17 06:44:33
R1-1710382	Discussion on pre-emption indication for downlink	vivo	available	2017-06-14 12:28:06	2017-06-17 06:44:33
R1-1710383	Discussion on UL multiplexing data with different transmission durations	vivo	available	2017-06-14 12:28:06	2017-06-17 06:44:33
R1-1710384	Interference analysis for LTE-NR co-existence	vivo	noted	2017-06-14 12:28:06	2017-06-17 06:44:33
R1-1710385	Issues on UL transmission for LTE-NR co-existence	vivo	available	2017-06-14 12:28:06	2017-06-17 06:44:33
R1-1710386	Discussion on short-PUCCH up to 2-bit	vivo	withdrawn	2017-06-14 12:28:07	2017-06-17 06:56:31
R1-1710387	Discussion on short-PUCCH more than 2-bit	vivo	revised	2017-06-14 12:28:07	2017-06-17 06:56:31
R1-1710388	Discussion of PUCCH resource indication	vivo	withdrawn	2017-06-14 12:28:07	
R1-1710389	DMRS design for NR-PDCCH	vivo	available	2017-06-14 12:28:07	2017-06-17 06:44:33
R1-1710390	Discussion on REG bundling size/structure	vivo	available	2017-06-14 12:28:07	2017-06-17 06:44:33
R1-1710391	Discussion on group common PDCCH and BD	vivo	available	2017-06-14 12:28:07	2017-06-17 06:44:33
R1-1710392	Discussion on downlink RA	vivo	available	2017-06-14 12:28:07	2017-06-17 06:44:33
R1-1710393	Discussion on search space design supporting dynamic DCI size	vivo	available	2017-06-14 12:28:07	2017-06-17 06:44:33
R1-1710394	Discussion on NR UE supporting self-contained operation	vivo	available	2017-06-14 12:28:07	2017-06-17 06:44:33
R1-1710395	DCI content size and compression	vivo	available	2017-06-14 12:28:07	2017-06-17 06:44:33
R1-1710396	Discussion on CB grouping	vivo	available	2017-06-14 12:28:07	2017-06-17 06:44:33
R1-1710397	Discussion on flexible length scheduling	vivo	available	2017-06-14 12:28:07	2017-06-17 06:44:33
R1-1710398	NR transmission on anchor bandwidth part	vivo	available	2017-06-14 12:28:07	2017-06-17 06:44:33
R1-1710399	Beam management and beam reporting	vivo	available	2017-06-14 12:28:07	2017-06-17 06:44:33
R1-1710400	Beam failure recovery procedure	vivo	available	2017-06-14 12:28:07	2017-06-17 06:44:33
R1-1710401	On CSI-RS design for beam management	vivo	available	2017-06-14 12:28:07	2017-06-17 06:44:33
R1-1710402	On DL DMRS design	vivo	available	2017-06-14 12:28:07	2017-06-17 06:44:33
R1-1710403	On PT-RS design for CP-OFDM	vivo	available	2017-06-14 12:28:07	2017-06-17 06:44:33
R1-1710404	UL multi-beam power control	vivo	available	2017-06-14 12:28:07	2017-06-17 06:44:33
R1-1710405	Feasibility study on subband constellation rotation for uplink PAPR reduction for CP-OFDM waveform	vivo	available	2017-06-14 12:28:07	2017-06-17 06:44:33
R1-1710406	PAE consideration on supporting CP-OFDM and DFT-S-OFDM	vivo	available	2017-06-14 12:28:07	2017-06-17 06:44:33
R1-1710407	Forward compatibility consideration for ECP design and NR-MBMS	vivo	available	2017-06-14 12:28:07	2017-06-17 06:44:33
R1-1710408	On pre-DFT RS/UCI multiplexing for PUCCH in short duration	Mitsubishi Electric RCE	available	2017-06-14 13:38:38	2017-06-16 14:58:34
R1-1710409	Views on SRS designs	Mitsubishi Electric Co.	revised	2017-06-14 15:38:40	2017-06-16 09:53:04
R1-1710410	Evaluation of DL DMRS designs	Mitsubishi Electric Co.	available	2017-06-14 15:43:21	2017-06-16 09:53:04

R1-1710411	Views on DL DMRS designs	Mitsubishi Electric Co.	available	2017-06-14 15:46:25	2017-06-16 09:53:04
R1-1710412	NR SS block and burst set composition	AT&T	noted	2017-06-14 18:39:05	2017-06-17 03:18:23
R1-1710413	Further details on forward compatible resources in NR	AT&T	available	2017-06-14 18:39:05	2017-06-17 03:18:23
R1-1710414	Transmission duration indication for symbol-level/slot-level/multi-slot-level scheduling	AT&T	available	2017-06-14 18:39:05	2017-06-17 03:18:23
R1-1710415	Remaining details on the number of HARQ processes in NR	AT&T	available	2017-06-14 18:39:05	2017-06-17 03:18:23
R1-1710416	Design considerations for NR operation with wide bandwidths	AT&T	available	2017-06-14 18:39:05	2017-06-17 03:18:23
R1-1710417	Remaining details of NR-LTE coexistence in overlapping spectrum	AT&T	noted	2017-06-14 18:39:05	2017-06-17 03:18:23
R1-1710418	HARQ-ACK feedback timing for FDD, semi-static TDD and mini-slot based transmissions	AT&T	available	2017-06-14 18:39:05	2017-06-17 03:18:23
R1-1710419	SS block time index indication	AT&T	available	2017-06-14 18:39:05	2017-06-17 03:18:23
R1-1710420	SS block transmissions in a wideband CC	AT&T	available	2017-06-14 18:39:05	2017-06-17 03:18:23
R1-1710421	Details of NR-PBCH contents	AT&T	available	2017-06-14 18:39:05	2017-06-17 03:18:23
R1-1710422	DL Tx beam reporting in msg. 3	AT&T	available	2017-06-14 18:39:05	2017-06-17 03:18:23
R1-1710423	Measurement based on SS block	AT&T	available	2017-06-14 18:39:05	2017-06-17 03:18:23
R1-1710424	Measurement based on CSI-RS for L3 mobility	AT&T	available	2017-06-14 18:39:05	2017-06-17 03:18:23
R1-1710425	Radio link monitoring	AT&T	available	2017-06-14 18:39:05	2017-06-17 03:18:23
R1-1710426	Remaining details of codeword mapping for NR MIMO	AT&T	noted	2017-06-14 18:39:05	2017-06-17 03:18:23
R1-1710427	UL diversity transmision for NR	AT&T	noted	2017-06-14 18:39:05	2017-06-17 03:18:23
R1-1710428	On the details of multi-TRP and multi-panel transmission	AT&T	available	2017-06-14 18:39:05	2017-06-17 03:18:23
R1-1710429	On the need of per RE level PDSCH rate-matching and RE mapping signalling	AT&T	available	2017-06-14 18:39:05	2017-06-17 03:18:23
R1-1710430	DL beam management details	AT&T	available	2017-06-14 18:39:05	2017-06-17 03:18:23
R1-1710431	Considerations on beam failure recovery mechanism	AT&T	available	2017-06-14 18:45:46	2017-06-17 03:18:23
R1-1710432	Discussion on the channels to carry CSI report	AT&T	available	2017-06-14 18:45:46	2017-06-17 03:18:23
R1-1710433	On the details of CSI acquisition	AT&T	available	2017-06-14 18:45:46	2017-06-17 03:18:23
R1-1710434	CSI feedback for closed loop and semi open loop transmission schemes	AT&T	available	2017-06-14 18:45:46	2017-06-17 03:18:23
R1-1710435	Multiplexing of CSI-RS with PDSCH in mixed numerology scenarios	AT&T	noted	2017-06-14 18:45:46	2017-06-17 03:18:23
R1-1710436	Remaining details of CSI-RS	AT&T	available	2017-06-14 18:45:46	2017-06-17 03:18:23
R1-1710437	Control channel configuration for multi-TRP and multi-panel transmission	AT&T	available	2017-06-14 18:45:46	2017-06-17 03:18:23
R1-1710438	Group common PDCCH Structure for NR	AT&T	available	2017-06-14 18:45:46	2017-06-17 03:18:23
R1-1710439	On the contents of group common PDCCH	AT&T	available	2017-06-14 18:45:46	2017-06-17 03:18:23
R1-1710440	UE behaviour for group common PDCCH	AT&T	available	2017-06-14 18:45:46	2017-06-17 03:18:23
R1-1710441	Transmit diversity for PUCCH	AT&T	withdrawn	2017-06-14 18:45:46	
R1-1710442	On CBG construction for NR PDSCH and PUSCH	AT&T	available	2017-06-14 18:45:46	2017-06-17 03:18:23
R1-1710443	DCI design for CBG based re transmision	AT&T	available	2017-06-14 18:45:46	2017-06-17 03:18:23
R1-1710444	Uplink control channel design for CBG based re transmission	AT&T	available	2017-06-14 18:45:46	2017-06-17 03:18:23
R1-1710445	Minimum UE bandwidth in NR	Huawei, HiSilicon	available	2017-06-14 21:19:49	2017-06-17 02:52:07
R1-1710446	Codeword to layer mapping in NR	Huawei, HiSilicon	noted	2017-06-14 21:19:49	2017-06-17 02:58:56
R1-1710447	Codebook based transmission for UL MIMO	Huawei, HiSilicon	available	2017-06-14 21:19:49	2017-06-17 02:58:56

R1-1710448	Diversity-based transmission for UL	Huawei, HiSilicon	available	2017-06-14 21:19:49	2017-06-17 02:58:56
R1-1710449	General views on DL beam management	Huawei, HiSilicon	revised	2017-06-14 21:19:49	2017-06-17 02:58:56
R1-1710450	Multi-beam transmission for DL control channel	Huawei, HiSilicon	available	2017-06-14 21:19:49	2017-06-17 02:58:56
R1-1710451	CSI acquisition details for NCJT	Huawei, HiSilicon	available	2017-06-14 21:19:49	2017-06-17 02:58:56
R1-1710452	CSI acquisition details for hybrid CSI	Huawei, HiSilicon	available	2017-06-14 21:19:49	2017-06-17 02:58:56
R1-1710453	The remaining issues for Type I codebook	Huawei, HiSilicon	available	2017-06-14 21:19:49	2017-06-17 02:58:56
R1-1710454	The remaining issues for Type II codebook	Huawei, HiSilicon	available	2017-06-14 21:19:49	2017-06-17 02:58:56
R1-1710455	Signaling of DMRS ports for SU/MU-MIMO	Huawei, HiSilicon	available	2017-06-14 21:19:49	2017-06-17 02:56:42
R1-1710456	DMRS design for URLLC	Huawei, HiSilicon	available	2017-06-14 21:19:49	2017-06-17 02:56:42
R1-1710457	Considerations on UE-specific RS Sequence Design	Huawei, HiSilicon	available	2017-06-14 21:19:49	2017-06-17 02:56:42
R1-1710458	Discussion on UL DMRS power boosting	Huawei, HiSilicon	available	2017-06-14 21:19:49	2017-06-17 02:56:42
R1-1710459	Discussion on UL SRS transmission power	Huawei, HiSilicon	available	2017-06-14 21:19:49	2017-06-17 02:56:42
R1-1710460	Resource sharing between NR-PDCCH and data	Huawei, HiSilicon	available	2017-06-14 21:19:49	2017-06-17 02:56:42
R1-1710461	PUCCH resource allocation for HARQ-ACK and SR	Huawei, HiSilicon	available	2017-06-14 21:19:49	2017-06-17 02:56:42
R1-1710462	On HARQ-ACK multiplexing and/or bundling	Huawei, HiSilicon	available	2017-06-14 21:19:49	2017-06-17 02:56:42
R1-1710463	Transmit diversity for PUCCH	Huawei, HiSilicon	available	2017-06-14 21:19:49	2017-06-17 02:56:42
R1-1710464	Multiplexing of PUCCH and PUSCH	Huawei, HiSilicon	available	2017-06-14 21:19:49	2017-06-17 02:56:42
R1-1710465	On uplink data scheduling	Huawei, HiSilicon	available	2017-06-14 21:19:49	2017-06-17 02:52:07
R1-1710466	Consideration on subsequent transmission after pre-emption	Huawei, HiSilicon	available	2017-06-14 21:19:49	2017-06-17 02:58:56
R1-1710467	DCI design for URLLC	Huawei, HiSilicon	available	2017-06-14 21:19:50	2017-06-17 02:58:56
R1-1710468	Discussion on Multi-TRP cooperation for URLLC	Huawei, HiSilicon	available	2017-06-14 21:19:50	2017-06-17 02:58:56
R1-1710469	Support of URLLC for TDD	Huawei, HiSilicon	available	2017-06-14 21:19:50	2017-06-17 02:58:56
R1-1710470	Necessity of multiple sequence for Polar code	Huawei, HiSilicon	noted	2017-06-14 21:19:50	2017-06-20 05:17:55
R1-1710471	CRC polynomial for L1 control information and MIB	Huawei, HiSilicon	available	2017-06-14 21:19:50	2017-06-20 05:17:55
R1-1710472	Benefits of implicit soft combining for PBCH by Polar code construction	Huawei, HiSilicon	revised	2017-06-14 21:19:50	2017-06-20 05:17:55
R1-1710473	Network-based mechanism for millimeter-wave link recovery	Huawei, HiSilicon	available	2017-06-14 21:19:50	2017-06-17 02:58:56
R1-1710474	Further consideration on pi/2 BPSK with FDSS	Huawei, HiSilicon	available	2017-06-14 21:19:50	2017-06-17 02:58:56
R1-1710475	Discussion on PHR calculation	Huawei, HiSilicon	available	2017-06-14 21:19:50	2017-06-17 02:56:42
R1-1710476	UE behavior related to group-common PDCCH	Huawei, HiSilicon	available	2017-06-14 21:19:50	2017-06-17 02:56:42
R1-1710477	Discussion on other system information delivery	Huawei, HiSilicon	available	2017-06-14 21:19:50	2017-06-17 02:52:07
R1-1710478	RACH procedures and resource configuration	Huawei, HiSilicon	available	2017-06-14 21:19:50	2017-06-17 02:52:07
R1-1710479	Evaluation of PM based early termination for Polar code	Huawei, HiSilicon	available	2017-06-14 21:19:50	2017-06-20 05:17:55
R1-1710480	CRC Attachment for Code Block Group	Ericsson	available	2017-06-14 22:27:05	2017-06-20 07:06:34
R1-1710481	Study of Number of CRC Bits for Code Blocks	Ericsson	available	2017-06-14 22:27:05	2017-06-20 07:06:34
R1-1710482	Study of Number of CRC Bits for Small Transport Blocks	Ericsson	noted	2017-06-14 22:27:05	2017-06-20 07:06:34
R1-1710483	LDPC Code Performance at High Code Rate	Ericsson	available	2017-06-14 22:27:05	2017-06-20 07:06:34
R1-1710484	Bit Ordering for Circular Buffer of LDPC Codes	Ericsson	noted	2017-06-14 22:27:05	2017-06-20 07:06:34
R1-1710485	Rate Matching for NR LDPC codes	Ericsson	noted	2017-06-14 22:27:05	2017-06-20 07:06:34
R1-1710486	Throughput Requirements of LDPC Decoder	Ericsson	available	2017-06-14 22:27:05	2017-06-20 07:06:34
R1-1710487	LDPC Code Design for Base Graph #1	Ericsson	available	2017-06-14 22:27:05	2017-06-27 15:17:52
R1-1710488	LDPC Code Design for Base Graph #2	Ericsson	available	2017-06-14 22:27:05	2017-06-27 15:17:52
R1-1710489	Application of Two Base Graphs for NR Data Channels	Ericsson	available	2017-06-14 22:27:05	2017-06-20 07:06:34
R1-1710490	CRC-based Polar Code Construction	Ericsson	noted	2017-06-14 22:27:05	2017-06-20 07:06:34

R1-1710491	Study of Early Termination for DCI	Ericsson	available	2017-06-14 22:27:05	2017-06-20 07:06:34
R1-1710492	Information Sequence Design for Polar Codes	Ericsson	withdrawn	2017-06-14 22:27:05	
R1-1710493	On Bit Mapping Design for Polar Codes	Ericsson	revised	2017-06-14 22:27:05	2017-06-20 07:06:34
R1-1710494	Impact of Puncturing on Bit-channel Capacities	Ericsson	revised	2017-06-14 22:27:05	2017-06-20 07:06:34
R1-1710495	Polar Code Performance in Fading Channel	Ericsson	revised	2017-06-14 22:27:05	2017-06-20 07:06:34
R1-1710496	Thresholds for Mother Code Size Determination	Ericsson	available	2017-06-14 22:27:05	2017-06-20 07:06:35
R1-1710497	Study of Number of CRC Bits for PBCH	Ericsson	available	2017-06-14 22:27:05	2017-06-20 07:06:35
R1-1710498	Polar Code Design for NR-PBCH	Ericsson	available	2017-06-14 22:27:05	2017-06-20 07:06:35
R1-1710499	LDPC Code Performance for High Reliability Use Cases	Ericsson	available	2017-06-14 22:27:05	2017-06-20 07:06:34
R1-1710500	Draft Reply LS on reading time index indication for RRM measurements	Intel Corporation	noted	2017-06-15 00:22:53	2017-06-17 06:19:32
R1-1710501	NR PSS and SSS design	Intel Corporation	noted	2017-06-15 00:22:53	2017-06-17 06:19:32
R1-1710502	SS Burst Set Composition	Intel Corporation	available	2017-06-15 00:22:54	2017-06-17 06:19:32
R1-1710503	Time Index Signaling for SS Blocks	Intel Corporation	revised	2017-06-15 00:22:54	2017-06-20 04:44:09
R1-1710504	SS Block(s) in Wideband Operation	Intel Corporation	available	2017-06-15 00:22:54	2017-06-17 10:18:33
R1-1710505	NR PBCH Design	Intel Corporation	available	2017-06-15 00:22:54	2017-06-17 06:19:31
R1-1710506	SS Block Composition	Intel Corporation	revised	2017-06-15 00:22:54	2017-06-20 04:44:09
R1-1710507	DMRS Sequence for NR PBCH	Intel Corporation	available	2017-06-15 00:22:54	2017-06-17 08:09:28
R1-1710508	RMSI Delivery Mechanisms	Intel Corporation	available	2017-06-15 00:22:54	2017-06-17 06:19:31
R1-1710509	NR Paging Design	Intel Corporation	available	2017-06-15 00:22:54	2017-06-17 06:19:31
R1-1710510	NR PRACH Preamble design	Intel Corporation	available	2017-06-15 00:22:54	2017-06-17 06:19:31
R1-1710511	Discussions on PRACH Capacity	Intel Corporation	available	2017-06-15 00:22:54	2017-06-27 15:17:52
R1-1710512	PRACH Power ramping procedure	Intel Corporation	available	2017-06-15 00:22:54	2017-06-17 06:19:31
R1-1710513	4-step PRACH Procedures	Intel Corporation	available	2017-06-15 00:22:54	2017-06-17 06:19:31
R1-1710514	SS Block based RRM Measurements	Intel Corporation	available	2017-06-15 00:22:54	2017-06-17 07:10:49
R1-1710515	CSI-RS based RRM Measurements	Intel Corporation	available	2017-06-15 00:22:54	2017-06-17 07:10:49
R1-1710516	NR Radio Link Monitoring	Intel Corporation	available	2017-06-15 00:22:54	2017-06-17 06:19:31
R1-1710517	Remaining details on CW to MIMO layer mapping	Intel Corporation	noted	2017-06-15 00:22:54	2017-06-17 06:19:31
R1-1710518	On codebook based UL tansmission	Intel Corporation	noted	2017-06-15 00:22:54	2017-06-17 06:19:31
R1-1710519	On non-codebook based UL transmission	Intel Corporation	available	2017-06-15 00:22:54	2017-06-17 06:19:31
R1-1710520	On diversity based UL transmission	Intel Corporation	available	2017-06-15 00:22:54	2017-06-17 06:19:31
R1-1710521	On PRB bundling for DL	Intel Corporation	available	2017-06-15 00:22:54	2017-06-17 06:19:31
R1-1710522	Discussion on uplink multi-panel and multi-TRP operation	Intel Corporation	noted	2017-06-15 00:22:54	2017-06-17 06:19:31
R1-1710523	Support of downlink NC-JT in NR	Intel Corporation	available	2017-06-15 00:22:54	2017-06-17 06:19:31
R1-1710524	Rate matching for NR	Intel Corporation	available	2017-06-15 00:22:54	2017-06-17 06:19:31
R1-1710525	Details for UL Beam Management	Intel Corporation	available	2017-06-15 00:22:54	2017-06-17 06:19:31
R1-1710526	Details for DL Beam Management	Intel Corporation	available	2017-06-15 00:22:54	2017-06-17 06:19:31
R1-1710527	Discussion for Mechanism to Recover from Beam Failure	Intel Corporation	noted	2017-06-15 00:22:54	2017-06-17 06:19:31
R1-1710528	On Timing Advance for multi-beam operation	Intel Corporation	available	2017-06-15 00:22:54	2017-06-17 06:19:31
R1-1710529	On NR CSI framework	Intel Corporation	available	2017-06-15 00:22:54	2017-06-17 06:19:31
R1-1710530	On Details of CSI acquisition	Intel Corporation	noted	2017-06-15 00:22:54	2017-06-17 06:19:31
R1-1710531	On multiplexing of different RS types	Intel Corporation	available	2017-06-15 00:22:54	2017-06-17 06:19:31
R1-1710532	On CSI-RS for beam management	Intel Corporation	noted	2017-06-15 00:22:54	2017-06-17 06:19:31
R1-1710533	On CSI-RS for CSI acquisition	Intel Corporation	available	2017-06-15 00:22:54	2017-06-17 06:19:31

R1-1710534	On the remaining details of DM-RS design	Intel Corporation	available	2017-06-15 00:22:54	2017-06-17 06:19:31
R1-1710535	On PT-RS for CP-OFDM	Intel Corporation	noted	2017-06-15 00:22:54	2017-06-17 06:19:31
R1-1710536	On PT-RS for DFT-s-OFDM	Intel Corporation	noted	2017-06-15 00:22:54	2017-06-17 06:19:31
R1-1710537	Discussion on SRS for NR	Intel Corporation	available	2017-06-15 00:22:54	2017-06-17 06:19:31
R1-1710538	Discussion on TRS	Intel Corporation	available	2017-06-15 00:22:54	2017-06-17 06:19:31
R1-1710539	On QCL for different BW parts and other QCL details	Intel Corporation	noted	2017-06-15 00:22:54	2017-06-17 06:19:31
R1-1710540	Calibration results for Phase 2 NR MIMO system level calibration	Intel Corporation	available	2017-06-15 00:22:54	2017-06-17 06:19:31
R1-1710541	NR PDCCH physical structure	Intel Corporation	noted	2017-06-15 00:22:54	2017-06-17 08:50:57
R1-1710542	On DM-RS design for NR PDCCH	Intel Corporation	available	2017-06-15 00:22:54	2017-06-17 06:19:31
R1-1710543	CORESETs for NR PDCCH	Intel Corporation	available	2017-06-15 00:22:54	2017-06-17 06:19:31
R1-1710544	NR PDCCH: Search spaces and monitoring behavior	Intel Corporation	available	2017-06-15 00:22:54	2017-06-17 06:19:31
R1-1710545	Multi-beam operation for NR PDCCH	Intel Corporation	available	2017-06-15 00:22:54	2017-06-17 06:19:31
R1-1710546	Dynamic resource sharing between control and data	Intel Corporation	available	2017-06-15 00:22:54	2017-06-17 06:19:31
R1-1710547	Group-common PDCCH: Physical structure	Intel Corporation	available	2017-06-15 00:22:54	2017-06-17 06:24:59
R1-1710548	Group-common PDCCH: Contents	Intel Corporation	available	2017-06-15 00:22:54	2017-06-17 06:24:59
R1-1710549	Group-common PDCCH: UE behavior	Intel Corporation	available	2017-06-15 00:22:54	2017-06-17 06:24:59
R1-1710550	Satisfying ultra-reliability targets for NR PDCCH	Intel Corporation	available	2017-06-15 00:22:54	2017-06-17 06:19:31
R1-1710551	Performance of short PUCCH format for 1~2 bits HARQ-ACK	Intel Corporation	available	2017-06-15 00:22:54	2017-06-17 06:19:31
R1-1710552	2-symbol NR PUCCH	Intel Corporation	available	2017-06-15 00:22:54	2017-06-17 06:19:31
R1-1710553	Structure of 1~2 bits HARQ-ACK long PUCCH with TDM DMRS	Intel Corporation	available	2017-06-15 00:22:54	2017-06-17 06:19:31
R1-1710554	Long PUCCH for moderate and large payload	Intel Corporation	available	2017-06-15 00:22:54	2017-06-17 06:19:31
R1-1710555	Long PUCCH over multiple slots	Intel Corporation	available	2017-06-15 00:22:54	2017-06-17 09:31:05
R1-1710556	Transmit diversity for PUCCH	Intel Corporation	available	2017-06-15 00:22:54	2017-06-17 06:19:31
R1-1710557	Resource allocation for PUCCH during initial access	Intel Corporation	available	2017-06-15 00:22:55	2017-06-17 06:19:32
R1-1710558	UCI multiplexing onto PUSCH	Intel Corporation	available	2017-06-15 00:22:55	2017-06-17 06:19:32
R1-1710559	PUCCH-PUSCH multiplexing	Intel Corporation	available	2017-06-15 00:22:55	2017-06-17 06:19:32
R1-1710560	On UL control channel design aspects for URLLC	Intel Corporation	available	2017-06-15 00:22:55	2017-06-17 06:19:32
R1-1710561	Configurations of various long PUCCH lengths	Intel Corporation	available	2017-06-15 00:22:55	2017-06-17 06:19:32
R1-1710562	Short PUCCH formats for 1~2 bits UCI	Intel Corporation	available	2017-06-15 00:22:55	2017-06-17 06:19:32
R1-1710563	Cyclic shift assignment and CM for FDM DMRS and UCI	Intel Corporation	available	2017-06-15 00:22:55	2017-06-17 06:19:32
R1-1710564	Short UL control channel early in a slot	Intel Corporation	available	2017-06-15 00:22:55	2017-06-17 06:19:32
R1-1710565	DL/UL data frequency-domain resource allocation	Intel Corporation	available	2017-06-15 00:22:55	2017-06-17 09:35:22
R1-1710566	Time-domain resource allocation for DL and UL data	Intel Corporation	available	2017-06-15 00:22:55	2017-06-17 06:24:59
R1-1710567	SR configuration and UL data scheduling	Intel Corporation	available	2017-06-15 00:22:55	2017-06-17 06:19:32
R1-1710568	UL grant-free transmissions: Resource configuration	Intel Corporation	available	2017-06-15 00:22:55	2017-06-17 06:19:32
R1-1710569	On CBG construction	Intel Corporation	available	2017-06-15 00:22:55	2017-06-17 06:24:59
R1-1710570	DCI design and scheduling of CBG-based (re)transmissions	Intel Corporation	available	2017-06-15 00:22:55	2017-06-17 06:19:32
R1-1710571	HARQ-ACK feedback for CBG-based (re)transmissions	Intel Corporation	available	2017-06-15 00:22:55	2017-06-17 06:19:32
R1-1710572	HARQ-ACK multiplexing and bundling	Intel Corporation	available	2017-06-15 00:22:55	2017-06-17 06:19:32
R1-1710573	On HARQ processes and HARQ RTT	Intel Corporation	available	2017-06-15 00:22:55	2017-06-17 06:19:32
R1-1710574	Soft-buffer requirements in NR	Intel Corporation	available	2017-06-15 00:22:55	2017-06-17 06:19:32
R1-1710575	Remaining details of DL pre-emption indication	Intel Corporation	available	2017-06-15 00:22:55	2017-06-17 06:19:32

R1-1710576	Multiplexing of UL transmissions with different data durations and latency requirements	Intel Corporation	available	2017-06-15 00:22:55	2017-06-17 06:19:32
R1-1710577	On link adaptation enhancements to support URLLC	Intel Corporation	available	2017-06-15 00:22:55	2017-06-17 06:19:32
R1-1710578	Scheduling and UCI feedback for carrier aggregation	Intel Corporation	available	2017-06-15 00:22:55	2017-06-17 06:24:59
R1-1710579	On SRS fast switching	Intel Corporation	available	2017-06-15 00:22:55	2017-06-17 07:00:10
R1-1710580	On Dual Connectivity for NR	Intel Corporation	available	2017-06-15 00:22:55	2017-06-17 06:24:59
R1-1710581	Details on cross-link interference measurement	Intel Corporation	noted	2017-06-15 00:22:55	2017-06-17 06:19:32
R1-1710582	On RS transmission location for cross-link interference measurement for NR duplex flexibility	Intel Corporation	available	2017-06-15 00:22:55	2017-06-17 06:19:32
R1-1710583	Open issues for wider bandwidth operations	Intel Corporation	available	2017-06-15 00:22:55	2017-06-17 06:19:32
R1-1710584	Open issues for LTE-NR coexistence	Intel Corporation	noted	2017-06-15 00:22:55	2017-06-17 06:19:32
R1-1710585	Power sharing mechanism for NR dual connectivity	Intel Corporation	available	2017-06-15 00:22:55	2017-06-17 06:24:59
R1-1710586	PUSCH and PUCCH power control	Intel Corporation	available	2017-06-15 00:22:55	2017-06-17 06:19:32
R1-1710587	Polar code construction for NR control channel	NEC Corporation	available	2017-06-15 00:57:03	2017-06-20 03:41:45
R1-1710588	Results for short PUCCH for UCI of up to 2 bits	IITH	available	2017-06-15 01:02:02	2017-06-16 22:04:30
R1-1710589	Further discussion on pre-DFT multiplexing for short PUCCH	IITH	available	2017-06-15 01:04:00	2017-06-16 22:22:45
R1-1710590	Views on long-duration PUCCH	IITH	available	2017-06-15 01:06:19	2017-06-16 22:36:26
R1-1710591	Sequence design evaluation for rate-matched polar codes	NEC Corporation	available	2017-06-15 01:07:14	2017-06-20 03:42:25
R1-1710592	Next steps for pi/2 BPSK with spectrum shaping	IITH	available	2017-06-15 01:10:10	2017-06-16 21:25:44
R1-1710593	Discussion on CBG grouping	Guangdong OPPO Mobile Telecom.	available	2017-06-15 01:13:24	2017-06-16 10:20:33
R1-1710594	On codeword to RE mapping scheme	Lenovo, Motorola Mobility	available	2017-06-15 02:53:58	2017-06-16 18:49:37
R1-1710595	Discussion of RS for DL beam management	Lenovo, Motorola Mobility	available	2017-06-15 02:53:58	2017-06-16 18:49:37
R1-1710596	Discussion of beam recovery procedure	Lenovo, Motorola Mobility	available	2017-06-15 02:53:58	2017-06-16 18:49:37
R1-1710597	Enhanced SR carried in UL control channel	Lenovo, Motorola Mobility	available	2017-06-15 02:53:58	2017-06-16 18:49:37
R1-1710598	Long PUCCH design for UCI of up to 2 bits	Lenovo, Motorola Mobility	available	2017-06-15 02:53:58	2017-06-16 18:49:37
R1-1710599	Long PUCCH design for UCI of more than 2 bits	Lenovo, Motorola Mobility	available	2017-06-15 02:53:58	2017-06-16 18:49:37
R1-1710600	Long PUCCH over multiple slots	Lenovo, Motorola Mobility	available	2017-06-15 02:53:58	2017-06-16 18:49:37
R1-1710601	UL grant-free transmission for URLLC	Lenovo, Motorola Mobility	available	2017-06-15 02:53:58	2017-06-16 18:49:37
R1-1710602	CBG construction for CBG-based retransmission	Lenovo, Motorola Mobility	available	2017-06-15 02:53:58	2017-06-16 18:49:37
R1-1710603	DL control signalling for CBG-based retransmission	Lenovo, Motorola Mobility	available	2017-06-15 02:53:58	2017-06-16 18:49:37
R1-1710604	UL HARQ-ACK feedback for CBG-based retransmission	Lenovo, Motorola Mobility	available	2017-06-15 02:53:58	2017-06-16 18:49:37

R1-1710605	HARQ-ACK codebook design for CBG-based transmission	Lenovo, Motorola Mobility	available	2017-06-15 02:53:58	2017-06-16 18:49:37
R1-1710606	On eMBB/URLLC multiplexing for uplink transmission	Lenovo, Motorola Mobility	available	2017-06-15 02:53:58	2017-06-16 18:49:37
R1-1710607	On DM-RS for NR	Intel Corporation	available	2017-06-15 03:58:48	2017-06-17 06:19:32
R1-1710608	Delivery of remaining minimum system information	ETRI	available	2017-06-15 04:47:45	2017-06-17 02:52:24
R1-1710609	Delivery of other system information	ETRI	available	2017-06-15 04:47:45	2017-06-17 02:52:24
R1-1710610	NR-PRACH for various use cases	ETRI	available	2017-06-15 04:47:45	2017-06-17 02:52:24
R1-1710611	Discussion on codeword mapping	ETRI	available	2017-06-15 04:47:45	2017-06-17 02:52:24
R1-1710612	Discussion on downlink DMRS design	ETRI	available	2017-06-15 04:47:46	2017-06-17 02:52:24
R1-1710613	Discussion on uplink DMRS design	ETRI	available	2017-06-15 04:47:46	2017-06-17 02:52:24
R1-1710614	NR-PDCCH mapping structure and REG bundle size	ETRI	available	2017-06-15 04:47:46	2017-06-17 02:52:24
R1-1710615	DMRS design for NR-PDCCH	ETRI	available	2017-06-15 04:47:46	2017-06-17 02:52:24
R1-1710616	NR-PDCCH for broadcast information delivery	ETRI	available	2017-06-15 04:47:46	2017-06-17 02:52:24
R1-1710617	Discussion on dynamic indication of PDSCH start symbol	ETRI	available	2017-06-15 04:47:46	2017-06-17 02:52:24
R1-1710618	Short-PUCCH for UCI of up to 2 bits	ETRI	available	2017-06-15 04:47:46	2017-06-17 02:52:24
R1-1710619	Short-PUCCH for UCI of more than 2 bits	ETRI	available	2017-06-15 04:47:46	2017-06-17 02:52:24
R1-1710620	Long-PUCCH over multiple slots	ETRI	available	2017-06-15 04:47:46	2017-06-17 02:52:24
R1-1710621	Resource allocation and transmission scheme for URLLC grant-free transmission	ETRI	available	2017-06-15 04:47:46	2017-06-17 02:52:24
R1-1710622	UE bandwidth configuration during initial access	ETRI	available	2017-06-15 04:47:46	2017-06-17 02:52:24
R1-1710623	Remaining details on SS sequence design	Samsung	available	2017-06-15 08:06:47	2017-06-16 20:00:34
R1-1710624	SS burst set composition	Samsung	revised	2017-06-15 08:06:47	2017-06-17 01:00:30
R1-1710625	Timing indication based on SS block	Samsung	revised	2017-06-15 08:06:47	2017-06-20 04:47:54
R1-1710626	Remaining details on mulitple SS block transmissions in wideband CC	Samsung	available	2017-06-15 08:06:47	2017-06-16 16:24:13
R1-1710627	NR-PBCH contents and payload size	Samsung	available	2017-06-15 08:06:47	2017-06-16 21:03:18
R1-1710628	NR-PBCH RE mapping and SS block composition	Samsung	noted	2017-06-15 08:06:47	2017-06-20 04:50:07
R1-1710629	Sequence design of DMRS for NR-PBCH	Samsung	available	2017-06-15 08:06:47	2017-06-16 20:00:34
R1-1710630	Remaining minimum system information delivery	Samsung	available	2017-06-15 08:06:47	2017-06-16 12:30:24
R1-1710631	Other system information delivery	Samsung	available	2017-06-15 08:06:47	2017-06-16 12:30:24
R1-1710632	Paging design	Samsung	available	2017-06-15 08:06:47	2017-06-17 00:42:26
R1-1710633	PRACH preamble format details for long/short sequence length	Samsung	available	2017-06-15 08:06:47	2017-06-16 07:58:22
R1-1710634	PRACH preamble format details for capacity enhancement and beam management	Samsung	available	2017-06-15 08:06:47	2017-06-16 10:51:50
R1-1710635	Power ramping and power control during RA procedure	Samsung	available	2017-06-15 08:06:47	2017-06-16 10:51:50
R1-1710636	4-step RACH procedure	Samsung	available	2017-06-15 08:06:47	2017-06-16 10:51:50
R1-1710637	Measurement based on SS block	Samsung	noted	2017-06-15 08:06:47	2017-06-16 19:59:42
R1-1710638	Measurement based on CSI-RS for L3 mobility	Samsung	revised	2017-06-15 08:06:47	2017-06-16 19:59:42
R1-1710639	Radio link monitoring	Samsung	available	2017-06-15 08:06:47	2017-06-16 19:59:42
R1-1710640	Discussion on SS periodicity and PBCH TTI	Samsung	available	2017-06-15 08:06:47	2017-06-17 01:50:11
R1-1710641	Considerations on PRACH design in high-mobility scenario	Samsung	available	2017-06-15 08:06:47	2017-06-16 10:51:50
R1-1710642	Finalizing Layer Mapping	Samsung	noted	2017-06-15 08:06:47	2017-06-16 21:23:17

R1-1710643	Codebook-Based UL Transmission	Samsung	noted	2017-06-15 08:06:47	2017-06-16 20:15:10
R1-1710644	Discussion on Non-Codebook-Based UL Transmission	Samsung	noted	2017-06-15 08:06:47	2017-06-16 21:23:17
R1-1710645	Diversity transmission for UL	Samsung	available	2017-06-15 08:06:47	2017-06-16 06:58:08
R1-1710646	PRB bundling for NR DMRS	Samsung	available	2017-06-15 08:06:47	2017-06-16 06:58:08
R1-1710647	Discussions on NR DL network coordination	Samsung	available	2017-06-15 08:06:47	2017-06-16 07:44:43
R1-1710648	Discussions on NR UL multi-panel/multi-TRP	Samsung	noted	2017-06-15 08:06:47	2017-06-16 07:44:43
R1-1710649	On PDSCH rate matching for NR	Samsung	noted	2017-06-15 08:06:48	2017-06-16 19:59:42
R1-1710650	Discussion on transmission parameter sets	Samsung	available	2017-06-15 08:06:48	2017-06-16 06:58:08
R1-1710651	Discussion of number of PDSCHs in NR-CoMP	Samsung	available	2017-06-15 08:06:48	2017-06-16 19:15:24
R1-1710652	Multi-TA procedures for Multi-TRP	Samsung	available	2017-06-15 08:06:48	2017-06-16 23:45:41
R1-1710653	UL beam management	Samsung	available	2017-06-15 08:06:48	2017-06-16 21:31:21
R1-1710654	DL beam management for NR	Samsung	noted	2017-06-15 08:06:48	2017-06-16 22:14:27
R1-1710655	Beam failure recovery	Samsung	available	2017-06-15 08:06:48	2017-06-17 01:50:11
R1-1710656	Measurement and reporting for beam management	Samsung	available	2017-06-15 08:06:48	2017-06-16 21:31:21
R1-1710657	Discussion on Group based reporting	Samsung	available	2017-06-15 08:06:48	2017-06-16 21:31:21
R1-1710658	Discusssion on Tx beam grouping configuration	Samsung	available	2017-06-15 08:06:48	2017-06-16 21:31:22
R1-1710659	Discussion on beam indication for PDSCH	Samsung	available	2017-06-15 08:06:48	2017-06-16 21:31:22
R1-1710660	L1 RSRP reporting for beam management	Samsung	available	2017-06-15 08:06:48	2017-06-16 06:58:08
R1-1710661	L1-RSRP measurement duration	Samsung	available	2017-06-15 08:06:48	2017-06-16 22:14:27
R1-1710662	On SS-block based beam management	Samsung	noted	2017-06-15 08:06:48	2017-06-16 22:14:27
R1-1710663	DL beam management configuration	Samsung	available	2017-06-15 08:06:48	2017-06-16 22:14:27
R1-1710664	QCL associations for beam management RS	Samsung	available	2017-06-15 08:06:48	2017-06-16 22:14:27
R1-1710665	Aperiodic BSI reporting	Samsung	available	2017-06-15 08:06:48	2017-06-16 23:45:41
R1-1710666	Beam management for PDCCH	Samsung	revised	2017-06-15 08:06:48	2017-06-16 00:17:37
R1-1710667	CSI Acquisition and Beam Management Framework	Samsung	available	2017-06-15 08:06:48	2017-06-16 21:23:17
R1-1710668	Discussions on CSI measurements and reporting for NR	Samsung	available	2017-06-15 08:06:48	2017-06-16 06:58:08
R1-1710669	CSI Reporting for Reciprocity Operation	Samsung	noted	2017-06-15 08:06:48	2017-06-16 21:23:17
R1-1710670	Remaining details of Type I and Type II CSI codebooks	Samsung	available	2017-06-15 08:06:48	2017-06-16 20:15:10
R1-1710671	CSI support for transparent precoder cycling	Samsung	available	2017-06-15 08:06:48	2017-06-16 06:58:08
R1-1710672	CSI parameters and multiplexing	Samsung	noted	2017-06-15 08:06:48	2017-06-16 21:23:17
R1-1710673	Differential reporting of Type II CSI	Samsung	available	2017-06-15 08:06:48	2017-06-16 20:15:10
R1-1710674	On higher rank (3 and 4) Type II CSI	Samsung	available	2017-06-15 08:06:48	2017-06-16 20:15:10
R1-1710675	Discussion on CSI-RS Resource Activation	Samsung	available	2017-06-15 08:06:48	2017-06-16 21:23:17
R1-1710676	Discussions on channel and interference measurements for NR	Samsung	available	2017-06-15 08:06:48	2017-06-16 06:58:08
R1-1710677	Discussions on CSI Feedback Signalling Overhead Reduction	Samsung	available	2017-06-15 08:06:48	2017-06-16 18:47:31
R1-1710678	Discussions on multiplexing of different types of RSs for DL	Samsung	noted	2017-06-15 08:06:48	2017-06-16 07:44:43
R1-1710679	Discussions on multiplexing of different types of RSs for UL	Samsung	available	2017-06-15 08:06:48	2017-06-16 07:44:43
R1-1710680	Discussions on CSI-RS design for NR MIMO	Samsung	available	2017-06-15 08:06:48	2017-06-16 07:44:43
R1-1710681	CSI-RS for beam management	Samsung	available	2017-06-15 08:06:48	2017-06-16 10:13:46
R1-1710682	Discussion on DL DMRS design for NR	Samsung	available	2017-06-15 08:06:48	2017-06-16 07:25:09
R1-1710683	Evaluation results on DL DMRS for NR	Samsung	available	2017-06-15 08:06:48	2017-06-16 07:46:21
R1-1710684	Discussion on UL DMRS design for NR	Samsung	available	2017-06-15 08:06:48	2017-06-16 07:46:21
R1-1710685	Evaluation results on UL DMRS for NR	Samsung	available	2017-06-15 08:06:48	2017-06-16 07:46:21

R1-1710686	On DL PTRS design	Samsung	available	2017-06-15 08:06:48	2017-06-16 07:58:22
R1-1710687	On UL PTRS for DFT-s-OFDM	Samsung	available	2017-06-15 08:06:48	2017-06-16 07:58:22
R1-1710688	SRS design for NR	Samsung	available	2017-06-15 08:06:48	2017-06-16 21:31:22
R1-1710689	Discussions on fine time/frequency tracking for NR	Samsung	available	2017-06-15 08:06:48	2017-06-16 07:44:43
R1-1710690	On QCL for NR	Samsung	available	2017-06-15 08:06:48	2017-06-16 19:59:42
R1-1710691	Resource Mapping for PDCCH	Samsung	available	2017-06-15 08:06:48	2017-06-16 12:30:24
R1-1710692	DMRS Structure for PDCCH	Samsung	revised	2017-06-15 08:06:49	2017-06-16 12:30:24
R1-1710693	CORESET Configurations	Samsung	available	2017-06-15 08:06:49	2017-06-17 01:26:31
R1-1710694	Search Space Design	Samsung	available	2017-06-15 08:06:49	2017-06-16 12:30:24
R1-1710695	Multibeam Transmission for PDCCH	Samsung	available	2017-06-15 08:06:49	2017-06-16 12:30:24
R1-1710696	Multiplexing NR-PDCCH and PDSCH	Samsung	available	2017-06-15 08:06:49	2017-06-16 12:30:24
R1-1710697	UE-Group Common PDCCH Structure	Samsung	available	2017-06-15 08:06:49	2017-06-17 01:26:31
R1-1710698	Functionalities of UE-Common PDCCH	Samsung	available	2017-06-15 08:06:49	2017-06-17 01:26:31
R1-1710699	UE Behavior for UE-Group Common PDCCH Detection	Samsung	available	2017-06-15 08:06:49	2017-06-17 01:26:31
R1-1710700	PDCCH Design for URLLC	Samsung	available	2017-06-15 08:06:49	2017-06-16 07:17:15
R1-1710701	Transmit Diversity for PDCCH	Samsung	available	2017-06-15 08:06:49	2017-06-17 00:42:26
R1-1710702	Bandwidth Part Hopping for CORESETS	Samsung	available	2017-06-15 08:06:49	2017-06-17 01:26:31
R1-1710703	Short PUCCH for UCI of 1 or 2 Bits	Samsung	available	2017-06-15 08:06:49	2017-06-17 02:43:12
R1-1710704	Short PUCCH for UCI of more than 2 Bits	Samsung	available	2017-06-15 08:06:49	2017-06-17 02:43:12
R1-1710705	Long PUCCH for UCI of 1 or 2 Bits	Samsung	available	2017-06-15 08:06:49	2017-06-17 01:26:31
R1-1710706	Long PUCCH for UCI of more than 2 Bits	Samsung	available	2017-06-15 08:06:49	2017-06-17 01:26:31
R1-1710707	Multi-Slot Long PUCCH Transmission	Samsung	available	2017-06-15 08:06:49	2017-06-16 12:30:24
R1-1710708	Transmit Diversity for PUCCH	Samsung	available	2017-06-15 08:06:49	2017-06-17 02:43:12
R1-1710709	Resource Allocation for PUCCH with HARQ-ACK	Samsung	available	2017-06-15 08:06:49	2017-06-16 10:51:50
R1-1710710	On UCI Multiplexing in PUSCH	Samsung	available	2017-06-15 08:06:49	2017-06-17 01:26:31
R1-1710711	On Simultaneous PUSCH and PUCCH Transmissions	Samsung	available	2017-06-15 08:06:49	2017-06-17 01:26:31
R1-1710712	PUCCH Design for URLLC	Samsung	available	2017-06-15 08:06:49	2017-06-16 07:17:15
R1-1710713	Performance Results for Long PUCCH	Samsung	available	2017-06-15 08:06:49	2017-06-17 02:43:12
R1-1710714	Performance Results for UCI and Data Multiplexing	Samsung	available	2017-06-15 08:06:49	2017-06-17 02:43:12
R1-1710715	UE-Group CSI Reporting	Samsung	withdrawn	2017-06-15 08:06:49	
R1-1710716	Multiplexing PUSCH with Short PUCCH or SRS	Samsung	available	2017-06-15 08:06:49	2017-06-17 01:26:31
R1-1710717	BSI/CSI Transmission on PUCCH	Samsung	available	2017-06-15 08:06:49	2017-06-16 23:45:41
R1-1710718	DL/UL Frequency Resource Allocation	Samsung	available	2017-06-15 08:06:49	2017-06-17 00:42:26
R1-1710719	DL/UL Time Resource Allocation	Samsung	available	2017-06-15 08:06:49	2017-06-16 10:51:50
R1-1710720	Transport Block Size Determination	Samsung	available	2017-06-15 08:06:49	2017-06-16 07:36:57
R1-1710721	SR Transmission for Multiple Configurations	Samsung	available	2017-06-15 08:06:49	2017-06-16 07:39:43
R1-1710722	Procedures for Grant-Based UL Transmissions	Samsung	available	2017-06-15 08:06:49	2017-06-16 07:39:43
R1-1710723	Procedures for Grant-Free UL Transmissions	Samsung	available	2017-06-15 08:06:49	2017-06-16 07:39:43
R1-1710724	Grant-Free and Grant-Based UL Transmissions	Samsung	available	2017-06-15 08:06:49	2017-06-16 10:51:50
R1-1710725	CBG Construction	Samsung	available	2017-06-15 08:06:49	2017-06-16 07:36:57
R1-1710726	Scheduling for CBG Retransmissions	Samsung	available	2017-06-15 08:06:49	2017-06-16 10:51:50
R1-1710727	HARQ-ACK Feedback for CBG-Based Retransmissions	Samsung	available	2017-06-15 08:06:49	2017-06-16 10:51:50
R1-1710728	HARQ-ACK Feedback Timing	Samsung	available	2017-06-15 08:06:49	2017-06-16 10:51:50
R1-1710729	HARQ-ACK Codeword Determination	Samsung	available	2017-06-15 08:06:50	2017-06-16 10:51:50

R1-1710730	On Number of HARQ Processes and HARQ RTT	Samsung	available	2017-06-15 08:06:50	2017-06-16 07:36:57
R1-1710731	Soft Buffer Partitioning	Samsung	available	2017-06-15 08:06:50	2017-06-17 01:26:31
R1-1710732	Indication of Preempted Resources in DL	Samsung	available	2017-06-15 08:06:50	2017-06-16 07:17:15
R1-1710733	On Indication of Preempted Resources in UL	Samsung	available	2017-06-15 08:06:50	2017-06-16 12:30:24
R1-1710734	Scheduling/HARQ Procedures for URLLC	Samsung	available	2017-06-15 08:06:50	2017-06-16 07:17:16
R1-1710735	Remaining Aspects for Short Scheduling Durations	Samsung	available	2017-06-15 08:06:50	2017-06-16 07:39:43
R1-1710736	Triggered UCI Transmissions	Samsung	available	2017-06-15 08:06:50	2017-06-17 01:26:31
R1-1710737	DL Resource Allocation for Multiplexing Data with Different Transmissions Durations	Samsung	available	2017-06-15 08:06:50	2017-06-16 06:52:04
R1-1710738	Average User Plane Latency for Preemption based Multiplexing	Samsung	available	2017-06-15 08:06:50	2017-06-16 06:52:04
R1-1710739	Cross-Carrier Scheduling and HARQ-ACK Feedback	Samsung	available	2017-06-15 08:06:50	2017-06-17 01:26:31
R1-1710740	Fast Carrier Switcing for SRS Transmissions	Samsung	available	2017-06-15 08:06:50	2017-06-17 01:26:31
R1-1710741	DC for UE with Single UL Carrier Capability	Samsung	available	2017-06-15 08:06:50	2017-06-17 01:26:31
R1-1710742	CB segmentation on data channel	Samsung	noted	2017-06-15 08:06:50	2017-06-19 10:55:02
R1-1710743	UE operation for two different base graphs	Samsung	available	2017-06-15 08:06:50	2017-06-19 10:55:02
R1-1710744	LDPC Code for BG#1	Samsung	available	2017-06-15 08:06:50	2017-06-20 06:37:16
R1-1710745	LDPC Code for BG#2	Samsung	available	2017-06-15 08:06:50	2017-06-20 06:37:16
R1-1710746	Modulo Lifting for Length-Flexible QC LDPC Codes	Samsung	available	2017-06-15 08:06:50	2017-06-20 06:37:16
R1-1710747	Polar code construction	Samsung	available	2017-06-15 08:06:50	2017-06-20 06:37:16
R1-1710748	Scrambling for polar codes	Samsung	available	2017-06-15 08:06:50	2017-06-20 06:37:16
R1-1710749	Design of combined-and-Nested polar code sequences	Samsung	revised	2017-06-15 08:06:50	2017-06-20 06:37:16
R1-1710750	Design of unfied rate-matching for polar codes	Samsung	available	2017-06-15 08:06:50	2017-06-20 06:37:16
R1-1710751	Circular buffer management for polar code rate-matching	Samsung	noted	2017-06-15 08:06:50	2017-06-20 06:37:16
R1-1710752	Design of channel interleaver for polar codes	Samsung	available	2017-06-15 08:06:50	2017-06-20 06:37:16
R1-1710753	Modulation Schemes for NR	Samsung	available	2017-06-15 08:06:50	2017-06-17 02:01:01
R1-1710754	Cross-link Interference Management Based on UE Measurements	Samsung	available	2017-06-15 08:06:50	2017-06-16 22:14:27
R1-1710755	Cross-link Interference Management based on Coordinated Beamforming	Samsung	noted	2017-06-15 08:06:50	2017-06-16 07:54:11
R1-1710756	Performance Evaluation of Cross-Link Interference Management	Samsung	available	2017-06-15 08:06:50	2017-06-16 22:14:27
R1-1710757	Timing Alignment on Cross-Link for Dynamic TDD	Samsung	available	2017-06-15 08:06:50	2017-06-16 07:54:11
R1-1710758	Cross-Link Interference Management based on Power Control	Samsung	available	2017-06-15 08:06:50	2017-06-16 07:54:11
R1-1710759	Discussion on CLI Mitigation with Network Coordination	Samsung	available	2017-06-15 08:06:50	2017-06-16 19:15:24
R1-1710760	Interference Measurement Table and Beam Coordination	Samsung	available	2017-06-15 08:06:51	2017-06-16 08:10:01
R1-1710761	Wider Bandwidth Operations	Samsung	available	2017-06-15 08:06:51	2017-06-16 12:30:24
R1-1710762	LTE-NR coexistence for DL	Samsung	available	2017-06-15 08:06:51	2017-06-16 12:30:24
R1-1710763	LTE-NR coexistence for UL	Samsung	noted	2017-06-15 08:06:51	2017-06-16 09:36:38
R1-1710764	On UL Power Sharing for Multi-Cell Transmissions	Samsung	available	2017-06-15 08:06:51	2017-06-22 03:09:57
R1-1710765	Power Control Framework	Samsung	available	2017-06-15 08:06:51	2017-06-17 02:43:12
R1-1710766	On PHR Requirements and Calculation	Samsung	available	2017-06-15 08:06:51	2017-06-16 10:51:50
R1-1710767	ECP Aspects for 60kHz SCS	Samsung	available	2017-06-15 08:06:51	2017-06-17 02:43:12

R1-1710768	On PAPR of DMRS for p/2-BPSK DFT-s-OFDM with Spectrum Shaping	Samsung	available	2017-06-15 08:06:51	2017-06-17 02:01:01
R1-1710769	RACH Aspects for CA and DC	Samsung	available	2017-06-15 08:06:51	2017-06-16 13:47:05
R1-1710770	Discussion on Polar code construction	Spreadtrum Communications	available	2017-06-15 08:42:47	2017-06-19 14:13:21
R1-1710771	Discussions on UE-to-UE interference measurement and report	Panasonic	noted	2017-06-15 09:25:24	2017-06-16 09:22:06
R1-1710772	Discussions on intended DL/UL direction configuration via Xn signalling	Panasonic	available	2017-06-15 09:25:24	2017-06-16 09:22:06
R1-1710773	CORESET configuration for RMSI scheduling	CMCC	available	2017-06-15 09:46:37	2017-06-17 02:39:22
R1-1710774	Discussion on RACH configuration	CMCC	available	2017-06-15 09:46:37	2017-06-17 02:39:22
R1-1710775	Discussion on RRM measurement on SS blocks	CMCC	withdrawn	2017-06-15 09:46:37	
R1-1710776	Comparisons on Beam Reporting in NR	CMCC	available	2017-06-15 09:46:37	2017-06-17 02:39:22
R1-1710777	Discussion on PT-RS design	CMCC	available	2017-06-15 09:46:37	2017-06-17 02:39:22
R1-1710778	On DMRS Design for NR-PDCCH	CMCC	available	2017-06-15 09:46:37	2017-06-17 02:39:22
R1-1710779	Discussion on CORESET duration	CMCC	available	2017-06-15 09:46:37	2017-06-17 02:39:22
R1-1710780	Discussion on NR-PDCCH search space design	CMCC	available	2017-06-15 09:46:37	2017-06-17 02:39:22
R1-1710781	UE behaviour related to dynamic and semi-static configured resources	CMCC	available	2017-06-15 09:46:37	2017-06-17 02:39:22
R1-1710782	Discussion on subband-based PUCCH resource allocation and indication	CMCC	available	2017-06-15 09:46:37	2017-06-17 02:39:22
R1-1710783	Discussion on timing design for semi-static DL/UL assignment	CMCC	available	2017-06-15 09:46:37	2017-06-17 02:39:22
R1-1710784	Discussion on UE-to-UE cross-link interference management	CMCC	noted	2017-06-15 09:46:37	2017-06-17 02:39:22
R1-1710785	Discussion on the change of SS block frequency position	CMCC	available	2017-06-15 09:46:37	2017-06-17 02:39:22
R1-1710786	Discussion on NR power control and sharing	CMCC	available	2017-06-15 09:46:37	2017-06-17 02:39:22
R1-1710787	On default bandwidth part	PANASONIC	available	2017-06-15 09:50:28	2017-06-15 09:57:44
R1-1710788	Discussions on NR-PDCCH Structure	MediaTek Inc.	available	2017-06-15 10:24:15	2017-06-17 05:19:18
R1-1710789	RS structures for NR-PDCCH	MediaTek Inc.	available	2017-06-15 10:24:15	2017-06-17 05:19:18
R1-1710790	Discussions on CORESET configurations	MediaTek Inc.	available	2017-06-15 10:24:15	2017-06-17 05:19:18
R1-1710791	Resource sharing between PDCCH and PDSCH	MediaTek Inc.	available	2017-06-15 10:24:15	2017-06-17 05:19:18
R1-1710792	Structure of group-common PDCCH	MediaTek Inc.	available	2017-06-15 10:24:15	2017-06-17 05:19:18
R1-1710793	Contents of group-common PDCCH	MediaTek Inc.	available	2017-06-15 10:24:15	2017-06-17 05:19:18
R1-1710794	UE behaviour for group-common PDCCH	MediaTek Inc.	available	2017-06-15 10:24:15	2017-06-17 05:19:18
R1-1710795	Timing of HARQ-ACK for PDSCH	MediaTek Inc.	available	2017-06-15 10:24:15	2017-06-17 05:19:18
R1-1710796	Further Details on Wider Bandwidth Operations in NR	MediaTek Inc.	available	2017-06-15 10:24:15	2017-06-17 05:19:18
R1-1710797	Discussion on PBCH Contents	MediaTek Inc.	available	2017-06-15 10:24:15	2017-06-17 05:19:18
R1-1710798	Discussion on SS burst set composition	MediaTek Inc.	available	2017-06-15 10:24:15	2017-06-20 06:02:12
R1-1710799	Further discussion on SS block index indication	MediaTek Inc.	available	2017-06-15 10:24:16	2017-06-17 05:19:18
R1-1710800	Performance evaluation for RE mapping and SS block composition	MediaTek Inc.	noted	2017-06-15 10:24:16	2017-06-20 06:02:12
R1-1710801	Further discussion on Remaining minimum system information delivery	MediaTek Inc.	available	2017-06-15 10:24:16	2017-06-17 05:47:09
R1-1710802	Further discussion on OSI delivery	MediaTek Inc.	available	2017-06-15 10:24:16	2017-06-17 05:19:18
R1-1710803	Further discussion on paging design	MediaTek Inc.	available	2017-06-15 10:24:16	2017-06-20 06:02:12

R1-1710804	Discussion on measurement based on SS block	MediaTek Inc.	available	2017-06-15 10:24:16	2017-06-17 05:19:18
R1-1710805	Discussion on CSI-RS for L3 mobility	MediaTek Inc.	noted	2017-06-15 10:24:16	2017-06-17 05:19:18
R1-1710806	Discussion on Radio Link Monitoring	MediaTek Inc.	available	2017-06-15 10:24:16	2017-06-17 05:19:18
R1-1710807	On the Robustness of NR SSS in Frequency Offset	MediaTek Inc.	noted	2017-06-15 10:24:16	2017-06-17 05:19:18
R1-1710808	Discussions on NR DL beam management	MediaTek Inc.	available	2017-06-15 10:24:16	2017-06-17 05:19:18
R1-1710809	Efficient UL beam management with imperfect beam correspondence	MediaTek Inc.	available	2017-06-15 10:24:16	2017-06-17 05:19:18
R1-1710810	Mechanism for flexible beam failure recovery	MediaTek Inc.	noted	2017-06-15 10:24:16	2017-06-17 05:19:18
R1-1710811	IFDMA Based Beam Management CSI-RS for Flexible TX/RX Beam Sweeping	MediaTek Inc.	noted	2017-06-15 10:24:16	2017-06-17 05:19:18
R1-1710812	CSI acquisition for reciprocity based operation	MediaTek Inc.	available	2017-06-15 10:24:16	2017-06-17 05:19:18
R1-1710813	Remaining issues in NR CSI feedback	MediaTek Inc.	available	2017-06-15 10:24:16	2017-06-17 05:19:18
R1-1710814	Multi-TRP and panel transmission	MediaTek Inc.	available	2017-06-15 10:24:16	2017-06-23 20:31:49
R1-1710815	codeword mapping in NR	MediaTek Inc.	available	2017-06-15 10:24:16	2017-06-17 05:19:18
R1-1710816	Codebook based transmission in UL	MediaTek Inc.	available	2017-06-15 10:24:16	2017-06-17 05:19:18
R1-1710817	SRS design in NR	MediaTek Inc.	available	2017-06-15 10:24:16	2017-06-23 20:31:49
R1-1710818	CLI measurements in NR	MediaTek Inc.	noted	2017-06-15 10:24:16	2017-06-17 05:19:18
R1-1710819	Performance evaluation on channel structure of short PUCCH for 1 or 2 bits UCI	MediaTek Inc.	available	2017-06-15 10:24:16	2017-06-17 05:19:18
R1-1710820	Discussion on UCI on PUSCH	MediaTek Inc.	available	2017-06-15 10:24:16	2017-06-17 05:19:18
R1-1710821	Discussion on PUCCH and PUSCH multiplexing	MediaTek Inc.	available	2017-06-15 10:24:16	2017-06-17 05:19:18
R1-1710822	On PRACH design to support uplink requests	MediaTek Inc.	available	2017-06-15 10:24:16	2017-06-17 05:19:18
R1-1710823	PRACH Msg1 retransmission	MediaTek Inc.	revised	2017-06-15 10:24:16	2017-06-17 05:19:18
R1-1710824	On 4-step RACH procedure	MediaTek Inc.	available	2017-06-15 10:24:16	2017-06-17 05:19:18
R1-1710825	Optimization and comparison of Polar code rate-matching design	MediaTek Inc.	available	2017-06-15 10:24:16	2017-06-20 06:02:12
R1-1710826	Polar coding design for NR-PBCH combining	MediaTek Inc.	available	2017-06-15 10:24:16	2017-06-20 06:02:12
R1-1710827	On CRC attachment for TB and CB	MediaTek Inc.	noted	2017-06-15 10:24:16	2017-06-20 06:02:12
R1-1710828	On interleaver for NR LDPC code	MediaTek Inc.	noted	2017-06-15 10:24:16	2017-06-20 06:02:12
R1-1710829	On NR LDPC design and performance	MediaTek Inc.	revised	2017-06-15 10:24:16	2017-06-20 06:02:12
R1-1710830	Discussion on CBG construction for CBG-based (re)transmission	MediaTek Inc.	available	2017-06-15 10:24:16	2017-06-17 05:19:18
R1-1710831	On downlink DMRS design	MediaTek Inc.	noted	2017-06-15 10:24:16	2017-06-17 05:19:18
R1-1710832	On TRS design requirement	MediaTek Inc.	noted	2017-06-15 10:24:16	2017-06-17 05:19:19
R1-1710833	On CSI-RS configuration for fine time and frequency tracking support	MediaTek Inc.	available	2017-06-15 10:24:16	2017-06-17 05:19:19
R1-1710834	On support of Grant-free and Grant-based transmission for UL URLLC	MediaTek Inc.	available	2017-06-15 10:24:16	2017-06-17 05:19:19
R1-1710835	Grant-free Scheduling and retransmission schemes for UL URLLC	MediaTek Inc.	available	2017-06-15 10:24:16	2017-06-17 05:19:19
R1-1710836	On use of scrambling for UL Grant-free URLLC transmission	MediaTek Inc.	available	2017-06-15 10:24:16	2017-06-17 05:19:19
R1-1710837	HARQ procedure for DL URLLC	MediaTek Inc.	available	2017-06-15 10:24:16	2017-06-17 05:19:19
R1-1710838	Cross-slot scheduling for UE power saving	MediaTek Inc.	available	2017-06-15 10:24:16	2017-06-17 05:19:19
R1-1710839	UL Power Sharing for LTE-NR Dual Connectivity	MediaTek Inc.	noted	2017-06-15 10:24:16	2017-06-17 05:19:19

R1-1710840	Discussion on Uplink TDM Operation for NR NSA	China Telecommunications	noted	2017-06-15 10:49:27	2017-06-16 12:39:08
R1-1710841	Discussion on remaining system information delivery	Beijing Xinwei Telecom Techn.	available	2017-06-15 11:12:24	2017-06-16 09:52:57
R1-1710842	A flexible, low-latency, hardware-efficient SCL polar decoder	AccelerComm Ltd	available	2017-06-15 11:29:56	2017-06-16 21:38:19
R1-1710843	On the storage of polar code sequences	AccelerComm Ltd	noted	2017-06-15 11:31:22	2017-06-16 21:38:19
R1-1710844	Consideration on coding chain for eMBB data channel	ZTE	available	2017-06-15 12:32:22	2017-06-20 06:38:44
R1-1710845	Shift coefficients design for base graph 1	ZTE	revised	2017-06-15 12:32:22	2017-06-20 06:38:44
R1-1710846	Shift coefficients design for base graph 2	ZTE	revised	2017-06-15 12:32:22	2017-06-20 06:38:44
R1-1710847	Performance evaluations on Polar codes	ZTE	available	2017-06-15 12:32:22	2017-06-20 06:38:44
R1-1710848	Rate matching scheme of Polar codes	ZTE	available	2017-06-15 12:32:22	2017-06-20 06:38:44
R1-1710849	Segmentation of Polar codes	ZTE	revised	2017-06-15 12:32:22	2017-06-20 06:38:44
R1-1710850	Considerations on Channel Coding for NR-PBCH	ZTE	available	2017-06-15 12:32:22	2017-06-20 06:38:44
R1-1710851	Considerations on DL beam management	Sony	available	2017-06-15 13:05:36	2017-06-16 16:58:19
R1-1710852	Considerations on UL beam management	Sony	available	2017-06-15 13:05:36	2017-06-16 16:58:19
R1-1710853	Considerations on fine time/frequency tracking	Sony	available	2017-06-15 13:05:36	2017-06-16 16:58:19
R1-1710854	Considerations on interference measurement	Sony	available	2017-06-15 13:05:36	2017-06-16 16:58:19
R1-1710855	Considerations on SRS design	Sony	noted	2017-06-15 13:05:36	2017-06-16 16:58:19
R1-1710856	On contents of group-common PDCCH	Sony	available	2017-06-15 13:05:36	2017-06-16 16:58:19
R1-1710857	On structure of group-common PDCCH	Sony	available	2017-06-15 13:05:36	2017-06-16 16:58:19
R1-1710858	Discussion on SS block time index indication	Sony	revised	2017-06-15 13:05:36	2017-06-19 20:01:27
R1-1710859	Considerations on SS block compositions	Sony	revised	2017-06-15 13:05:36	2017-06-19 20:01:27
R1-1710860	Considerations on 4-step RA procedure	Sony	available	2017-06-15 13:05:36	2017-06-16 16:58:19
R1-1710861	Pre-emption in UL grant free resource	Sony	available	2017-06-15 13:05:36	2017-06-16 16:58:19
R1-1710862	Reliable PDCCH operation for URLLC	Sony	available	2017-06-15 13:05:36	2017-06-16 16:58:19
R1-1710863	Discussion on the retransmission of UL transmission without grant	Sony	available	2017-06-15 13:05:36	2017-06-16 16:58:19
R1-1710864	Discussion on the CBG index indication by DCI	Sony	available	2017-06-15 13:05:36	2017-06-16 16:58:19
R1-1710865	Remaining issues on using pre-emption indicator for DL URLLC/eMBB multiplexing	Sony	available	2017-06-15 13:05:36	2017-06-16 16:58:19
R1-1710866	Feedback for improving URLLC reliability	Sony	available	2017-06-15 13:05:36	2017-06-16 16:58:19
R1-1710867	Multiplexing data with different transmission durations for Uplink	Sony	available	2017-06-15 13:05:36	2017-06-16 16:58:19
R1-1710868	Blind Detection with Polar Codes	McGill University	withdrawn	2017-06-15 13:49:00	
R1-1710869	Partitioned List Decoding of Polar Codes	McGill University	withdrawn	2017-06-15 13:52:26	
R1-1710870	Power ramping for Msg1 preamble re-transmission	InterDigital, Inc.	available	2017-06-15 14:07:00	2017-06-16 20:55:03
R1-1710871	Multiple Msg1 transmissions for one monitored RAR window	InterDigital, Inc.	available	2017-06-15 14:07:00	2017-06-16 20:55:03
R1-1710872	CORESET Monitoring Under Dynamic Change of BWP	InterDigital, Inc.	available	2017-06-15 14:07:00	2017-06-16 20:55:03
R1-1710873	PDSCH starting position in NR	InterDigital, Inc.	available	2017-06-15 14:07:00	2017-06-16 20:55:03
R1-1710874	Considerations for ultra-reliable DCI transmission	InterDigital, Inc.	available	2017-06-15 14:07:00	2017-06-16 20:55:03
R1-1710875	Considerations for ultra-reliable UCI transmission	InterDigital, Inc.	available	2017-06-15 14:07:00	2017-06-16 20:55:03
R1-1710876	CBG based HARQ for NR	InterDigital, Inc.	available	2017-06-15 14:07:00	2017-06-16 20:55:03
R1-1710877	DL HARQ Feedback suppression	InterDigital, Inc.	available	2017-06-15 14:07:00	2017-06-16 20:55:03
R1-1710878	Bandwidth Adaptation via BWP Selection in NR	InterDigital, Inc.	available	2017-06-15 14:07:00	2017-06-16 20:55:03

R1-1710879	Power Sharing Mechanisms with LTE-NR DC and NR DC	InterDigital, Inc.	noted	2017-06-15 14:07:00	2017-06-16 20:55:03
R1-1710880	On uplink half-tone shift	Ericsson AB	noted	2017-06-15 14:31:31	2017-06-16 21:30:26
R1-1710881	On pi/2-BPSK DFTS-OFDM with spectrum shaping	Ericsson AB	available	2017-06-15 14:33:11	2017-06-16 21:30:26
R1-1710882	Multiple SS Blocks in wideband carrier	Ericsson AB	available	2017-06-15 14:38:27	2017-06-16 21:30:26
R1-1710883	On wider band aspects of NR	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-15 14:43:35	2017-06-16 16:34:45
R1-1710884	On NR CA/DC configuration	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-15 14:43:35	2017-06-16 16:34:45
R1-1710885	On cross-carrier scheduling and joint UCI design	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-15 14:43:35	2017-06-16 16:34:45
R1-1710886	UL diversity transmission for DFTsOFDM	Mitsubishi Electric RCE	available	2017-06-15 16:01:47	2017-06-16 14:58:34
R1-1710887	UL grant-free transmissions: Physical layer procedures	Intel Corporation	available	2017-06-15 16:40:08	2017-06-17 06:19:32
R1-1710888	HARQ-ACK feedback: Timing considerations	Intel Corporation	withdrawn	2017-06-15 16:41:03	
R1-1710889	NR Physical Random Access Channel	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-15 17:23:41	2017-06-16 21:12:36
R1-1710890	NR Physical Random Access Channel Capacity	Nokia, Alcatel-Lucent Shanghai Bell	noted	2017-06-15 17:23:41	2017-06-16 21:12:36
R1-1710891	Preamble Power Ramping and RACH Message 3 Power Control	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-15 17:23:41	2017-06-16 21:12:36
R1-1710892	NR 4-step RACH procedure	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-15 17:23:41	2017-06-16 21:12:36
R1-1710893	On the short PUCCH design for small UCI payloads	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-15 17:24:28	2017-06-16 21:23:22
R1-1710894	Short PUCCH design for UCI of more than 2 bits	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-15 17:24:28	2017-06-16 21:23:22
R1-1710895	On long PUCCH design for small payloads	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-15 17:24:28	2017-06-16 21:23:22
R1-1710896	Long PUCCH design for UCI more than 2 bits	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-15 17:24:28	2017-06-16 21:23:22
R1-1710897	Transmit Diversity for PUCCH	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-15 17:24:28	2017-06-16 21:23:22
R1-1710898	On the resource allocation for PUCCH	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-15 17:24:28	2017-06-16 21:23:22
R1-1710899	UCI multiplexing on PUSCH	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-15 17:24:28	2017-06-16 21:23:22
R1-1710900	On the multiplexing between PUCCHs and PUSCH	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-15 17:24:28	2017-06-16 21:23:22
R1-1710901	On URLLC UCI transmission	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-15 17:24:28	2017-06-16 21:23:22
R1-1710902	CP-OFDM waveform for NR long PUCCH	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-15 17:24:28	2017-06-16 21:23:22
R1-1710903	PDCCH structure for NR	NEC	available	2017-06-15 17:34:00	2017-06-17 05:46:17
R1-1710904	Uplink transmission in NR NSA mode	Apple Inc.	noted	2017-06-15 18:48:58	2017-06-17 04:14:25

R1-1710905	Signaling of SS block index	Apple Inc.	noted	2017-06-15 18:48:59	2017-06-17 04:14:25
R1-1710906	UE behavior on UL/DL transmission direction determination in NR TDD	Apple Inc.	available	2017-06-15 18:48:59	2017-06-17 04:14:25
R1-1710907	Control indicator in group-common PDCCH for UE power saving	Apple Inc.	available	2017-06-15 18:48:59	2017-06-17 04:14:25
R1-1710908	DL control signal for CBG-based transmission	Apple Inc.	available	2017-06-15 18:48:59	2017-06-17 04:14:25
R1-1710909	Discussion of NR-LTE coexistence on DL	ZTE	available	2017-06-15 19:16:36	2017-06-17 02:58:30
R1-1710910	Considerations of NR-LTE coexistence in uplink	ZTE	revised	2017-06-15 19:20:04	2017-06-17 02:58:30
R1-1710911	Power Control for CA and DC in NR	ZTE	available	2017-06-15 19:22:45	2017-06-17 02:58:30
R1-1710912	Reserved resources supporting NR co-existence with LTE and NB-IoT	Ericsson AB	available	2017-06-15 20:57:12	2017-06-16 21:30:26
R1-1710913	On Design of Synchronization Signal Sequences in NR	InterDigital, Inc.	available	2017-06-16 00:11:27	2017-06-17 02:41:30
R1-1710914	On SS Burst Set Composition and Multiplexing	InterDigital, Inc.	available	2017-06-16 00:13:07	2017-06-17 02:41:30
R1-1710915	On SS Block Based Timing Indication in NR	InterDigital, Inc.	available	2017-06-16 00:15:16	2017-06-20 04:20:51
R1-1710916	On Physical Broadcast Channel in NR	InterDigital, Inc.	available	2017-06-16 00:17:06	2017-06-17 02:41:30
R1-1710917	On NR-PBCH RE Mapping and SS Block Composition	InterDigital, Inc.	noted	2017-06-16 00:18:23	2017-06-20 04:20:51
R1-1710918	On DMRS Designs for NR-PBCH	InterDigital, Inc.	available	2017-06-16 00:19:14	2017-06-17 02:41:30
R1-1710919	On Minimum System Information Delivery	InterDigital, Inc.	available	2017-06-16 00:20:20	2017-06-17 02:41:30
R1-1710920	TPMI Indication for Frequency Selective UL Precoding	InterDigital, Inc.	available	2017-06-16 00:21:43	2017-06-16 23:50:38
R1-1710921	STBC-based Transmission for Uplink Transmit Diversity	InterDigital, Inc.	available	2017-06-16 00:22:23	2017-06-16 23:50:38
R1-1710922	PRG Size Indication in NR	InterDigital, Inc.	available	2017-06-16 00:23:13	2017-06-16 23:50:38
R1-1710923	DCI Design for Multi-TRP/Panel Transmission for DL	InterDigital, Inc.	available	2017-06-16 00:23:55	2017-06-16 23:50:38
R1-1710924	On Beam Management for DL Control and Data Channels	InterDigital, Inc.	available	2017-06-16 00:24:51	2017-06-16 23:50:38
R1-1710925	On Efficient UL Beam Management	InterDigital, Inc.	available	2017-06-16 00:25:56	2017-06-16 23:51:11
R1-1710926	On Remaining Details of Beam Failure Recovery	InterDigital, Inc.	available	2017-06-16 00:26:36	2017-06-16 23:51:11
R1-1710927	On CSI framework for NR	InterDigital, Inc.	available	2017-06-16 00:27:17	2017-06-16 23:51:11
R1-1710928	On CSI acquisition for NR	InterDigital, Inc.	available	2017-06-16 00:27:59	2017-06-16 23:51:11
R1-1710929	Discussion on SRS sequence generation for NR	Panasonic Corporation	available	2017-06-16 00:28:02	2017-06-16 10:02:07
R1-1710930	Discussion on 1-symbol NR-PUCCH for UCI of up to 2 bits	Panasonic Corporation	revised	2017-06-16 00:28:38	2017-06-16 10:02:07
R1-1710931	CSI-RS Design for Beam Management	InterDigital, Inc.	noted	2017-06-16 00:28:44	2017-06-16 23:51:11
R1-1710932	Discussion on channel structure of long-duration NR-PUCCH for UCI of up to 2 bits	Panasonic Corporation	available	2017-06-16 00:29:05	2017-06-16 10:02:07
R1-1710933	On DM-RS design for NR	InterDigital, Inc.	available	2017-06-16 00:29:16	2017-06-16 23:51:34
R1-1710934	Discussion on channel design of long-duration NR-PUCCH for UCI of more than 2 bits	Panasonic Corporation	available	2017-06-16 00:29:27	2017-06-16 10:02:07
R1-1710935	Discussion on support of long-duration NR-PUCCH over multiple slots	Panasonic Corporation	available	2017-06-16 00:29:48	2017-06-16 10:02:07
R1-1710936	Remaining Issues on PTRS for NR	InterDigital, Inc.	noted	2017-06-16 00:29:52	2017-06-16 23:51:34
R1-1710937	Discussion on resource allocation for uplink control channel	Panasonic Corporation	available	2017-06-16 00:30:13	2017-06-16 10:02:07
R1-1710938	On SRS for NR	InterDigital, Inc.	available	2017-06-16 00:30:27	2017-06-16 23:51:34
R1-1710939	Discussion on UCI on PUSCH	Panasonic Corporation	available	2017-06-16 00:30:35	2017-06-16 10:02:07
R1-1710940	Discussion on UCI and data multiplexing	Panasonic Corporation	available	2017-06-16 00:30:53	2017-06-16 10:02:07
R1-1710941	On QCL for NR	InterDigital, Inc.	available	2017-06-16 00:31:02	2017-06-16 23:51:34

R1-1710942	Discussion on SR for URLLC and multiplexing with HARQ-ACK	Panasonic Corporation	available	2017-06-16 00:31:10	2017-06-16 10:02:07
R1-1710943	Discussion on PRB grid and PRB indexing	Panasonic Corporation	available	2017-06-16 00:31:33	2017-06-16 10:02:07
R1-1710944	On the impact of multi-beam operation on PDCCH structure	InterDigital, Inc.	available	2017-06-16 00:31:54	2017-06-16 23:51:34
R1-1710945	On REG bundling and associated DMRS	InterDigital, Inc.	available	2017-06-16 00:32:29	2017-06-16 23:51:58
R1-1710946	Search space design for eMBB-URLLC Multiplexing	InterDigital, Inc.	available	2017-06-16 00:33:05	2017-06-16 23:51:58
R1-1710947	Group-common PDCCH design considerations	InterDigital, Inc.	available	2017-06-16 00:33:54	2017-06-16 23:51:58
R1-1710948	UE behaviour related to CORESET(s) configured by PBCH	InterDigital, Inc.	available	2017-06-16 00:34:31	2017-06-16 23:51:58
R1-1710949	On Ultra-reliable and low-latency PDCCH	InterDigital, Inc.	available	2017-06-16 00:35:27	2017-06-16 23:51:58
R1-1710950	Evaluations of 1-symbol short-PUCCH with 1 or 2 bit(s)	InterDigital, Inc.	available	2017-06-16 00:36:11	2017-06-17 05:36:32
R1-1710951	On transmit diversity for Long PUCCH	InterDigital, Inc.	available	2017-06-16 00:36:52	2017-06-16 23:52:20
R1-1710952	Considerations on UCI transmission on PUSCH	InterDigital, Inc.	available	2017-06-16 00:37:46	2017-06-16 23:52:20
R1-1710953	On frequency-domain resource allocation for NR	InterDigital, Inc.	available	2017-06-16 00:38:23	2017-06-16 23:52:20
R1-1710954	HARQ feedback design considerations for CBG based transmission	InterDigital, Inc.	available	2017-06-16 00:39:02	2017-06-16 23:52:20
R1-1710955	Signalling design considerations for DL pre-emption indication	InterDigital, Inc.	available	2017-06-16 00:39:39	2017-06-16 23:52:20
R1-1710956	Multiplexing of low-latency traffic and non-latency sensitive traffic in UL	InterDigital, Inc.	available	2017-06-16 00:40:25	2017-06-16 23:52:42
R1-1710957	Data channel processing and CRC attachment	InterDigital, Inc.	noted	2017-06-16 00:41:15	2017-06-16 23:52:42
R1-1710958	Code block segmentation for eMBB data channel	InterDigital, Inc.	available	2017-06-16 00:43:49	2017-06-16 23:52:42
R1-1710959	Parameter selection for polar codes puncturing and shortening	InterDigital, Inc.	available	2017-06-16 00:44:32	2017-06-16 23:52:42
R1-1710960	Parameter selection for polar codes repetition	InterDigital, Inc.	available	2017-06-16 00:45:06	2017-06-16 23:52:42
R1-1710961	Interleaver design for polar codes with high order modulation	InterDigital, Inc.	available	2017-06-16 00:45:37	2017-06-16 23:52:55
R1-1710962	Common and Beam Specific Power Control Parameters	InterDigital, Inc.	withdrawn	2017-06-16 00:46:20	2017-06-16 23:52:55
R1-1710963	On network resources and UE transmission configurations for grant-free access	NEC	available	2017-06-16 01:48:34	2017-06-16 06:28:42
R1-1710964	On UE-to-UE measurement for CLI management	NEC	available	2017-06-16 01:48:34	2017-06-16 06:28:42
R1-1710965	On cross-carrier scheduling and HARQ-ACK feedback for NR CA	NEC	available	2017-06-16 01:48:34	2017-06-16 06:28:42
R1-1710966	Flexible subcarrier spacing in the uplink for NR use cases including mMTC	ATR	available	2017-06-16 01:49:13	2017-06-16 02:14:35
R1-1710967	Number of HARQ processes for co-existence with TD-LTE	NEC Corporation	available	2017-06-16 02:03:08	2017-06-16 09:27:36
R1-1710968	Summary of [89-20] email discussion on Group-common PDCCH for NR	CATT	noted	2017-06-16 02:20:28	2017-06-28 13:47:51
R1-1710969	NR-PDCCH for multi-TRP transmission	China Telecommunications	available	2017-06-16 02:21:34	2017-06-16 08:11:55
R1-1710970	On front-load DMRS design	China Telecommunications	available	2017-06-16 02:23:10	2017-06-16 08:11:55
R1-1710971	UL grant-free transmission for URLLC	China Telecommunications	available	2017-06-16 02:27:44	2017-06-16 08:11:55
R1-1710972	Control signalling for CBG-based (re)transmission	China Telecommunications	available	2017-06-16 02:29:56	2017-06-16 08:11:55
R1-1710973	Discussion on REG bundle size	ITRI	available	2017-06-16 02:36:07	2017-06-16 08:54:11

R1-1710974	Discussion on using sub-time unit for CSI-RS of beam management	ITRI	available	2017-06-16 02:36:07	2017-06-16 08:54:11
R1-1710975	Considerations and Evaluation on SS Sequence Design for New Radio	ITRI	available	2017-06-16 02:36:07	2017-06-16 08:54:11
R1-1710976	NR Long PUCCH Requirements	CMCC	available	2017-06-16 02:43:39	2017-06-17 02:39:22
R1-1710977	Discussion on RRM measurement on SS blocks	CMCC	noted	2017-06-16 02:50:19	2017-06-17 02:39:22
R1-1710978	On the PDCCH construction for NR	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 02:57:52	2017-06-17 03:29:17
R1-1710979	On the remaining details of PDCCH reference signal structure	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 02:57:52	2017-06-17 03:29:17
R1-1710980	On the PDCCH control resource set and its connection to the search space for NR	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 02:57:52	2017-06-17 03:29:17
R1-1710981	On the search space design and UE blind detection	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 02:57:52	2017-06-17 03:29:17
R1-1710982	PDCCH support for multi-beam system	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 02:57:52	2017-06-17 03:29:17
R1-1710983	Resource sharing between PDCCH and PDSCH in NR	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 02:57:52	2017-06-17 03:29:17
R1-1710984	On the structure of group common PDCCH in NR	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 02:57:52	2017-06-17 03:29:17
R1-1710985	On the contents of group common PDCCH in NR	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 02:57:52	2017-06-17 03:29:17
R1-1710986	On the UE behaviour related to group common PDCCH in NR	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 02:57:52	2017-06-17 03:29:17
R1-1710987	On the URLLC specific aspects for DL control channel	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 02:57:52	2017-06-17 03:29:17
R1-1710988	On the usage of PDCCH DMRS as a complementary synchronization signal in DL	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 02:57:53	2017-06-17 03:29:17
R1-1710989	On resource allocation in frequency domain for PDSCH and PUSCH in NR	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 02:57:53	2017-06-17 03:29:17
R1-1710990	Time-domain resource allocation for NR	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 02:57:53	2017-06-17 03:29:17
R1-1710991	Transport block size determination and the support of slot aggregation in NR	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 02:57:53	2017-06-17 03:29:17
R1-1710992	Discussion on multiple SR configuration	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 02:57:53	2017-06-17 03:29:17
R1-1710993	Unified framework for UL grant-free and UL SPS	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 02:57:53	2017-06-17 03:29:17
R1-1710994	UE identification and HARQ for URLLC UL grant-free	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 02:57:53	2017-06-17 03:29:17
R1-1710995	Mapping code blocks to code block groups	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 02:57:53	2017-06-17 03:29:17
R1-1710996	DL control signalling for CBG-based transmissions	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 02:57:53	2017-06-17 03:29:17

R1-1710997	HARQ-ACK feedback for CBG-based (re-)transmission in NR	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 02:57:53	2017-06-17 03:29:17
R1-1710998	Timing aspects for HARQ-ACK feedback	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 02:57:53	2017-06-17 03:29:17
R1-1710999	On HARQ feedback determination	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 02:57:53	2017-06-17 03:29:17
R1-1711000	On the number of HARQ processes	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 02:57:53	2017-06-17 03:29:17
R1-1711001	On the HARQ soft buffer handling	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 02:57:53	2017-06-17 03:29:17
R1-1711002	On pre-emption indication	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 02:57:53	2017-06-17 03:29:17
R1-1711003	Pause-Resume Scheduling for Low Latency Uplink Transmissions	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 02:57:53	2017-06-17 03:29:17
R1-1711004	Discussion on scheduling based URLLC transmission	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 02:57:53	2017-06-17 03:29:17
R1-1711005	CSI measuring and reporting procedure for URLLC	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 02:57:53	2017-06-17 04:36:40
R1-1711006	Issues and Control Design for UL Grant-free URLLC	III	available	2017-06-16 03:22:13	2017-06-16 20:22:34
R1-1711007	Codeword to layer mapping for DL and UL	Ericsson	noted	2017-06-16 03:22:19	2017-06-17 05:29:06
R1-1711008	UL MIMO for codebook based transmission	Ericsson	revised	2017-06-16 03:22:19	2017-06-17 05:29:06
R1-1711009	UL MIMO for non-codebook based transmission	Ericsson	available	2017-06-16 03:22:19	2017-06-17 05:29:06
R1-1711010	Robust Transmission Scheme for PUSCH	Ericsson	available	2017-06-16 03:22:19	2017-06-17 05:29:06
R1-1711011	PRB bundling	Ericsson	available	2017-06-16 03:22:19	2017-06-17 05:29:06
R1-1711012	UL multi-panel transmission	Ericsson	available	2017-06-16 03:22:19	2017-06-17 05:29:06
R1-1711013	DL multi-TRP and multi-panel transmission	Ericsson	noted	2017-06-16 03:22:19	2017-06-17 05:29:06
R1-1711014	On rate matching	Ericsson	noted	2017-06-16 03:22:19	2017-06-17 05:29:06
R1-1711015	On DL beam indication	Ericsson	available	2017-06-16 03:22:19	2017-06-17 05:29:06
R1-1711016	UL beam management details	Ericsson	noted	2017-06-16 03:22:19	2017-06-17 05:29:06
R1-1711017	Mechanism to recover from beam failure	Ericsson	available	2017-06-16 03:22:19	2017-06-17 05:29:06
R1-1711018	Beam management in C-DRX	Ericsson	available	2017-06-16 03:22:19	2017-06-17 05:29:06
R1-1711019	On the use of SS for beam management	Ericsson	available	2017-06-16 03:22:19	2017-06-17 05:29:06
R1-1711020	Further results on beam management without beam indication	Ericsson	available	2017-06-16 03:22:19	2017-06-17 05:29:06
R1-1711021	Performance of beam grouping	Ericsson	available	2017-06-16 03:22:19	2017-06-17 05:29:06
R1-1711022	On beam grouping	Ericsson	available	2017-06-16 03:22:19	2017-06-17 05:29:06
R1-1711023	Analysis of beam indication signalling options	Ericsson	available	2017-06-16 03:22:19	2017-06-17 05:29:06
R1-1711024	Further details of CSI framework	Ericsson	noted	2017-06-16 03:22:19	2017-06-17 05:29:06
R1-1711025	On CSI acquisition and reporting	Ericsson	available	2017-06-16 03:22:19	2017-06-17 05:29:06
R1-1711026	Further discussion on CSI acquisition for reciprocity-based operation	Ericsson	revised	2017-06-16 03:22:19	2017-06-17 05:29:06
R1-1711027	CSI feedback and Transparent PDSCH TxD	Ericsson	available	2017-06-16 03:22:19	2017-06-17 05:29:06
R1-1711028	Codebook subset restriction	Ericsson	available	2017-06-16 03:22:19	2017-06-17 05:29:06
R1-1711029	Type I & II CSI reporting	Ericsson	available	2017-06-16 03:22:19	2017-06-17 05:29:06
R1-1711030	Encoding and mapping of CSI parameters	Ericsson	available	2017-06-16 03:22:19	2017-06-17 05:29:06

R1-1711031	CSI feedback for multi-TRP	Ericsson	available	2017-06-16 03:22:19	2017-06-17 05:29:06
R1-1711032	On Dynamic Triggering for CSI Reports and CSI-RS	Ericsson	available	2017-06-16 03:22:19	2017-06-17 05:29:06
R1-1711033	A comparison of CSI-RS activation schemes based on MAC CE and DCI	Ericsson	available	2017-06-16 03:22:19	2017-06-17 05:29:06
R1-1711034	Identifying bounds on parameters in CSI framework	Ericsson	available	2017-06-16 03:22:19	2017-06-17 05:29:06
R1-1711035	Frequency parametrization for Type II CSI codebook	Ericsson	available	2017-06-16 03:22:19	2017-06-17 05:29:06
R1-1711036	Further details of measurement restriction configuration	Ericsson	available	2017-06-16 03:22:19	2017-06-17 05:29:06
R1-1711037	Performance impact of inactive antenna ports	Ericsson	revised	2017-06-16 03:22:19	2017-06-17 05:29:06
R1-1711038	On partial bands and CSI acquistion	Ericsson	available	2017-06-16 03:22:19	2017-06-17 05:29:06
R1-1711039	NR CSI Computation Capability	Ericsson	available	2017-06-16 03:22:19	2017-06-17 05:29:06
R1-1711040	On Multiplexing of RS types for downlink	Ericsson	available	2017-06-16 03:22:19	2017-06-17 05:29:06
R1-1711041	On CSI-RS for CSI-acquisition	Ericsson	noted	2017-06-16 03:22:19	2017-06-17 05:56:36
R1-1711042	On CSI-RS for beam management	Ericsson	noted	2017-06-16 03:22:19	2017-06-17 05:29:06
R1-1711043	On DL DMRS design	Ericsson	noted	2017-06-16 03:22:19	2017-06-17 05:29:06
R1-1711044	On DL DMRS evaluations	Ericsson	available	2017-06-16 03:22:19	2017-06-17 05:29:06
R1-1711045	On UL DMRS design	Ericsson	available	2017-06-16 03:22:19	2017-06-17 05:29:06
R1-1711046	On UL DMRS evaluations	Ericsson	available	2017-06-16 03:22:19	2017-06-17 05:29:06
R1-1711047	On PTRS DL design	Ericsson	available	2017-06-16 03:22:20	2017-06-17 05:29:06
R1-1711048	On PTRS UL design	Ericsson	available	2017-06-16 03:22:20	2017-06-17 05:29:06
R1-1711049	On SRS design	Ericsson	noted	2017-06-16 03:22:20	2017-06-17 05:29:06
R1-1711050	On time and frequency tracking of the channel	Ericsson	revised	2017-06-16 03:22:20	2017-06-17 05:29:07
R1-1711051	The QCL framework in NR	Ericsson	available	2017-06-16 03:22:20	2017-06-17 05:29:07
R1-1711052	On the number of antenna ports for CSI-RS	Ericsson	available	2017-06-16 03:22:20	2017-06-17 05:29:07
R1-1711053	On the collision between DMRS and DC subcarrier	Ericsson	available	2017-06-16 03:22:20	2017-06-17 05:29:07
R1-1711054	On the NR UL power control framework	Ericsson	available	2017-06-16 03:22:20	2017-06-17 05:29:07
R1-1711055	Initial views on UE category	NTT DOCOMO, INC.	noted	2017-06-16 03:35:04	2017-06-17 04:15:18
R1-1711056	Discussion on remaining details on SS sequence design for NR	NTT DOCOMO, INC.	available	2017-06-16 03:35:04	2017-06-17 03:27:56
R1-1711057	Discussion on SS burst set composition for NR	NTT DOCOMO, INC.	available	2017-06-16 03:35:04	2017-06-17 03:27:56
R1-1711058	Discussion on timing indication based on SS block for NR	NTT DOCOMO, INC.	available	2017-06-16 03:35:04	2017-06-20 05:34:46
R1-1711059	Discussion on remaining details on multiple SS block transmissions in wideband CC for NR	NTT DOCOMO, INC.	available	2017-06-16 03:35:04	2017-06-17 03:27:56
R1-1711060	Discussion on NR-PBCH contents and payload size	NTT DOCOMO, INC.	available	2017-06-16 03:35:04	2017-06-17 03:27:56
R1-1711061	Discussion on NR-PBCH design and SS block composition	NTT DOCOMO, INC.	revised	2017-06-16 03:35:04	2017-06-20 05:34:46
R1-1711062	Discussion on sequence design of DMRS for NR-PBCH	NTT DOCOMO, INC.	available	2017-06-16 03:35:04	2017-06-17 03:27:56
R1-1711063	Discussion on remaining minimum system information delivery for NR	NTT DOCOMO, INC.	available	2017-06-16 03:35:04	2017-06-17 03:27:56
R1-1711064	Discussion on paging design for NR	NTT DOCOMO, INC.	available	2017-06-16 03:35:04	2017-06-17 03:27:56
R1-1711065	Discussion on PRACH preamble format details for long/short sequence length for NR	NTT DOCOMO, INC.	available	2017-06-16 03:35:04	2017-06-17 03:27:56
R1-1711066	Discussion on PRACH preamble format details for capacity enhancement and beam management for NR	NTT DOCOMO, INC.	available	2017-06-16 03:35:04	2017-06-17 03:27:56
R1-1711067	Discussion on power ramping and power control during RA procedure for NR	NTT DOCOMO, INC.	available	2017-06-16 03:35:04	2017-06-17 03:27:56

R1-1711068	Discussion on 4-step RA procedure for NR	NTT DOCOMO, INC.	available	2017-06-16 03:35:04	2017-06-17 03:27:56
R1-1711069	Discussion on NR RRM measurement based on SS block	NTT DOCOMO, INC.	available	2017-06-16 03:35:04	2017-06-17 03:27:56
R1-1711070	Discussion on NR RRM measurement based on CSI-RS for L3 mobility	NTT DOCOMO, INC.	available	2017-06-16 03:35:04	2017-06-17 03:27:56
R1-1711071	Discussion on NR RLM and RLF	NTT DOCOMO, INC.	available	2017-06-16 03:35:04	2017-06-17 03:27:56
R1-1711072	Discussion on codeword mapping	NTT DOCOMO, INC.	available	2017-06-16 03:35:05	2017-06-17 05:25:40
R1-1711073	Codebook design for uplink	NTT DOCOMO, INC.	noted	2017-06-16 03:35:05	2017-06-17 03:27:56
R1-1711074	Beam determination for non-codebook based transmission for uplink	NTT DOCOMO, INC.	available	2017-06-16 03:35:05	2017-06-17 03:27:56
R1-1711075	View on Beam Management Details	NTT DOCOMO, INC.	available	2017-06-16 03:35:05	2017-06-17 05:25:40
R1-1711076	Further views on mechanism to recover from beam failure	NTT DOCOMO, INC.	noted	2017-06-16 03:35:05	2017-06-17 05:25:40
R1-1711077	Discussion on CSI framework	NTT DOCOMO, INC.	available	2017-06-16 03:35:05	2017-06-17 05:25:40
R1-1711078	On CSI measurement for NR	NTT DOCOMO, INC.	available	2017-06-16 03:35:05	2017-06-17 05:25:40
R1-1711079	CSI Feedback Design for NR MIMO	NTT DOCOMO, INC.	available	2017-06-16 03:35:05	2017-06-17 05:25:40
R1-1711080	Feedback Design for CSI Type I	NTT DOCOMO, INC.	available	2017-06-16 03:35:05	2017-06-17 05:25:40
R1-1711081	Feedback Design for CSI Type II	NTT DOCOMO, INC.	available	2017-06-16 03:35:05	2017-06-17 05:25:40
R1-1711082	CSI-RS for beam managmenent	NTT DOCOMO, INC.	available	2017-06-16 03:35:05	2017-06-17 05:25:40
R1-1711083	CSI-RS for CSI acquisition	NTT DOCOMO, INC.	available	2017-06-16 03:35:05	2017-06-17 05:25:40
R1-1711084	Evaluation results of DM-RS	NTT DOCOMO, INC.	available	2017-06-16 03:35:05	2017-06-16 16:33:53
R1-1711085	Discussion on DM-RS design	NTT DOCOMO, INC.	available	2017-06-16 03:35:05	2017-06-16 16:33:53
R1-1711086	Discussion on PT-RS design	NTT DOCOMO, INC.	available	2017-06-16 03:35:05	2017-06-16 16:33:53
R1-1711087	Discussions on NR SRS Design	NTT DOCOMO, INC.	noted	2017-06-16 03:35:05	2017-06-17 05:25:40
R1-1711088	Views on remaining issues of resource mapping for NR-PDCCH	NTT DOCOMO, INC.	available	2017-06-16 03:35:05	2017-06-17 04:15:18
R1-1711089	Views on DM-RS design for NR-PDCCH	NTT DOCOMO, INC.	available	2017-06-16 03:35:05	2017-06-17 04:15:18
R1-1711090	Views on control resource set configuration for NR-PDCCH	NTT DOCOMO, INC.	available	2017-06-16 03:35:05	2017-06-17 04:15:18
R1-1711091	Views on search space design for NR-PDCCH	NTT DOCOMO, INC.	available	2017-06-16 03:35:05	2017-06-17 04:15:18
R1-1711092	Views on multi-beam based NR-PDCCH	NTT DOCOMO, INC.	available	2017-06-16 03:35:05	2017-06-17 04:15:18
R1-1711093	Resource sharing between data and control channels	NTT DOCOMO, INC.	available	2017-06-16 03:35:05	2017-06-17 04:15:18
R1-1711094	Views on structure of group-common PDCCH	NTT DOCOMO, INC.	available	2017-06-16 03:35:05	2017-06-17 04:15:18
R1-1711095	Views on contents of group-common PDCCH	NTT DOCOMO, INC.	available	2017-06-16 03:35:05	2017-06-17 04:15:18
R1-1711096	Views on UE behavior for group-common PDCCH	NTT DOCOMO, INC.	available	2017-06-16 03:35:05	2017-06-17 04:15:18
R1-1711097	DL control channel design for URLLC	NTT DOCOMO, INC.	available	2017-06-16 03:35:05	2017-06-17 04:15:18
R1-1711098	Sequence-based PUCCH for UCI of up to 2 bits	NTT DOCOMO, INC.	available	2017-06-16 03:35:05	2017-06-17 04:15:18
R1-1711099	FDM-based PUCCH for UCI of more than 2 bits	NTT DOCOMO, INC.	available	2017-06-16 03:35:05	2017-06-17 04:15:18
R1-1711100	Long-PUCCH for UCI of up to 2 bits	NTT DOCOMO, INC.	available	2017-06-16 03:35:05	2017-06-17 04:15:18
R1-1711101	Long-PUCCH for UCI of more than 2 bits	NTT DOCOMO, INC.	available	2017-06-16 03:35:05	2017-06-17 04:15:18
R1-1711102	Long-PUCCH for more than one slot	NTT DOCOMO, INC.	available	2017-06-16 03:35:05	2017-06-17 04:15:19
R1-1711103	PUCCH resource allocation	NTT DOCOMO, INC.	available	2017-06-16 03:35:05	2017-06-17 04:15:19
R1-1711104	UCI on PUSCH	NTT DOCOMO, INC.	available	2017-06-16 03:35:05	2017-06-17 04:15:19
R1-1711105	Multiplexing of PUCCH and PUSCH	NTT DOCOMO, INC.	available	2017-06-16 03:35:05	2017-06-17 04:15:19
R1-1711106	UL control channel design for URLLC	NTT DOCOMO, INC.	available	2017-06-16 03:35:05	2017-06-17 04:15:19
R1-1711107	Frequency-domain resource allocation	NTT DOCOMO, INC.	available	2017-06-16 03:35:05	2017-06-17 04:15:19
R1-1711108	Time-domain resource allocation	NTT DOCOMO, INC.	available	2017-06-16 03:35:05	2017-06-17 04:15:19

R1-1711109	Transport block size determination	NTT DOCOMO, INC.	available	2017-06-16 03:35:06	2017-06-17 04:15:19
R1-1711110	Scheduling request design in NR system	NTT DOCOMO, INC.	available	2017-06-16 03:35:06	2017-06-17 04:15:19
R1-1711111	Overall solutions for UL grant free transmission	NTT DOCOMO, INC.	available	2017-06-16 03:35:06	2017-06-17 04:15:19
R1-1711112	CBG construction	NTT DOCOMO, INC.	available	2017-06-16 03:35:06	2017-06-17 04:15:19
R1-1711113	DL control signalling for CBG-based (re)transmission	NTT DOCOMO, INC.	available	2017-06-16 03:35:06	2017-06-17 04:15:18
R1-1711114	UL control signalling for CBG-based (re)transmission	NTT DOCOMO, INC.	available	2017-06-16 03:35:06	2017-06-17 04:15:18
R1-1711115	HARQ-ACK timing	NTT DOCOMO, INC.	available	2017-06-16 03:35:06	2017-06-17 04:15:18
R1-1711116	HARQ-ACK multiplexing	NTT DOCOMO, INC.	available	2017-06-16 03:35:06	2017-06-17 04:15:18
R1-1711117	Processing time and HARQ process number for NR	NTT DOCOMO, INC.	available	2017-06-16 03:35:06	2017-06-17 04:15:18
R1-1711118	Soft-buffer size and management	NTT DOCOMO, INC.	available	2017-06-16 03:35:06	2017-06-17 04:15:18
R1-1711119	Pre-emption indication for downlink	NTT DOCOMO, INC.	available	2017-06-16 03:35:06	2017-06-17 04:15:18
R1-1711120	Multiplexing of different data durations for uplink	NTT DOCOMO, INC.	available	2017-06-16 03:35:06	2017-06-17 04:15:18
R1-1711121	Scheduling and HARQ procedures for URLLC	NTT DOCOMO, INC.	available	2017-06-16 03:35:06	2017-06-17 04:15:18
R1-1711122	NR carrier aggregation	NTT DOCOMO, INC.	available	2017-06-16 03:35:06	2017-06-17 04:15:18
R1-1711123	LTE-NR Dual connectivity	NTT DOCOMO, INC.	available	2017-06-16 03:35:06	2017-06-17 04:15:18
R1-1711124	Distributed simple parity check Polar codes	NTT DOCOMO, INC.	available	2017-06-16 03:35:06	2017-06-20 03:01:06
R1-1711125	Performance evaluation of DSPC-Polar codes	NTT DOCOMO, INC.	noted	2017-06-16 03:35:06	2017-06-20 03:01:06
R1-1711126	Sequence design of Polar codes	NTT DOCOMO, INC.	noted	2017-06-16 03:35:06	2017-06-20 03:01:06
R1-1711127	Rate matching of Polar codes	NTT DOCOMO, INC.	available	2017-06-16 03:35:06	2017-06-20 03:01:06
R1-1711128	Interleaving design of Polar codes	NTT DOCOMO, INC.	available	2017-06-16 03:35:06	2017-06-20 03:01:06
R1-1711129	Discussion on cross-link interference mitigation for duplexing flexibility	NTT DOCOMO, INC.	noted	2017-06-16 03:35:06	2017-06-17 04:15:18
R1-1711130	Discussion on prioritized scenarios for duplexing flexibility	NTT DOCOMO, INC.	available	2017-06-16 03:35:06	2017-06-17 04:15:18
R1-1711131	Remaing issues on wider bandwidth operations for NR	NTT DOCOMO, INC.	available	2017-06-16 03:35:06	2017-06-16 16:33:53
R1-1711132	Views on single UL transmission and UL sharing	NTT DOCOMO, INC.	noted	2017-06-16 03:35:06	2017-06-16 10:05:35
R1-1711133	LTE-NR power sharing mechanism	NTT DOCOMO, INC.	available	2017-06-16 03:35:06	2017-06-17 03:27:57
R1-1711134	Power control framework for PUSCH	NTT DOCOMO, INC.	noted	2017-06-16 03:35:06	2017-06-17 03:27:57
R1-1711135	Synchronization signal sequence design	Qualcomm Incorporated	available	2017-06-16 03:51:27	2017-06-17 06:59:10
R1-1711136	SS burst set composition consideration	Qualcomm Incorporated	revised	2017-06-16 03:51:27	2017-06-17 06:59:10
R1-1711137	Timing indication based on SS block consideration	Qualcomm Incorporated	revised	2017-06-16 03:51:27	2017-06-20 04:56:36
R1-1711138	Multiple SS block transmissions design in wideband CC	Qualcomm Incorporated	available	2017-06-16 03:51:27	2017-06-17 06:59:10
R1-1711139	PBCH contents and payload size consideration	Qualcomm Incorporated	available	2017-06-16 03:51:27	2017-06-17 06:59:10
R1-1711140	SS bock composition and PBCH RE mapping design	Qualcomm Incorporated	noted	2017-06-16 03:51:27	2017-06-20 04:56:36
R1-1711141	DMRS design for NR-PBCH	Qualcomm Incorporated	available	2017-06-16 03:51:27	2017-06-17 06:59:11
R1-1711142	Remaining system information delivery consideration	Qualcomm Incorporated	available	2017-06-16 03:51:27	2017-06-17 06:59:11

R1-1711143	Other system information delivery consideration	Qualcomm Incorporated	available	2017-06-16 03:51:27	2017-06-17 06:59:11
R1-1711144	Paging design consideration	Qualcomm Incorporated	available	2017-06-16 03:51:27	2017-06-17 06:59:11
R1-1711145	PRACH preamble format design for long/short sequence length	Qualcomm Incorporated	available	2017-06-16 03:51:27	2017-06-17 06:59:11
R1-1711146	PRACH preamble design for capacity enhancement	Qualcomm Incorporated	available	2017-06-16 03:51:27	2017-06-17 06:59:11
R1-1711147	Power ramping and power control for RA procedure	Qualcomm Incorporated	available	2017-06-16 03:51:27	2017-06-17 06:59:11
R1-1711148	4-step RACH procedure consideration	Qualcomm Incorporated	available	2017-06-16 03:51:27	2017-06-17 06:59:11
R1-1711149	Measurement based on SS block consideration	Qualcomm Incorporated	available	2017-06-16 03:51:27	2017-06-17 06:59:10
R1-1711150	Measurement based on CSI-RS for L3 mobility consideration	Qualcomm Incorporated	available	2017-06-16 03:51:27	2017-06-17 06:59:10
R1-1711151	Radio link monitoring consideration	Qualcomm Incorporated	noted	2017-06-16 03:51:27	2017-06-17 07:04:57
R1-1711152	CW to layer mapping and frequency domain interleaving	Qualcomm Incorporated	noted	2017-06-16 03:51:27	2017-06-17 05:16:31
R1-1711153	Codebook based UL transmission	Qualcomm Incorporated	available	2017-06-16 03:51:27	2017-06-17 05:58:12
R1-1711154	Non-codebook based UL transmission	Qualcomm Incorporated	noted	2017-06-16 03:51:27	2017-06-17 05:59:34
R1-1711155	On UL diversity transmission scheme	Qualcomm Incorporated	available	2017-06-16 03:51:27	2017-06-17 05:33:03
R1-1711156	Discussion on PRB bundling for DL	Qualcomm Incorporated	noted	2017-06-16 03:51:27	2017-06-17 05:16:31
R1-1711157	On multi-TRP and multi-panel transmission	Qualcomm Incorporated	available	2017-06-16 03:51:27	2017-06-17 05:16:31
R1-1711158	On PDSCH and PUSCH RE mapping	Qualcomm Incorporated	available	2017-06-16 03:51:27	2017-06-17 06:01:02
R1-1711159	Transmission scheme for broadcast PDSCH	Qualcomm Incorporated	noted	2017-06-16 03:51:27	2017-06-17 06:02:25
R1-1711160	Beam management for NR	Qualcomm Incorporated	noted	2017-06-16 03:51:27	2017-06-17 05:16:31
R1-1711161	Beam recovery procedures	Qualcomm Incorporated	available	2017-06-16 03:51:27	2017-06-17 05:16:31
R1-1711162	Details of CSI framework	Qualcomm Incorporated	available	2017-06-16 03:51:27	2017-06-17 06:05:57
R1-1711163	Details of CSI acquisition	Qualcomm Incorporated	available	2017-06-16 03:51:27	2017-06-17 06:05:57
R1-1711164	CSI acquisition for reciprocity based operation	Qualcomm Incorporated	available	2017-06-16 03:51:27	2017-06-17 05:50:14

R1-1711165	On Type I and Type II CSI feedback using PUCCH	Qualcomm Incorporated	available	2017-06-16 03:51:27	2017-06-17 05:51:33
R1-1711166	On CSI feedback for open- or semi-open-loop transmission	Qualcomm Incorporated	available	2017-06-16 03:51:27	2017-06-17 05:52:48
R1-1711167	On multiplexing of different types of RSs	Qualcomm Incorporated	available	2017-06-16 03:51:27	2017-06-17 05:16:31
R1-1711168	Discussion on CSI-RS design	Qualcomm Incorporated	revised	2017-06-16 03:51:27	2017-06-17 05:54:22
R1-1711169	Discussion on UL DMRS design	Qualcomm Incorporated	available	2017-06-16 03:51:27	2017-06-17 05:33:03
R1-1711170	Discussion on DL DMRS design	Qualcomm Incorporated	available	2017-06-16 03:51:27	2017-06-17 05:16:31
R1-1711171	Evaluation of UL DMRS design	Qualcomm Incorporated	available	2017-06-16 03:51:27	2017-06-17 05:16:31
R1-1711172	Evaluation of DL DMRS design	Qualcomm Incorporated	available	2017-06-16 03:51:27	2017-06-17 05:16:32
R1-1711173	Phase and frequency tracking reference signal considerations	Qualcomm Incorporated	available	2017-06-16 03:51:27	2017-06-17 05:16:32
R1-1711174	Discussion on SRS design	Qualcomm Incorporated	noted	2017-06-16 03:51:27	2017-06-17 05:17:10
R1-1711175	Further analysis on fine time/frequency tracking RS design	Qualcomm Incorporated	noted	2017-06-16 03:51:27	2017-06-17 06:09:16
R1-1711176	Discussion on QCL	Qualcomm Incorporated	noted	2017-06-16 03:51:27	2017-06-17 06:09:16
R1-1711177	PDCCH structure	Qualcomm Incorporated	revised	2017-06-16 03:51:27	2017-06-17 06:48:43
R1-1711178	RS for DL control channel	Qualcomm Incorporated	revised	2017-06-16 03:51:27	2017-06-17 06:48:43
R1-1711179	Control resource set and search space	Qualcomm Incorporated	available	2017-06-16 03:51:28	2017-06-17 06:48:43
R1-1711180	Nested search space design	Qualcomm Incorporated	available	2017-06-16 03:51:28	2017-06-17 06:48:43
R1-1711181	Multi-beam control operation	Qualcomm Incorporated	withdrawn	2017-06-16 03:51:28	
R1-1711182	Resource reuse for data in DL control region	Qualcomm Incorporated	available	2017-06-16 03:51:28	2017-06-17 06:48:43
R1-1711183	Structure of group common PDCCH	Qualcomm Incorporated	available	2017-06-16 03:51:28	2017-06-17 06:48:43
R1-1711184	Contents of group common PDCCH	Qualcomm Incorporated	revised	2017-06-16 03:51:28	2017-06-17 06:48:43
R1-1711185	UE behaviour related to group common PDCCH	Qualcomm Incorporated	available	2017-06-16 03:51:28	2017-06-17 06:48:43
R1-1711186	Common control resource set signaling in MIB	Qualcomm Incorporated	available	2017-06-16 03:51:28	2017-06-17 06:40:09

R1-1711187	Advanced Grant Indication for UE Power Saving	Qualcomm Incorporated	available	2017-06-16 03:51:28	2017-06-17 06:40:09
R1-1711188	Channelization of 1-symbol short PUCCH with 1 or 2 bits payload	Qualcomm Incorporated	available	2017-06-16 03:51:28	2017-06-17 05:17:10
R1-1711189	Channelization of 1-symbol short PUCCH with more than 2 bits payload	Qualcomm Incorporated	available	2017-06-16 03:51:28	2017-06-17 05:33:03
R1-1711190	Long PUCCH design with 1 or 2 bits UCI payload	Qualcomm Incorporated	available	2017-06-16 03:51:28	2017-06-17 05:17:10
R1-1711191	Long PUCCH design with more than 2 bits UCI payload	Qualcomm Incorporated	available	2017-06-16 03:51:28	2017-06-17 06:37:55
R1-1711192	Long PUCCH over multiple slots	Qualcomm Incorporated	available	2017-06-16 03:51:28	2017-06-17 05:17:10
R1-1711193	Transmit diversity for PUCCH	Qualcomm Incorporated	available	2017-06-16 03:51:28	2017-06-17 05:35:03
R1-1711194	Resource allocation for PUCCH	Qualcomm Incorporated	available	2017-06-16 03:51:28	2017-06-17 05:17:10
R1-1711195	UCI piggyback on PUSCH	Qualcomm Incorporated	available	2017-06-16 03:51:28	2017-06-17 05:17:10
R1-1711196	Multiplexing of PUCCH and PUSCH	Qualcomm Incorporated	available	2017-06-16 03:51:28	2017-06-17 05:38:14
R1-1711197	MPR issue with distributed RB allocation in UL	Qualcomm Incorporated	available	2017-06-16 03:51:28	2017-06-17 05:17:10
R1-1711198	Short PUSCH transmission in UL short duration	Qualcomm Incorporated	available	2017-06-16 03:51:28	2017-06-17 05:17:10
R1-1711199	Discussion TB size determination	Qualcomm Incorporated	available	2017-06-16 03:51:28	2017-06-17 05:17:10
R1-1711200	Simultaneous UL SR channel	Qualcomm Incorporated	available	2017-06-16 03:51:28	2017-06-17 05:17:10
R1-1711201	Uplink Resource for SR	Qualcomm Incorporated	available	2017-06-16 03:51:28	2017-06-17 05:17:10
R1-1711202	CBG Construction Principles for CBG-based Transmission with Multi-Bit HARQ feedback	Qualcomm Incorporated	available	2017-06-16 03:51:28	2017-06-18 23:50:05
R1-1711203	DCI considerations for CBG-based (re)-Transmissions	Qualcomm Incorporated	available	2017-06-16 03:51:28	2017-06-18 23:50:05
R1-1711204	UCI considerations for CBG-based (re)-Transmissions	Qualcomm Incorporated	available	2017-06-16 03:51:28	2017-06-18 23:50:05
R1-1711205	Low latency impact analysis on user plane and control plane	Qualcomm Incorporated	available	2017-06-16 03:51:28	2017-06-17 05:17:42
R1-1711206	UE processing time	Qualcomm Incorporated	available	2017-06-16 03:51:28	2017-06-18 23:50:05
R1-1711207	Considerations for soft buffer management	Qualcomm Incorporated	available	2017-06-16 03:51:28	2017-06-17 06:12:46
R1-1711208	Timing advance for different numerology	Qualcomm Incorporated	available	2017-06-16 03:51:28	2017-06-17 05:17:42

R1-1711209	CA with mixed numerology	Qualcomm Incorporated	available	2017-06-16 03:51:28	2017-06-23 20:31:49
R1-1711210	CRC attachment	Qualcomm Incorporated	noted	2017-06-16 03:51:28	2017-06-20 05:20:08
R1-1711211	LDPC segmentation	Qualcomm Incorporated	noted	2017-06-16 03:51:28	2017-06-20 05:20:08
R1-1711212	LDPC rate matching	Qualcomm Incorporated	available	2017-06-16 03:51:28	2017-06-20 05:20:08
R1-1711213	LDPC rate compatible design	Qualcomm Incorporated	revised	2017-06-16 03:51:28	2017-06-20 05:20:08
R1-1711214	Early termination scheme for Polar codes	Qualcomm Incorporated	available	2017-06-16 03:51:28	2017-06-20 06:50:31
R1-1711215	Evaluation of early termination for Polar codes	Qualcomm Incorporated	noted	2017-06-16 03:51:28	2017-06-20 06:50:31
R1-1711216	Decoding and encoding latency for polar codes with PC frozen bits or distributed CRC bits	Qualcomm Incorporated	noted	2017-06-16 03:51:28	2017-06-20 06:50:31
R1-1711217	Performance comparison between CA-polar and PC-polar	Qualcomm Incorporated	available	2017-06-16 03:51:28	2017-06-20 06:26:53
R1-1711218	Sequence construction of Polar codes for control channel	Qualcomm Incorporated	revised	2017-06-16 03:51:28	2017-06-20 06:50:31
R1-1711219	Determination of the values for the parameters in rate-matching for control channel	Qualcomm Incorporated	available	2017-06-16 03:51:28	2017-06-20 06:26:53
R1-1711220	Rate-matching scheme for control channel	Qualcomm Incorporated	available	2017-06-16 03:51:28	2017-06-20 06:26:53
R1-1711221	Design of Polar code for large UCI with segmentation	Qualcomm Incorporated	available	2017-06-16 03:51:29	2017-06-20 06:26:53
R1-1711222	Design and evaluation of Interleaver for Polar codes	Qualcomm Incorporated	available	2017-06-16 03:51:29	2017-06-20 06:26:53
R1-1711223	PBCH channel coding	Qualcomm Incorporated	revised	2017-06-16 03:51:29	2017-06-20 05:25:02
R1-1711224	Consideration for MCS table	Qualcomm Incorporated	noted	2017-06-16 03:51:29	2017-06-18 23:50:05
R1-1711225	Dynamic TDD UE-to-UE measurement considerations	Qualcomm Incorporated	available	2017-06-16 03:51:29	2017-06-17 06:20:57
R1-1711226	Dynamic TDD Cross-link interference management consideration	Qualcomm Incorporated	available	2017-06-16 03:51:29	2017-06-17 06:20:57
R1-1711227	UE Power Saving during Active State	Qualcomm Incorporated	available	2017-06-16 03:51:29	2017-06-17 06:20:57
R1-1711228	NR LTE Adjacent Channel Coexistence Consideration	Qualcomm Incorporated	available	2017-06-16 03:51:29	2017-06-17 06:20:57
R1-1711229	NR-LTE Co-channel Coexistence Considerations	Qualcomm Incorporated	noted	2017-06-16 03:51:29	2017-06-17 06:20:57
R1-1711230	Power control and PHR for NR	Qualcomm Incorporated	noted	2017-06-16 03:51:29	2017-06-17 05:17:42

R1-1711231	TDD-SUL CA scenario	Qualcomm Incorporated	withdrawn	2017-06-16 03:51:29	
R1-1711232	Indication of actually transmitted SS blocks	Sharp	available	2017-06-16 03:52:45	2017-06-17 01:27:00
R1-1711233	Remaining issues on power ramping in NR	Sharp	available	2017-06-16 03:52:45	2017-06-17 01:27:00
R1-1711234	Discussion on mechanisms for beam failure recovery	Sharp	available	2017-06-16 03:52:45	2017-06-17 01:27:00
R1-1711235	REG bundling for NR PDCCH	Sharp	available	2017-06-16 03:52:45	2017-06-17 01:27:00
R1-1711236	Indication of PDSCH starting position for NR	Sharp	available	2017-06-16 03:52:45	2017-06-17 01:27:00
R1-1711237	Group common PDCCH structure for NR	Sharp	available	2017-06-16 03:52:45	2017-06-17 01:27:00
R1-1711238	Group common PDCCH contents for NR	Sharp	available	2017-06-16 03:52:45	2017-06-17 01:27:00
R1-1711239	Group common PDCCH monitoring for NR	Sharp	available	2017-06-16 03:52:45	2017-06-17 01:27:00
R1-1711240	Slot structure of NR long PUCCH for more than 2 bits	Sharp	available	2017-06-16 03:52:45	2017-06-17 01:27:00
R1-1711241	Structure of NR long PUCCH over multiple slots	Sharp	available	2017-06-16 03:52:45	2017-06-17 01:27:00
R1-1711242	Short PUCCH structure for UCI of up to 2 bits	Sharp	available	2017-06-16 03:52:45	2017-06-17 01:27:00
R1-1711243	Short PUCCH structure for UCI of more than 2 bits	Sharp	available	2017-06-16 03:52:45	2017-06-17 01:27:00
R1-1711244	PUCCH and PUSCH multiplexing methods	Sharp	available	2017-06-16 03:52:45	2017-06-17 01:27:00
R1-1711245	Pardon the Interruption: Downlink Control Signaling to Enable Preemption and CBG-based (Re) Transmission	Sharp	available	2017-06-16 03:52:45	2017-06-17 01:27:00
R1-1711246	Discussion on Bursty Interference Measurement Resources	Qualcomm Incorporated	available	2017-06-16 04:20:24	2017-06-17 05:17:42
R1-1711247	Contents of group common PDCCH	Qualcomm Incorporated	available	2017-06-16 04:20:24	2017-06-23 20:31:49
R1-1711248	NR-LTE Co-channel Coexistence Considerations	Qualcomm Incorporated	withdrawn	2017-06-16 04:20:24	
R1-1711249	Power control and PHR for NR	Qualcomm Incorporated	withdrawn	2017-06-16 04:20:24	
R1-1711250	TDD-SUL CA scenario	Qualcomm Incorporated	withdrawn	2017-06-16 04:20:24	
R1-1711251	Design of Long-PUCCH for UCI of more than 2 bits	Cohere Technologies	available	2017-06-16 04:37:23	2017-06-17 05:25:01
R1-1711252	Support of long-PUCCH over multiple slots	Cohere Technologies	available	2017-06-16 04:41:50	2017-06-17 05:25:14
R1-1711253	Resource configuration for UL transmission without grant	NICT	available	2017-06-16 04:45:59	2017-06-16 11:03:26
R1-1711254	Discussion on Paging Design	III	available	2017-06-16 05:41:13	2017-06-16 12:14:15
R1-1711255	Correction on the formula of AnnexA	ZTE	revised	2017-06-16 05:46:26	2017-06-17 03:37:13
R1-1711256	Correction on Procedure A of spatially-consistency UT mobility modeling	ZTE	revised	2017-06-16 05:46:26	2017-06-17 03:37:13
R1-1711257	Discussion on DL control signalling for CBG-based retransmission	HTC Corporation	available	2017-06-16 05:57:05	2017-06-17 01:28:34
R1-1711258	Discussion on UL control signalling for CBG-based retransmission	HTC Corporation	available	2017-06-16 05:58:13	2017-06-17 01:28:34
R1-1711259	Discussion on CBG-based HARQ feedback multiplexing	HTC Corporation	available	2017-06-16 05:59:28	2017-06-17 01:28:34
R1-1711260	Remaining open issues on NR Synchronisation signal design	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 06:06:34	2017-06-16 18:13:14
R1-1711261	On SS Burst Set Composition	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 06:06:34	2017-06-16 18:13:14

R1-1711262	SS block time index indication	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 06:06:34	2017-06-16 18:13:14
R1-1711263	SS-block transmission in multi CC deployments	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 06:06:34	2017-06-16 18:13:14
R1-1711264	NR-PBCH content	Nokia, Alcatel-Lucent Shanghai Bell	revised	2017-06-16 06:06:34	2017-06-16 18:13:14
R1-1711265	SS block composition	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 06:06:34	2017-06-16 18:13:14
R1-1711266	NR-PBCH DMRS design	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 06:06:34	2017-06-16 18:13:14
R1-1711267	On Remaining System Information Delivery	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 06:06:34	2017-06-16 18:13:14
R1-1711268	SS block measurements and procedures	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 06:06:34	2017-06-16 18:13:14
R1-1711269	NR Radio link monitoring	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 06:06:34	2017-06-16 18:13:14
R1-1711270	[89-16] Email discussion on NR-PRACH preamble formats based on short sequence length	ZTE Corporation	available	2017-06-16 06:08:11	2017-06-16 21:19:03
R1-1711271	Paging in NR	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 06:14:48	2017-06-16 18:13:14
R1-1711272	Configuration for control resource sets and search spaces	HTC Corporation	available	2017-06-16 06:18:37	2017-06-16 10:59:06
R1-1711273	Design of resource mapping and NR-PDCCH	HTC Corporation	available	2017-06-16 06:25:14	2017-06-16 10:59:29
R1-1711274	Discussion on location and timing indication of SS block	Xiaomi Technology	available	2017-06-16 06:39:00	2017-06-18 03:18:55
R1-1711275	Discussion on NR-SSS working assumption	Motorola Mobility, Lenovo	available	2017-06-16 07:11:37	2017-06-17 06:13:40
R1-1711276	Indication of SS block timing information	Motorola Mobility, Lenovo	available	2017-06-16 07:11:37	2017-06-20 06:28:55
R1-1711277	Discussion on NR-PBCH contents	Motorola Mobility, Lenovo	available	2017-06-16 07:11:37	2017-06-19 03:13:16
R1-1711278	NR-PBCH RE mapping	Motorola Mobility, Lenovo	available	2017-06-16 07:11:37	2017-06-20 06:28:55
R1-1711279	RACH configuration and procedure	Motorola Mobility, Lenovo	available	2017-06-16 07:11:37	2017-06-17 05:59:36
R1-1711280	On CCE and PDCCH mapping	Motorola Mobility, Lenovo	available	2017-06-16 07:11:37	2017-06-19 06:26:29
R1-1711281	NR Group-common PDCCH contents and structure	Motorola Mobility, Lenovo	available	2017-06-16 07:11:37	2017-06-19 03:13:16
R1-1711282	Short PUCCH for up to 2 bit UCI	Motorola Mobility, Lenovo	available	2017-06-16 07:11:37	2017-06-26 09:06:31
R1-1711283	PUCCH resource allocation for HARQ-ACK feedback to Msg4	Motorola Mobility, Lenovo	available	2017-06-16 07:11:37	2017-06-19 03:13:16
R1-1711284	Codebook Based Transmission and Codebook Design for UL MIMO	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 07:40:21	2017-06-16 21:15:08

R1-1711285	Non-codebook based UL-MIMO transmission	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 07:40:21	2017-06-16 21:15:08
R1-1711286	UL-MIMO diversity-based transmission	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 07:40:21	2017-06-16 21:15:08
R1-1711287	On details of PRB Bundling	Nokia, Alcatel-Lucent Shanghai Bell	noted	2017-06-16 07:40:21	2017-06-16 21:15:08
R1-1711288	On the maximum number of PDSCH/PDSCHs to be supported for multi-TRP transmission	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 07:40:21	2017-06-16 21:15:08
R1-1711289	On the utilization of SS block for beam management	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 07:40:21	2017-06-16 21:15:08
R1-1711290	SRS transmission for beam management	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 07:40:21	2017-06-16 21:15:08
R1-1711291	Beam Recovery in NR	Nokia, Alcatel-Lucent Shanghai Bell	noted	2017-06-16 07:40:21	2017-06-16 21:15:08
R1-1711292	BPL definition and Spatial QCL time indication	Nokia, Alcatel-Lucent Shanghai Bell	noted	2017-06-16 07:40:21	2017-06-16 21:15:08
R1-1711293	On beam grouping and reporting	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 07:40:21	2017-06-17 05:31:19
R1-1711294	On Multi-beam Downlink Control Channel Operation	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 07:40:21	2017-06-16 21:13:19
R1-1711295	Multi-beam Uplink Control Channel Operation	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 07:40:21	2017-06-16 21:15:47
R1-1711296	On the CRI definition and usability in NR	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 07:40:21	2017-06-16 21:15:47
R1-1711297	Remaining aspects on interference estimation options and configuration	Nokia, Alcatel-Lucent Shanghai Bell	noted	2017-06-16 07:40:21	2017-06-16 21:15:48
R1-1711298	On the channel reciprocity support for CSI acquisition	Nokia, Alcatel-Lucent Shanghai Bell	noted	2017-06-16 07:40:21	2017-06-16 21:15:48
R1-1711299	Feedback transmission of type II codebook	Nokia, Alcatel-Lucent Shanghai Bell	revised	2017-06-16 07:40:21	2017-06-16 21:15:48
R1-1711300	CSI feedback in support of semi-open loop transmission	Nokia, Alcatel-Lucent Shanghai Bell	noted	2017-06-16 07:40:21	2017-06-16 21:15:48
R1-1711301	On the CSI timing relationhips	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 07:40:21	2017-06-16 21:15:48
R1-1711302	On multiplexing of different RS types	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 07:40:21	2017-06-17 05:31:19
R1-1711303	On the CSI-RS configurations for NR CSI acquisition	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 07:40:21	2017-06-16 21:15:48
R1-1711304	On CSI-RS Design for DL Beam Management	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 07:40:21	2017-06-16 21:16:33
R1-1711305	On design of DL DM-RS for NR physical data channels	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 07:40:21	2017-06-16 21:16:33
R1-1711306	DL DM-RS patterns link performance evaluation	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 07:40:21	2017-06-16 21:16:33

R1-1711307	On design of UL DM-RS for NR physical data channels	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 07:40:21	2017-06-16 21:16:33
R1-1711308	Discussion on PT-RS design for CP-OFDM	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 07:40:21	2017-06-16 21:16:33
R1-1711309	On Details of the PT-RS Design for DFT-s-OFDM	Nokia, Alcatel-Lucent Shanghai Bell	revised	2017-06-16 07:40:21	2017-06-16 21:16:33
R1-1711310	UL SRS design considerations in NR	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 07:40:21	2017-06-16 21:16:33
R1-1711311	Views on the fTFT-RS in NR	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 07:40:21	2017-06-16 21:16:33
R1-1711312	On QCL Framework and Configurations in NR	Nokia, Alcatel-Lucent Shanghai Bell	noted	2017-06-16 07:40:21	2017-06-16 21:16:33
R1-1711313	Cross-link interference management based on Xn support	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 08:09:04	2017-06-16 18:18:46
R1-1711314	On NR Cross-Link Symbol Alignment Scheme	Nokia, Alcatel-Lucent Shanghai Bell	noted	2017-06-16 08:09:04	2017-06-16 18:18:46
R1-1711315	LBT-based UL transmission for dynamic TDD	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 08:09:04	2017-06-16 18:18:46
R1-1711316	DL control signaling for CBG-based (re)transmission	Shenzhen Coolpad Technologies	available	2017-06-16 08:41:31	2017-06-16 09:58:22
R1-1711317	Discussion on NR Operating in Unlicensed Spectrum	ASUSTEK COMPUTER (SHANGHAI)	available	2017-06-16 08:45:52	2017-06-16 12:44:50
R1-1711318	Discussion on the options in NR design	Panasonic	available	2017-06-16 08:50:17	2017-06-16 11:33:21
R1-1711319	Relation among NR-PBCH, SIBs and subcells	Panasonic	available	2017-06-16 08:50:17	2017-06-16 11:33:21
R1-1711320	Resource sharing between PDCCH and PDSCH	Panasonic	available	2017-06-16 08:50:17	2017-06-16 11:54:48
R1-1711321	PDCCH BD reduction	Panasonic	available	2017-06-16 08:50:17	2017-06-16 11:33:21
R1-1711322	Frequency/time resource assignment of the operation modes	Panasonic	available	2017-06-16 08:50:17	2017-06-16 11:37:48
R1-1711323	UL data transmission without grant	Panasonic	available	2017-06-16 08:50:17	2017-06-16 11:37:48
R1-1711324	DL control signalling for CBG-based (re)transmission	Panasonic	available	2017-06-16 08:50:17	2017-06-16 11:49:07
R1-1711325	UE category modelling and soft buffer	Panasonic	available	2017-06-16 08:50:17	2017-06-16 11:49:07
R1-1711326	Comment on NR specification	Panasonic	available	2017-06-16 08:50:18	2017-06-16 11:37:48
R1-1711327	The relation among REG, CCE, and CORESET	Panasonic	available	2017-06-16 08:50:18	2017-06-16 11:49:07
R1-1711328	RS mapping of NR-PDCCH	Panasonic	available	2017-06-16 08:50:18	2017-06-16 11:52:25
R1-1711329	Configuration of CORESET	Panasonic	available	2017-06-16 08:50:18	2017-06-16 11:52:25
R1-1711330	Search space design	Panasonic	available	2017-06-16 08:50:18	2017-06-16 11:41:35
R1-1711331	Discussion on structure of group common PDCCH	Panasonic	available	2017-06-16 08:50:18	2017-06-16 11:41:35
R1-1711332	Discussion on contents of group common PDCCH	Panasonic	available	2017-06-16 08:50:18	2017-06-16 11:41:35
R1-1711333	Discussion on DL/UL transmission direction	Panasonic	available	2017-06-16 08:50:18	2017-06-16 11:52:25
R1-1711334	Considerations on UE Beamforming Management	ASUSTEK COMPUTER (SHANGHAI)	available	2017-06-16 08:51:31	2017-06-16 17:56:36

R1-1711335	UL power control in multi-beam based approaches	ASUSTEK COMPUTER (SHANGHAI)	available	2017-06-16 08:53:02	2017-06-16 17:56:36
R1-1711336	Discussion on group based beam reporting	China Unicom	available	2017-06-16 08:59:23	2017-06-17 05:46:05
R1-1711337	On NR-LTE coexistence for NSA and SA	China Unicom	noted	2017-06-16 09:01:40	2017-06-17 05:46:05
R1-1711338	Consideration on physical downlink control channel for URLLC	CATR	available	2017-06-16 09:06:00	2017-06-16 09:11:15
R1-1711339	Consideration on the CSI-RS design for NR	CATR	available	2017-06-16 09:06:00	2017-06-16 09:11:15
R1-1711340	Consideration on the font loaded DM RS design for NR	CATR	available	2017-06-16 09:06:00	2017-06-16 09:11:15
R1-1711341	Discussions on the indication for CBG	CATR	available	2017-06-16 09:06:00	2017-06-16 09:11:15
R1-1711342	Discussion on the granularity of preemption indication	CATR	available	2017-06-16 09:06:00	2017-06-16 09:11:15
R1-1711343	Discussion on URLLC transmitted in same or different numerology resources	ASUSTEK COMPUTER (SHANGHAI)	available	2017-06-16 09:06:17	2017-06-16 10:34:01
R1-1711344	LDPC Coding chain	Intel Corporation	available	2017-06-16 09:17:09	2017-06-20 05:18:59
R1-1711345	Base Graph 1 lifting and evaluations	Intel Corporation	revised	2017-06-16 09:17:09	2017-06-20 05:20:10
R1-1711346	Base Graph 2 lifting and evaluations	Intel Corporation	revised	2017-06-16 09:17:09	2017-06-20 05:20:10
R1-1711347	Simple distributed CRC design for Polar codes	Intel Corporation	noted	2017-06-16 09:17:09	2017-06-20 06:23:28
R1-1711348	Evaluations of Polar code designs	Intel Corporation	available	2017-06-16 09:17:09	2017-06-20 06:23:28
R1-1711349	Discussion on Polar code rate-matching	Intel Corporation	available	2017-06-16 09:17:09	2017-06-20 05:20:10
R1-1711350	DMRS pattern configuration for NR	ITL	available	2017-06-16 09:23:22	2017-06-17 10:46:11
R1-1711351	On timing indication for NR	ITL	available	2017-06-16 09:24:51	2017-06-19 06:27:36
R1-1711352	Multiple SS block indication in wideband CC	ITL	available	2017-06-16 09:26:34	2017-06-17 10:46:11
R1-1711353	DMRS sequence design for NR-PBCH	ITL	available	2017-06-16 09:27:42	2017-06-17 10:46:11
R1-1711354	PDSCH starting position indication for NR	WILUS Inc.	available	2017-06-16 09:49:13	2017-06-17 08:04:26
R1-1711355	Discussion on structure for group-common PDCCH for NR	WILUS Inc.	available	2017-06-16 09:49:13	2017-06-17 08:04:26
R1-1711356	Discussion on contents for group-common PDCCH for NR	WILUS Inc.	available	2017-06-16 09:49:13	2017-06-17 08:04:26
R1-1711357	Discussion on UE behavior for group-common PDCCH for NR	WILUS Inc.	available	2017-06-16 09:49:13	2017-06-17 08:04:26
R1-1711358	Short PUCCH structure for UCI of up to 2 bits	WILUS Inc.	available	2017-06-16 09:49:13	2017-06-17 08:04:26
R1-1711359	Discussion on UCI piggyback on PUSCH	WILUS Inc.	available	2017-06-16 09:49:13	2017-06-17 08:04:26
R1-1711360	Simultaneous transmission for long-PUCCH and PUSCH	WILUS Inc.	available	2017-06-16 09:49:13	2017-06-17 08:04:26
R1-1711361	Discussion on UL HARQ-ACK feedback for CBG-based retransmission	WILUS Inc.	available	2017-06-16 09:49:13	2017-06-17 08:04:26
R1-1711362	Discussion on UE behavior by pre-emption indication	WILUS Inc.	available	2017-06-16 09:49:13	2017-06-17 08:04:26
R1-1711363	Two-step resource allocation for data channel in NR	ASUSTEK COMPUTER (SHANGHAI)	available	2017-06-16 09:50:00	2017-06-17 02:48:57
R1-1711364	Multiple SS block transmissions in a wideband CC	ASUSTEK COMPUTER (SHANGHAI)	available	2017-06-16 09:52:21	2017-06-17 02:49:16
R1-1711365	On UL coverage extension of TDD @3.5GHz	ORANGE	revised	2017-06-16 09:53:43	2017-06-16 15:23:03
R1-1711366	TS38.211 v0.0.1 NR; Physical channels and modulation	Ericsson LM	revised	2017-06-16 10:27:10	2017-06-19 07:47:13
R1-1711367	On UE processing time	Ericsson LM	available	2017-06-16 10:29:05	2017-06-16 15:16:59
R1-1711368	Discussion on the search space design	Xiaomi technology	available	2017-06-16 10:42:13	2017-06-16 11:53:51

R1-1711369	Discussion on the content of group common PDCCH	Xiaomi technology	available	2017-06-16 10:43:15	2017-06-16 11:53:51
R1-1711370	Discussion on the search space design	Xiaomi Technology	withdrawn	2017-06-16 10:44:13	
R1-1711371	Remaining details on NR-SS sequence design	Ericsson	available	2017-06-16 10:46:48	2017-06-17 05:48:06
R1-1711372	SS burst set composition	Ericsson	noted	2017-06-16 10:46:48	2017-06-17 05:48:06
R1-1711373	Timing indication based on SS block	Ericsson	noted	2017-06-16 10:46:48	2017-06-19 21:15:41
R1-1711374	NR-PBCH Content and payload size	Ericsson	available	2017-06-16 10:46:48	2017-06-17 05:48:06
R1-1711375	NR-PBCH RE mapping and SS block composition	Ericsson	available	2017-06-16 10:46:48	2017-06-19 21:15:41
R1-1711376	NR-PBCH DMRS design	Ericsson	available	2017-06-16 10:46:48	2017-06-17 05:48:06
R1-1711377	NR delivery of remaining minimum system information	Ericsson	available	2017-06-16 10:46:48	2017-06-17 05:48:06
R1-1711378	NR delivery of other system information	Ericsson	available	2017-06-16 10:46:48	2017-06-17 05:48:06
R1-1711379	On NR paging design	Ericsson	available	2017-06-16 10:46:48	2017-06-17 05:48:06
R1-1711380	NR-RACH preamble format details	Ericsson	available	2017-06-16 10:46:48	2017-06-17 05:48:06
R1-1711381	NR-RACH preamble format details for capacity enhancement and beam management	Ericsson	available	2017-06-16 10:46:48	2017-06-17 05:48:06
R1-1711382	Power ramping and power control during RA procedure	Ericsson	available	2017-06-16 10:46:48	2017-06-17 05:48:06
R1-1711383	4-step random access procedure	Ericsson	available	2017-06-16 10:46:48	2017-06-17 05:48:06
R1-1711384	Mobility measurements based on SS block	Ericsson	available	2017-06-16 10:46:48	2017-06-17 05:48:06
R1-1711385	Measurements based on CSI-RS for L3 mobility	Ericsson	available	2017-06-16 10:46:48	2017-06-17 05:48:06
R1-1711386	Radio link monitoring	Ericsson	available	2017-06-16 10:46:48	2017-06-17 05:48:06
R1-1711387	Consideration of PRACH Configuration in NR	Ericsson	available	2017-06-16 10:46:48	2017-06-17 05:48:06
R1-1711388	Additional synchronization provision	Ericsson	available	2017-06-16 10:46:48	2017-06-17 05:48:06
R1-1711389	Further details on scrambling	Ericsson	available	2017-06-16 10:46:48	2017-06-17 05:48:06
R1-1711390	Discussion on the structure of group common PDCCH	Xiaomi Technology	available	2017-06-16 10:49:26	2017-06-16 11:53:51
R1-1711391	On Other System Information Delivery	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 11:03:00	2017-06-19 11:19:16
R1-1711392	CSI-RS configuration for L3 mobility purposes	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 11:03:00	2017-06-16 18:13:14
R1-1711393	Calibration results for Phase 1 NR MIMO system level calibration	MOTOROLA MOBILITY LLC	available	2017-06-16 11:14:26	2017-06-17 04:32:27
R1-1711394	Discussion on SS Burst Set Design	Convida Wireless LLC	available	2017-06-16 11:39:23	2017-06-17 03:55:55
R1-1711395	Discussion on Multi-beam Operation for PDCCH	Convida Wireless LLC	available	2017-06-16 11:42:33	2017-06-17 03:56:38
R1-1711396	On power sharing between LTE and NR in DC	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 11:47:55	2017-06-16 16:22:19
R1-1711397	UL Power Control for MIMO	Nokia, Alcatel-Lucent Shanghai Bell	noted	2017-06-16 11:47:55	2017-06-16 16:22:19
R1-1711398	On spectrum shaping for uplink Pi/2 BPSK with DFT-S-OFDM	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 12:28:57	2017-06-16 18:22:15
R1-1711399	LTE and NR performance in NR-LTE UL sharing	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 12:28:57	2017-06-16 18:44:34
R1-1711400	On 1Tx only UE in LTE-NR Dual Connectivity	Nokia, Alcatel-Lucent Shanghai Bell	noted	2017-06-16 12:28:57	2017-06-16 18:44:34
R1-1711401	Measurement RS for beam management	Huawei, HiSilicon	available	2017-06-16 12:36:39	2017-06-17 03:15:49
R1-1711402	Relationship between beam failure recovery and RLF	Huawei, HiSilicon	available	2017-06-16 12:36:39	2017-06-17 03:15:49
R1-1711403	Robust transmission for UL control channel	Huawei, HiSilicon	available	2017-06-16 12:36:39	2017-06-17 03:15:49

R1-1711404	Discussion on reciprocity based CSI acquisition mechanism	Huawei, HiSilicon	available	2017-06-16 12:36:39	2017-06-17 04:46:39
R1-1711405	CSI acquisition for DL robust transmission	Huawei, HiSilicon	noted	2017-06-16 12:36:39	2017-06-17 03:15:49
R1-1711406	Other remaining issues for CSI framework	Huawei, HiSilicon	available	2017-06-16 12:36:39	2017-06-17 03:15:49
R1-1711407	Multiple-panel codebook	Huawei, HiSilicon	available	2017-06-16 12:36:39	2017-06-17 05:30:51
R1-1711408	Category 2 codebook design for type II codebook	Huawei, HiSilicon	available	2017-06-16 12:36:39	2017-06-17 03:15:49
R1-1711409	Codebook design for beamformed CSI-RS	Huawei, HiSilicon	available	2017-06-16 12:36:39	2017-06-17 03:15:49
R1-1711410	Cross-carrier beam management	Huawei, HiSilicon	available	2017-06-16 12:36:39	2017-06-17 03:15:49
R1-1711411	Evaluation on REG bundle sizes for 1-symbol CORESET duration	Huawei, HiSilicon	noted	2017-06-16 12:36:39	2017-06-17 02:56:42
R1-1711412	Evaluation on REG bundle sizes for more than 1 symbol CORESET duration	Huawei, HiSilicon	noted	2017-06-16 12:36:39	2017-06-17 02:56:42
R1-1711413	CCE-to-REG mapping	Huawei, HiSilicon	available	2017-06-16 12:36:39	2017-06-17 02:56:42
R1-1711414	PDCCH-to-CCE mapping	Huawei, HiSilicon	available	2017-06-16 12:36:39	2017-06-17 02:56:42
R1-1711415	NR DL control capacity and blocking probability	Huawei, HiSilicon	available	2017-06-16 12:36:39	2017-06-17 02:56:42
R1-1711416	Performance evaluations on 1-symbol PUCCH for up to 2 UCI bits	Huawei, HiSilicon	available	2017-06-16 12:36:39	2017-06-17 02:56:42
R1-1711417	Long PUCCH structure for large payload with no multiplexing capacity	Huawei, HiSilicon	available	2017-06-16 12:36:39	2017-06-17 02:56:42
R1-1711418	On CSI feedback in NR	Huawei, HiSilicon	available	2017-06-16 12:36:39	2017-06-17 02:56:42
R1-1711419	Transmit diversity for short duration PUCCH	Huawei, HiSilicon	available	2017-06-16 12:36:39	2017-06-17 02:56:42
R1-1711420	Multiplexing between PUCCHs	Huawei, HiSilicon	available	2017-06-16 12:36:39	2017-06-17 02:56:42
R1-1711421	Multiplexing of UL control channel and SRS in NR	Huawei, HiSilicon	available	2017-06-16 12:36:39	2017-06-17 02:56:42
R1-1711422	Resource allocation for data channels	Huawei, HiSilicon	available	2017-06-16 12:36:39	2017-06-17 02:56:42
R1-1711423	PDCCH monitoring for slot-aggregation and cross-slot scheduling	Huawei, HiSilicon	available	2017-06-16 12:36:39	2017-06-17 02:56:42
R1-1711424	On bandwidth adaptation	Huawei, HiSilicon	available	2017-06-16 12:36:39	2017-06-17 02:52:07
R1-1711425	Summary of LTE CA/DC and remaining issues for NR	Huawei, HiSilicon	available	2017-06-16 12:36:39	2017-06-17 02:56:42
R1-1711426	CBG-based transmission/retransmission for DL multiplexing of eMBB and URLLC	Huawei, HiSilicon	available	2017-06-16 12:36:39	2017-06-17 02:58:56
R1-1711427	Discussion on group common pre-emption indication	Huawei, HiSilicon	available	2017-06-16 12:36:39	2017-06-17 02:58:56
R1-1711428	Superposed transmission of pre-emption indication with eMBB data	Huawei, HiSilicon	available	2017-06-16 12:36:39	2017-06-17 02:58:56
R1-1711429	Consideration on ACK/NACK error in CBG-based retransmission	Huawei, HiSilicon	available	2017-06-16 12:36:39	2017-06-17 02:58:56
R1-1711430	Discussion on UL multiplexing of grant-based eMBB and URLLC	Huawei, HiSilicon	available	2017-06-16 12:36:39	2017-06-17 02:58:56
R1-1711431	HARQ feedback indication design for UL grant-free transmission	Huawei, HiSilicon	available	2017-06-16 12:36:39	2017-06-17 02:58:56
R1-1711432	Discussion on over-the-air time synchronization for URLLC	Huawei, HiSilicon	available	2017-06-16 12:36:39	2017-06-17 02:58:56
R1-1711433	Discussion on remaining frequency resources on symbol carrying CORESET	Huawei, HiSilicon	available	2017-06-16 12:36:39	2017-06-17 03:15:49
R1-1711434	Discussion on TB size determination	Huawei, HiSilicon	available	2017-06-16 12:36:39	2017-06-17 03:15:49
R1-1711435	Unified design for slot and mini-slot	Huawei, HiSilicon	available	2017-06-16 12:36:39	2017-06-17 03:15:49
R1-1711436	LDPC design for base graph 1	Huawei, HiSilicon	revised	2017-06-16 12:36:40	2017-06-27 15:17:52

R1-1711437	LDPC design for base graph 2	Huawei, HiSilicon	available	2017-06-16 12:36:40	2017-06-27 15:17:52
R1-1711438	Rate matching for LDPC codes	Huawei, HiSilicon	noted	2017-06-16 12:36:40	2017-06-20 05:18:35
R1-1711439	Segmentation for eMBB data	Huawei, HiSilicon	noted	2017-06-16 12:36:40	2017-06-20 05:18:35
R1-1711440	On LDPC codes for eMBB data	Huawei, HiSilicon	withdrawn	2017-06-16 12:36:40	
R1-1711441	On the feedback overhead reduction for multi-subband UL MIMO	Huawei, HiSilicon	available	2017-06-16 12:36:40	2017-06-18 14:26:23
R1-1711442	Summary of [89-27] Polar code proposal for NR	Huawei	noted	2017-06-16 12:36:40	2017-06-20 05:17:55
R1-1711443	Summary of [89-26] Polar code for NR -- alignment of latency/complexity calculation for early termination	Huawei	noted	2017-06-16 12:36:40	2017-06-20 05:17:55
R1-1711444	Continuous precoding for NR DMRS in time domain	Samsung	available	2017-06-16 12:56:25	2017-06-16 19:59:42
R1-1711445	System level evaluation results for beam management	Samsung	available	2017-06-16 12:56:25	2017-06-16 19:59:42
R1-1711446	Link level evaluation results for beam management	Samsung	available	2017-06-16 12:56:25	2017-06-16 19:59:42
R1-1711447	Link level simulation assumptions for beam management	Samsung	available	2017-06-16 12:56:25	2017-06-16 19:59:42
R1-1711448	System level simulation assumptions for beam management	Samsung	available	2017-06-16 12:56:25	2017-06-16 19:59:42
R1-1711449	Discussions on service specific CSI for NR	Samsung	available	2017-06-16 12:56:25	2017-06-16 19:59:42
R1-1711450	MIMO Phase-2 SLS calibration results on 30GHz frequency band	Samsung	available	2017-06-16 12:56:25	2017-06-17 02:01:01
R1-1711451	MIMO Phase-2 LLS calibration results on 30GHz frequency band	Samsung	available	2017-06-16 12:56:25	2017-06-17 02:01:01
R1-1711452	Evaluation results for dense urban on 30GHz frequency band	Samsung	available	2017-06-16 12:56:25	2017-06-17 02:01:01
R1-1711453	DL and UL Assignment for NR TDD	Samsung	available	2017-06-16 12:56:25	2017-06-16 19:59:42
R1-1711454	Slot Reconfiguration for Low Latency in TDD	Samsung	available	2017-06-16 12:56:25	2017-06-17 02:01:01
R1-1711455	Indication of Reserved Resources	Samsung	available	2017-06-16 12:56:25	2017-06-16 19:59:42
R1-1711456	HARQ Process Management in NR	Samsung	available	2017-06-16 12:56:25	2017-06-16 19:59:42
R1-1711457	Indication of Preempted Resources Prior to HARQ-ACK Feedback	Samsung	available	2017-06-16 12:56:25	2017-06-17 02:01:01
R1-1711458	Considerations on Signaling for Indicating Preempted Resources	Samsung	available	2017-06-16 12:56:25	2017-06-17 02:01:01
R1-1711459	Modulation Scheme for URLLC with Preemption Multiplexing	Samsung	available	2017-06-16 12:56:25	2017-06-17 02:01:01
R1-1711460	On Transparency of Spectrum Shaping for p/2-BPSK DFT-s-OFDM	Samsung	available	2017-06-16 12:56:25	2017-06-17 02:01:01
R1-1711461	On Spectrum Shaping Methods for p/2-BPSK DFT-s-OFDM	Samsung	available	2017-06-16 12:56:25	2017-06-17 02:01:01
R1-1711462	On Modulation Schemes for High Spectral Efficiency	Samsung	available	2017-06-16 12:56:25	2017-06-17 02:01:01
R1-1711463	Transmission and Reception for High-Order Modulation with MIMO	Samsung	available	2017-06-16 12:56:25	2017-06-17 02:01:01
R1-1711464	High level consideration on NR unlicensed band operation	Huawei, HiSilicon	available	2017-06-16 12:57:57	2017-06-17 02:52:07
R1-1711465	NR Numerology on unlicensed bands	Huawei, HiSilicon	available	2017-06-16 12:59:14	2017-06-17 02:52:07
R1-1711466	NR Frame structure on unlicensed bands	Huawei, HiSilicon	available	2017-06-16 13:00:09	2017-06-17 02:52:07
R1-1711467	Coexistence and Channel access for NR unlicensed band operations	Huawei, HiSilicon	available	2017-06-16 13:01:00	2017-06-17 02:52:07
R1-1711468	On CSI-RS design for DL beam management	KT Corp.	available	2017-06-16 13:01:55	2017-06-16 13:21:51
R1-1711469	NR standalone operation on unlicensed bands	Huawei, HiSilicon	available	2017-06-16 13:01:55	2017-06-17 02:52:07
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R1-1711471	Discussions on Transmission Duration	KT Corp.	available	2017-06-16 13:04:51	2017-06-16 13:21:51

R1-1711472	Considerations on TB-CRC Failure	KT Corp.	available	2017-06-16 13:07:24	2017-06-16 13:21:51
R1-1711473	View on Multi-Beam Management	KT Corp.	available	2017-06-16 13:09:28	2017-06-16 13:21:52
R1-1711474	Views on preemption indication for DL	KT Corp.	available	2017-06-16 13:11:45	2017-06-16 13:21:52
R1-1711475	Views on CCE-to-REG mapping	KT Corp.	available	2017-06-16 13:12:59	2017-06-16 13:21:52
R1-1711476	On UE Categories/Capabilities	Ericsson	noted	2017-06-16 13:23:46	2017-06-17 06:02:02
R1-1711477	On NR-PDCCH Structure	Ericsson	available	2017-06-16 13:23:46	2017-06-17 06:02:02
R1-1711478	On DM-RS for NR-PDCCH	Ericsson	available	2017-06-16 13:23:46	2017-06-17 06:02:02
R1-1711479	On Configuration of Control Resource Sets	Ericsson	available	2017-06-16 13:23:46	2017-06-17 06:02:02
R1-1711480	On Search Space and Blind Decoding Design	Ericsson	available	2017-06-16 13:23:46	2017-06-17 06:02:02
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R1-1711486	On PDCCH for Ultra-Reliable Transmission	Ericsson	available	2017-06-16 13:23:46	2017-06-17 06:02:02
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R1-1711489	On the Design of Short PUCCH for more than 2 UCI bits	Ericsson	available	2017-06-16 13:23:46	2017-06-17 06:02:02
R1-1711490	On the Design of Long PUCCH for 1-2 UCI bits	Ericsson	available	2017-06-16 13:23:46	2017-06-17 06:02:02
R1-1711491	On the Design of Long PUCCH for more than 2 UCI bits	Ericsson	available	2017-06-16 13:23:46	2017-06-17 06:02:02
R1-1711492	On support of Long PUCCH over multiple slots	Ericsson	available	2017-06-16 13:23:46	2017-06-17 06:02:02
R1-1711493	On Transmit Diversity Schemes for PUCCH	Ericsson	available	2017-06-16 13:23:46	2017-06-17 06:02:02
R1-1711494	On Resource Allocation for PUCCH and Multiplexing PUCCH Formats	Ericsson	available	2017-06-16 13:23:46	2017-06-17 06:02:02
R1-1711495	On UCI on PUSCH	Ericsson	available	2017-06-16 13:23:46	2017-06-17 06:02:02
R1-1711496	On Simultaneous Transmission of PUSCH and PUCCH	Ericsson	available	2017-06-16 13:23:46	2017-06-17 06:02:02
R1-1711497	On PUCCH for Ultra-Reliable Transmission	Ericsson	available	2017-06-16 13:23:46	2017-06-17 06:02:03
R1-1711498	On the Performance Evaluation of PUCCH for Ultra-Reliable Transmission	Ericsson	available	2017-06-16 13:23:46	2017-06-17 06:02:03
R1-1711499	On Resource Allocation in the Frequency Domain	Ericsson	available	2017-06-16 13:23:46	2017-06-17 06:02:03
R1-1711500	On Resource Allocation in the Time Domain	Ericsson	available	2017-06-16 13:23:46	2017-06-17 06:02:03
R1-1711501	On MCS/transport Block Size Determination	Ericsson	available	2017-06-16 13:23:46	2017-06-17 06:02:03
R1-1711502	On UL Data Scheduling Grant in NR	Ericsson	available	2017-06-16 13:23:46	2017-06-17 06:02:03
R1-1711503	On Scheduling Request Enhancements	Ericsson	available	2017-06-16 13:23:46	2017-06-17 06:02:03
R1-1711504	On SPS/Grant-Free Transmission	Ericsson	available	2017-06-16 13:23:46	2017-06-17 06:02:03
R1-1711505	On HARQ Retransmission for SPS/Grant-free	Ericsson	available	2017-06-16 13:23:46	2017-06-17 06:02:03
R1-1711506	On Code Block Group Formation and CRC Attachment	Ericsson	available	2017-06-16 13:23:46	2017-06-17 06:02:03
R1-1711507	On Retransmission Decoder Throughput Issues and CBG-based Retransmission Control	Ericsson	available	2017-06-16 13:23:46	2017-06-17 06:02:03
R1-1711508	On Design of CBG HARQ-ACK Feedback Schemes	Ericsson	available	2017-06-16 13:23:46	2017-06-17 06:02:03
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R1-1711510	On HARQ Codebook	Ericsson	available	2017-06-16 13:23:47	2017-06-17 06:02:02

R1-1711511	On Minimum Processing Time and Number of HARQ Processes in NR	Ericsson	available	2017-06-16 13:23:47	2017-06-17 06:02:02
R1-1711512	On HARQ and Soft Buffer Handling	Ericsson	available	2017-06-16 13:23:47	2017-06-17 06:02:02
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R1-1711514	On Pre-emption Indication for Uplink	Ericsson	available	2017-06-16 13:23:47	2017-06-17 06:02:02
R1-1711515	On Supporting High Reliability for Data Transmissions	Ericsson	available	2017-06-16 13:23:47	2017-06-17 06:02:02
R1-1711516	On Mixed Numerology	Ericsson	available	2017-06-16 13:23:47	2017-06-17 06:02:02
R1-1711517	On Scheduling and UCI Handling in Carrier Aggregation	Ericsson	available	2017-06-16 13:23:47	2017-06-17 06:02:02
R1-1711518	On SRS Fast Switching in NR	Ericsson	available	2017-06-16 13:23:47	2017-06-17 06:02:02
R1-1711519	On Dual Connectivity for NR	Ericsson	available	2017-06-16 13:23:47	2017-06-17 06:02:02
R1-1711520	Discussion of Multi-Antenna and Highly Directional Beam-Forming for Operation in Unlicensed Spectrum	Ericsson	available	2017-06-16 13:23:47	2017-06-17 06:02:02
R1-1711521	On Autonomous UL Transmissions for NR in Unlicensed Spectrum	Ericsson	available	2017-06-16 13:23:47	2017-06-17 06:02:02
R1-1711522	On Channel Access Mechanisms for NR in Unlicensed Spectrum	Ericsson	available	2017-06-16 13:23:47	2017-06-17 06:02:02
R1-1711523	On NR Operation in the 60 GHz Unlicensed Band	Ericsson	available	2017-06-16 13:23:47	2017-06-17 06:02:02
R1-1711524	On Physical Layer Design Policies for Unlicensed Operation of NR	Ericsson	available	2017-06-16 13:23:47	2017-06-17 06:02:02
R1-1711525	Technology Components for Unlicensed Operation	Ericsson	available	2017-06-16 13:23:47	2017-06-17 06:02:02
R1-1711526	Power Sharing for LTE-NR Dual Connectivity	Ericsson	noted	2017-06-16 13:23:47	2017-06-17 06:02:02
R1-1711527	PRACH Preamble Format Design	Cohere Technologies	available	2017-06-16 13:28:26	2017-06-17 03:53:10
R1-1711528	Extended Range Considerations for mMTC	HUGHES Network Systems Ltd	available	2017-06-16 13:29:00	2017-06-16 18:49:43
R1-1711529	Channel Model for Non-Terrestrial Networks	HUGHES Network Systems Ltd	available	2017-06-16 13:30:50	2017-06-16 18:50:04
R1-1711530	CBG based HARQ-Ack/Nack	Sequans Communications	available	2017-06-16 13:31:43	2017-06-16 13:40:06
R1-1711531	CBG based retransmission	Sequans Communications	available	2017-06-16 13:32:49	2017-06-16 13:40:06
R1-1711532	CRC attachment for CBG	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 13:33:18	2017-06-19 20:31:15
R1-1711533	CRC attachment for Smaller TBs	Nokia, Alcatel-Lucent Shanghai Bell	noted	2017-06-16 13:33:18	2017-06-19 20:31:15
R1-1711534	Code block segmentation of eMBB	Nokia, Alcatel-Lucent Shanghai Bell	noted	2017-06-16 13:33:18	2017-06-19 20:31:15
R1-1711535	Padding for LDPC	Nokia, Alcatel-Lucent Shanghai Bell	noted	2017-06-16 13:33:18	2017-06-19 20:31:15
R1-1711536	Rate matching for LDPC	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 13:33:18	2017-06-19 20:31:15
R1-1711537	LDPC designs for base graph 1 and base graph 2	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 13:33:18	2017-06-27 15:17:52
R1-1711538	Interleaving for LDPC	Nokia, Alcatel-Lucent Shanghai Bell	noted	2017-06-16 13:33:18	2017-06-19 20:31:16

R1-1711539	Distributed CRC Polar code construction	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 13:33:18	2017-06-19 20:31:16
R1-1711540	Early termination benefits of CRC distribution	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 13:33:18	2017-06-19 20:31:16
R1-1711541	Performance evaluation of polar code constructions	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 13:33:18	2017-06-25 11:52:50
R1-1711542	Sequence design for Polar codes	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 13:33:18	2017-06-19 20:31:16
R1-1711543	Rate matching for Polar codes	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 13:33:18	2017-06-19 20:31:16
R1-1711544	Implicit timing indication for PBCH	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 13:33:18	2017-06-19 20:31:16
R1-1711545	Summary of [89-24] Email discussion LDPC code base graph #1 for NR	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 13:33:18	2017-06-19 20:31:16
R1-1711546	Summary of [89-25] Email discussion on LDPC code base graph #2 for NR	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-16 13:33:18	2017-06-19 20:31:16
R1-1711547	Discussion on PRACH designs for short sequence	Sequans Communications	available	2017-06-16 13:34:47	2017-06-16 13:40:06
R1-1711548	Resource allocation for PUCCH to support URLLC	Sequans Communications	available	2017-06-16 13:36:26	2017-06-16 13:40:06
R1-1711549	Considerations on Satellite channel model	THALES	available	2017-06-16 13:46:12	2017-06-16 16:38:55
R1-1711550	NTN Bentpipe payload architecture and characteristics	THALES	available	2017-06-16 13:48:59	2017-06-16 17:39:55
R1-1711551	Considerations on multiplexing with different transmission durations	KDDI Corporation	available	2017-06-16 14:03:54	2017-06-16 14:06:30
R1-1711552	Management of URLLC DL control channel efficiency and reliability	Qualcomm Incorporated	available	2017-06-16 14:05:10	2017-06-17 05:17:42
R1-1711553	The necessity of reliable SR design for GF/GB UL URLLC transmission	Qualcomm Incorporated	available	2017-06-16 14:05:10	2017-06-17 05:17:42
R1-1711554	URLLC DL pre-emption and UL suspension indication channel design	Qualcomm Incorporated	available	2017-06-16 14:05:10	2017-06-17 05:17:42
R1-1711555	UL URLLC Capacity Based on URLLC and eMBB dynamic multiplexing	Qualcomm Incorporated	available	2017-06-16 14:05:10	2017-06-17 05:17:42
R1-1711556	Ultra reliable HARQ design with async CSI feedback	Qualcomm Incorporated	available	2017-06-16 14:05:10	2017-06-17 05:17:42
R1-1711557	Performance of polar code for very small block length	Qualcomm Incorporated	available	2017-06-16 14:05:10	2017-06-20 06:26:53
R1-1711558	Multiplexing of different types of RS for uplink	Ericsson	available	2017-06-16 14:11:16	2017-06-17 05:29:07
R1-1711559	Uplink operation for LTE+NR Dual Connectivity	VODAFONE Group Plc	withdrawn	2017-06-16 14:15:40	
R1-1711560	Discussion on wireless time synchronization for URLLC	SIA	available	2017-06-16 14:18:16	2017-06-16 15:23:03
R1-1711561	On Hybrid TDD and Measurements for Cross-link Interference Mitigation	Ericsson	available	2017-06-16 14:51:20	2017-06-17 04:32:04
R1-1711562	On Hybrid TDD and Signaling for Cross-link Interference Mitigation	Ericsson	revised	2017-06-16 14:51:20	2017-06-17 04:32:04

R1-1711563	On Dynamic TDD Scenarios	Ericsson	available	2017-06-16 14:51:20	2017-06-17 04:32:04
R1-1711564	On Duplexing in Paired Spectrum	Ericsson	available	2017-06-16 14:51:20	2017-06-17 04:32:04
R1-1711565	On bandwidth parties	Ericsson AB	available	2017-06-16 14:56:26	2017-06-16 21:30:26
R1-1711566	On semi-persistent CSI reporting on PUSCH	Ericsson	available	2017-06-16 14:58:03	2017-06-16 21:13:44
R1-1711567	Summary of e-mail discussion on DCI content	Ericsson LM	available	2017-06-16 15:03:03	2017-06-27 15:17:52
R1-1711568	Considerations on HAPS channel model	CNES, Thales	available	2017-06-16 16:18:46	2017-06-16 16:39:44
R1-1711569	PRACH Design	TCL Communication Ltd.	available	2017-06-16 21:26:15	2017-06-16 21:32:24
R1-1711570	UE_ID Insertion for Early Block Discrimination on DCI Blind Detection	Coherent Logix	available	2017-06-16 21:34:19	2017-06-20 02:58:41
R1-1711571	Scrambling Sequence Design for Early Block Discrimination on DCI Blind Detection	Coherent Logix	available	2017-06-16 21:34:19	2017-06-20 02:58:41
R1-1711572	Scrambling Sequence Design for Multi-Mode Block Discrimination on DCI Blind Detection	Coherent Logix	withdrawn	2017-06-16 21:34:19	
R1-1711573	Early Block Discrimination on DCI Blind Detection	Coherent Logix	available	2017-06-16 21:34:19	2017-06-28 13:47:52
R1-1711574	Discussion on bandwidth part configuration	LG Electronics Inc.	available	2017-06-17 07:03:22	2017-06-17 10:09:23
R1-1711575	Discussion on Polar codes for PBCH	CATT	available	2017-06-19 07:50:21	2017-06-19 08:58:20
R1-1711576	L3 Mobility based on CSI-RS based measurments	CATT	available	2017-06-19 07:51:33	2017-06-20 07:43:52
R1-1711577	On UL coverage extension of TDD @3.5GHz	ORANGE	revised	2017-06-19 20:43:18	2017-06-20 07:43:52
R1-1711578	Circulant permutation matrix design for LDPC codes base graph #2	LG Electronics	revised	2017-06-20 09:15:57	2017-06-27 15:17:52
R1-1711579	Calibration results for Phase 1 and Phase 2 NR MIMO system level calibration	vivo	available	2017-06-20 09:21:11	2017-06-21 16:29:24
R1-1711580	SS burst set composition	Samsung	noted	2017-06-20 09:25:07	2017-06-27 15:17:52
R1-1711581	Measurement based on CSI-RS for L3 mobility	Samsung	available	2017-06-20 09:25:41	2017-06-28 13:47:52
R1-1711582	Analysis of the benefits of PC bits for Polar code	Huawei, HiSilicon	available	2017-06-20 16:24:50	2017-06-21 16:29:24
R1-1711583	DMRS Structure for PDCCH	Samsung	available	2017-06-21 12:15:49	2017-06-23 20:31:49
R1-1711584	On UL coverage extension of TDD @3.5GHz	ORANGE	noted	2017-06-21 12:18:11	2017-06-23 20:31:49
R1-1711585	Partial pre-emption based multiplexing data with different transmission durations in DL	Samsung	available	2017-06-21 12:21:03	2017-06-23 20:31:49
R1-1711586	Selected highlights from RAN#76 of relevance to RAN1	RAN1 Chair	noted	2017-06-21 12:26:05	2017-06-21 16:29:24
R1-1711587	Shift coefficients design for base graph 1	ZTE	revised	2017-06-21 16:44:44	2017-06-27 15:17:52
R1-1711588	Shift coefficients design for base graph 2	ZTE	revised	2017-06-21 16:45:08	2017-06-27 15:17:52
R1-1711589	Timing indication based on SS block	Samsung	noted	2017-06-22 07:58:35	2017-06-23 20:31:49
R1-1711590	Feedback transmission of type II codebook	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-22 08:34:10	2017-06-22 08:57:13
R1-1711591	Link level performance evaluation for mobility scenario	Samsung	available	2017-06-22 08:41:54	2017-06-23 20:31:49
R1-1711592	Composite beam transmission for SS blocks	Samsung	available	2017-06-22 08:41:54	2017-06-23 20:31:49
R1-1711593	System level evaluation on effect of penetration loss in sub-6GHz and above-6GHz frequency bands	Samsung	available	2017-06-22 08:41:54	2017-06-23 20:31:49
R1-1711594	Analysis on random cluster effect in map-based hybrid channel model	Samsung	available	2017-06-22 08:41:54	2017-06-23 20:31:49
R1-1711595	Impact of channel estimation error on the performance of high spectral efficiency MIMO schemes	Samsung	available	2017-06-22 08:41:54	2017-06-27 15:17:52

R1-1711596	Indication of Preempted Resources for TB-based re-transmission	Samsung	available	2017-06-22 08:41:54	2017-06-23 20:31:49
R1-1711597	Remaining Issues on RB Grid	Samsung	available	2017-06-22 08:41:54	2017-06-23 20:31:49
R1-1711598	On numerology for NR RACH	Samsung	available	2017-06-22 08:41:54	2017-06-23 20:31:49
R1-1711599	Remaining issues on PT-RS dendisy in CP-OFDM	Samsung	available	2017-06-22 08:41:54	2017-06-23 20:31:49
R1-1711600	PRACH preamble sequences and formats for capacity enhancement and beam management	Huawei, HiSilicon	noted	2017-06-22 09:02:24	2017-06-22 14:56:47
R1-1711601	Draft Agenda of RAN1#AH_NR2 meeting	RAN1 Chair	approved	2017-06-22 13:29:38	2017-06-22 14:16:07
R1-1711602	Common and Beam Specific Power Control Parameters	InterDigital, Inc.	available	2017-06-22 13:33:16	2017-06-22 14:56:47
R1-1711603	Short PUCCH for small UCI payloads	CATT	available	2017-06-22 20:16:34	2017-06-23 20:31:49
R1-1711604	Beam management for PDCCH	Samsung	available	2017-06-22 20:19:15	2017-06-23 20:31:49
R1-1711605	PBCH channel coding	Qualcomm Incorporated	available	2017-06-22 20:20:43	2017-06-27 15:17:52
R1-1711606	Codeword mapping and interleaving	ZTE	available	2017-06-22 20:25:16	2017-06-25 11:52:50
R1-1711607	On CSI framework details	ZTE	available	2017-06-22 20:25:55	2017-06-25 11:52:50
R1-1711608	On reciprocity based CSI acquisition	ZTE	available	2017-06-22 20:26:20	2017-06-25 11:52:50
R1-1711609	Further discussion on CSI acquisition for reciprocity-based operation	Ericsson	available	2017-06-22 20:28:49	2017-06-26 03:03:20
R1-1711610	UL MIMO for codebook based transmission	Ericsson	noted	2017-06-22 20:29:25	2017-06-26 09:06:31
R1-1711611	Time Index Signaling for SS Blocks	Intel Corporation	revised	2017-06-22 20:30:39	2017-06-25 02:49:29
R1-1711612	SS Block Composition	Intel Corporation	revised	2017-06-22 20:31:07	2017-06-25 02:49:29
R1-1711613	On time and frequency tracking of the channel	Ericsson	available	2017-06-23 16:05:08	2017-06-26 01:09:57
R1-1711614	Dynamic resource allocation for Integrated Access and Backhaul	Samsung	available	2017-06-23 20:38:37	2017-06-24 06:59:12
R1-1711615	Deployment scenarios for Integrated Access and Backhaul	Samsung	available	2017-06-23 20:38:37	2017-06-24 06:59:12
R1-1711616	Evaluation assumptions for Integrated Access and Backhaul	Samsung	available	2017-06-23 20:38:37	2017-06-24 06:59:12
R1-1711617	RACH power control and power ramping procedure	CATT	available	2017-06-23 20:38:37	2017-06-24 06:59:12
R1-1711618	NR RACH Preamble Format for capacity enhancement,	CATT	available	2017-06-23 20:38:37	2017-06-26 01:09:57
R1-1711619	Discussion on msg.3 tx timing determination	Samsung	available	2017-06-23 20:38:37	2017-06-24 06:59:12
R1-1711620	Discussion on RACH design	Samsung	available	2017-06-23 20:38:37	2017-06-24 06:59:12
R1-1711621	Assisted information for Msg.3 tx beam determination	Samsung	available	2017-06-23 20:38:37	2017-06-24 06:59:12
R1-1711622	Discussion on NR-PBCH design and SS block composition	NTT DOCOMO, INC.	available	2017-06-23 20:38:37	2017-06-27 15:17:52
R1-1711623	Correction on the formula of AnnexA	ZTE, Ericsson	revised	2017-06-23 20:38:37	2017-06-28 13:47:52
R1-1711624	Correction on Procedure A of spatially-consistency UT mobility modeling	ZTE, Ericsson	revised	2017-06-23 20:38:37	2017-06-28 13:47:52
R1-1711625	PRACH Msg1 retransmission	MediaTek Inc.	available	2017-06-23 20:38:37	2017-06-24 06:59:12
R1-1711626	RRM for wider bandwidth operations	Samsung	available	2017-06-23 20:38:37	2017-06-24 06:59:12
R1-1711627	LDPC shift coefficients design for BG1	Samsung	available	2017-06-23 20:38:37	2017-06-27 15:17:52
R1-1711628	LDPC shift coefficients design for BG2	Samsung	available	2017-06-23 20:38:37	2017-06-27 15:17:52
R1-1711629	Performance evaluation of LDPC shift coefficients design for BG1	Samsung	available	2017-06-23 20:38:37	2017-06-27 15:17:52
R1-1711630	Performance evaluation of LDPC shift coefficients design for BG2	Samsung	available	2017-06-23 20:38:37	2017-06-27 15:17:52

R1-1711631	On Details of the PT-RS Design for DFT-s-OFDM	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-23 20:38:37	2017-06-24 14:35:52
R1-1711632	Channel and interference measurement for CSI acquisition	Huawei, HiSilicon	available	2017-06-23 20:38:37	2017-06-25 11:52:50
R1-1711633	PDCCH structure	Qualcomm Incorporated	available	2017-06-23 20:49:38	2017-06-25 02:49:29
R1-1711634	RS for DL control channel	Qualcomm Incorporated	available	2017-06-23 20:50:11	2017-06-25 02:49:29
R1-1711635	Summary of Open Issues on Layer Mapping	Samsung	revised	2017-06-23 20:53:10	
R1-1711636	General views on DL beam management	Huawei, HiSilicon	available	2017-06-24 06:57:47	2017-06-25 11:52:50
R1-1711637	Discussion on NTN Deployment Scenarios	Samsung	available	2017-06-24 14:39:04	2017-06-25 11:52:50
R1-1711638	Discussion on transition between NR network coordination schemes	Samsung	available	2017-06-24 14:41:03	2017-06-25 11:52:50
R1-1711639	Performance comparison of interleaver designs	Qualcomm	available	2017-06-25 03:02:41	2017-06-27 15:17:52
R1-1711640	Interleaver design for Polar codes	Qualcomm Incorporated	withdrawn	2017-06-25 03:04:55	
R1-1711641	Repetition scheme of polar codes	LG Electronics	available	2017-06-26 01:56:09	2017-06-27 15:17:52
R1-1711642	NR topics requiring coordination between RAN1 and RAN2	RAN2 Chair	noted	2017-06-26 08:43:03	2017-06-26 09:06:31
R1-1711643	Views on SRS designs	Mitsubishi Electric	available	2017-06-26 08:43:54	2017-06-27 15:17:52
R1-1711644	Study of Split-CRC Polar Code Construction for Early Termination	Tsofun Algorithm	noted	2017-06-26 09:18:42	2017-06-27 15:17:52
R1-1711645	SS burst set composition consideration	Qualcomm Incorporated	noted	2017-06-26 09:20:30	2017-06-27 15:17:52
R1-1711646	Timing indication based on SS block consideration	Qualcomm Incorporated	noted	2017-06-26 09:21:26	2017-06-27 15:17:52
R1-1711647	Time Index Signaling for SS Blocks	Intel Corporation	available	2017-06-26 14:32:45	2017-06-27 15:17:52
R1-1711648	SS Block Composition	Intel Corporation	available	2017-06-26 14:33:33	2017-06-27 15:17:52
R1-1711649	Discussion on 1-symbol NR-PUCCH for UCI of up to 2 bits	Panasonic Corporation	available	2017-06-27 15:10:16	2017-06-27 15:17:52
R1-1711650	NR-PBCH content	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-27 15:10:17	2017-06-27 15:17:52
R1-1711651	Discussion on CSI-RS design	Qualcomm Incorporated	withdrawn	2017-06-27 15:10:18	
R1-1711652	Summary of the 2nd NOMA Workshop	ZTE	available	2017-06-27 15:10:19	2017-06-27 15:17:52
R1-1711653	Considerations of NR-LTE coexistence in uplink	ZTE	revised	2017-06-27 15:10:19	2017-06-27 15:17:52
R1-1711654	WF on NR-SS sequence design	NTT DOCOMO, ZTE, InterDigital	noted	2017-06-27 15:10:20	2017-06-27 15:17:52
R1-1711655	Discussion on short-PUCCH more than 2-bit	vivo	available	2017-06-27 15:10:20	2017-06-27 15:17:52
R1-1711656	WF on PRACH formats for long sequence length (L = 839)	ZTE	withdrawn	2017-06-27 15:10:20	
R1-1711657	[DRAFT] Response LS on Support for fake gNB detection mechanisms	Nokia	revised	2017-06-27 15:10:20	2017-07-01 00:57:51
R1-1711658	Considerations on SS block compositions	Sony	available	2017-06-27 15:10:21	2017-06-27 15:17:52
R1-1711659	Discussion on SS block time index indication	Sony	available	2017-06-27 15:10:21	2017-06-27 15:17:52
R1-1711660	WF on CSI-RS	Samsung, Ericsson, NTT DOCOMO, CATT	available	2017-06-27 15:10:21	2017-06-28 13:47:52

R1-1711661	Summary of views on NR CSI-RS	Huawei, HiSilicon	available	2017-06-27 15:10:21	2017-06-27 15:17:52
R1-1711662	WF on CW to layer mapping	Huawei, HiSilicon, ZTE, Xinwei, China Unicom, ETRI, Softbank, DOCOMO, LGE, Deutsche Telekom, CATR	available	2017-06-27 15:10:21	2017-06-28 13:47:52
R1-1711663	On UL PT-RS design	LG Electronics	withdrawn	2017-06-27 15:10:21	
R1-1711664	WF on number of MCS and CQI configuration	Intel, Samsung	available	2017-06-27 15:10:22	2017-07-01 00:57:51
R1-1711665	WF on MIMO layer to CW correspondence	Intel, AT&T	available	2017-06-27 15:10:22	2017-07-01 00:57:51
R1-1711666	WF on SS block and DM-RS collision handling	Intel	noted	2017-06-27 15:10:22	2017-06-29 12:37:51
R1-1711667	WF on multiple PDSCH approach of supporting NC-JT	Intel	noted	2017-06-27 15:10:22	2017-06-28 13:47:52
R1-1711668	WF on SRS sequence for NR	Intel, Samsung, Qualcomm	noted	2017-06-27 15:10:22	2017-06-29 12:37:51
R1-1711669	LDPC design for eMBB data	CATT	revised	2017-06-27 15:10:22	2017-06-27 15:17:52
R1-1711670	Summary of remaining items on beam management	Qualcomm	withdrawn	2017-06-27 15:10:23	
R1-1711671	Performance impact of inactive antenna ports	Ericsson	available	2017-06-27 15:10:23	2017-06-27 15:17:52
R1-1711672	Summary of QCL	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-06-27 15:10:23	2017-06-27 15:17:52
R1-1711673	WF on QCL	Nokia, Alcatel-Lucent Shanghai Bell	withdrawn	2017-06-27 15:10:23	
R1-1711674	Summary of Issues and WFs on Codebook based transmission for UL	Intel	revised	2017-06-27 15:10:23	2017-06-28 13:47:52
R1-1711675	WF on UE self-interference	Vivo, OPPO, Coolpad, China Telecom, Xiaomi, Huawei, HiSilicon, China Unicom	noted	2017-06-27 15:10:23	2017-06-27 15:17:52
R1-1711676	WF on Transmission Scheme of Broadcast PDSCH	Qualcomm	withdrawn	2017-06-27 15:10:23	
R1-1711677	Summary of the E-mail Discussion [89-21]: On Long PUCCH for NR	Ericsson	noted	2017-06-27 15:10:23	2017-06-28 13:47:52
R1-1711678	Way forward on the mapping of SS blocks	Nokia	revised	2017-06-27 15:10:23	2017-06-29 12:37:51
R1-1711679	Impact of Puncturing on Bit-channel Capacities	Ericsson	available	2017-06-27 15:10:23	2017-06-28 13:47:52
R1-1711680	WF on LTE-NR Coexistence with UL sharing	Huawei, HiSilicon	withdrawn	2017-06-27 15:10:24	
R1-1711681	WF on the structure of a data channel including DMRS	Panasonic, OPPO, NTT DOCOMO	available	2017-06-27 15:10:24	2017-06-27 15:17:52
R1-1711682	WF on UE to UE measurement as an enabler for CLI mitigation schemes	ZTE	noted	2017-06-27 15:10:24	2017-06-27 15:17:52
R1-1711683	[DRAFT LS] on NR Beam Management	Qualcomm	revised	2017-06-27 15:10:24	2017-07-01 00:57:51
R1-1711684	[DRAFT] LS on Beam Aspects of NR RACH	Huawei	revised	2017-06-27 15:10:24	2017-06-29 12:37:51
R1-1711685	[DRAFT] LS on HARQ operation	Nokia	revised	2017-06-27 15:10:24	2017-07-01 00:57:51
R1-1711686	LS on NR UL SPS / UL transmission without UL grant	RAN1, NTT DOCOMO	approved	2017-06-27 15:10:24	2017-08-12 09:40:07
R1-1711687	[DRAFT LS] to RAN2 on PDCCH monitoring and DRX	CATT	withdrawn	2017-06-27 15:10:24	

R1-1711688	Way Forward on PTRS	Intel	revised	2017-06-27 15:10:24	2017-06-29 12:37:51
R1-1711689	Outputs of offline discussion on RBG size/number determination	OPPO	revised	2017-06-27 15:10:24	2017-07-03 14:07:51
R1-1711690	WF on the number of CBGs	OPPO	available	2017-06-27 15:10:24	2017-06-28 13:47:52
R1-1711691	Analysis of SSS Proposals	Intel Corporation	revised	2017-06-27 15:10:24	2017-06-28 13:47:52
R1-1711692	WF on final PCM selection	Nokia, Alcatel-Lucent Shanghai Bell	noted	2017-06-27 15:10:24	2017-06-27 15:17:52
R1-1711693	Base Graph 1 lifting and evaluations	Intel Corporation	available	2017-06-27 15:10:24	2017-06-27 15:17:52
R1-1711694	Base Graph 2 lifting and evaluations	Intel Corporation	available	2017-06-27 15:10:25	2017-06-27 15:17:52
R1-1711695	WF on cross-link interference aware UPLC	Huawei	available	2017-06-27 15:10:25	2017-06-27 15:17:52
R1-1711696	On NR LDPC design and performance	MediaTek Inc.	revised	2017-06-27 15:10:25	2017-06-27 15:17:52
R1-1711697	WF on rate-matching for Polar codes	Qualcomm	noted	2017-06-27 15:10:25	2017-06-29 12:37:51
R1-1711698	WF on interleaver design	Qualcomm	available	2017-06-27 15:10:25	2017-06-29 12:37:51
R1-1711699	WF on SRS design in NR	LG Electronics	revised	2017-06-27 15:10:25	2017-06-29 12:37:51
R1-1711700	WF on CLI measurement	MediaTek Inc.	noted	2017-06-27 15:10:25	2017-06-27 15:17:52
R1-1711701	Considerations of NR-LTE coexistence in uplink	ZTE	noted	2017-06-27 15:10:25	2017-06-27 15:17:52
R1-1711702	Rate matching for Polar code	Huawei, HiSilicon	available	2017-06-27 15:10:25	2017-06-28 13:47:52
R1-1711703	Support of implicit soft combining for PBCH by Polar code construction	Huawei, HiSilicon	withdrawn	2017-06-27 15:10:26	
R1-1711704	Benefits of implicit soft combining for PBCH by Polar code construction	Huawei, HiSilicon	withdrawn	2017-06-27 15:10:26	
R1-1711705	WF on handling of single UL transmision	NTT DOCOMO	revised	2017-06-27 15:10:26	2017-06-27 15:17:52
R1-1711706	On Hybrid TDD and Signaling for Cross-link Interference Mitigation	Ericsson	withdrawn	2017-06-27 15:10:26	
R1-1711707	WF on inter-TRP signaling for UE-to-UE cross-link interference measurement	LG Electronics	noted	2017-06-27 15:10:27	2017-06-27 15:17:52
R1-1711708	WF on REG bundle size in a CORESET with interleaving	LG Electronics, ETRI, NTT DOCOMO, Ericsson, InterDigital	noted	2017-06-27 15:10:27	2017-06-27 15:17:52
R1-1711709	WF on NR-LTE coexistence in overlapping spectrum	AT&T, Deutsche Telekom, Vodafone, Intel, Ericsson, Samsung, Orange, China Unicom, Huawei, HiSilicon, China Telecom	noted	2017-06-27 15:10:27	2017-06-27 15:17:52
R1-1711710	WF on NR-LTE coexistence	AT&T, Nokia, Ericsson, Vodafone	noted	2017-06-27 15:10:27	2017-06-29 12:37:51
R1-1711711	LDPC design for eMBB data	CATT	available	2017-06-27 15:10:27	2017-06-27 15:17:52
R1-1711712	WF on group-based beam reporting	ZTE, ASTRI, Nokia, ASB, NTT DOCOMO, Intel, Qualcomm, Samsung, AT&T	available	2017-06-27 15:10:27	2017-07-01 00:57:51
R1-1711713	WF on beam indication	ZTE	withdrawn	2017-06-27 15:10:27	

R1-1711714	WF on DMRS multipexing in time domain	ZTE, Xinwei, ASTRI, Spreadtrum	noted	2017-06-27 15:10:27	2017-06-28 13:47:52
R1-1711715	WF on channel reciprocity based CSI	ZTE, Nokia, ASB, LG Electronics, ASTRI, Ericsson, NTT DOCOMO	available	2017-06-27 15:10:27	2017-07-01 00:57:51
R1-1711716	WF on partial channel reciprocity based CSI	ZTE, CMCC, China Telecom, China Unicom, ASTRI	available	2017-06-27 15:10:27	2017-07-01 00:57:51
R1-1711717	WF on using SS block for beam recovery	ZTE, Ericsson, NTT DOCOMO, MediaTek, Spreadtrum, vivo, OPPO, Qualcomm, Xinwei, LG Electronics, AT&T, Lenovo, CMCC, China Unicom, China Telecom, ASTRI, Samsung, Nokia, ASB, III, MTI, Sharp, National Instruments	noted	2017-06-27 15:10:27	2017-07-01 00:57:51
R1-1711718	WF on DL beam indication with beam correspondence	ZTE	withdrawn	2017-06-27 15:10:27	
R1-1711719	WF on CSI in PUCCH	ZTE, NTT DOCOMO	available	2017-06-27 15:10:27	2017-07-01 00:57:51
R1-1711720	WF on Type II CSI	ZTE, MediaTek	available	2017-06-27 15:10:27	2017-07-01 00:57:51
R1-1711721	WF on power control	ZTE, NTT DOCOMO	noted	2017-06-27 15:10:27	2017-06-29 12:37:51
R1-1711722	WF on DMRS multiplexing with data	ZTE, Qualcomm, KT Corp., NTT DOCOMO	noted	2017-06-27 15:10:27	2017-06-29 12:37:51
R1-1711723	WF on CSI-RS CDM pattern	ZTE	available	2017-06-27 15:10:27	2017-06-28 13:47:52
R1-1711724	Summary of power control	ZTE	noted	2017-06-27 15:10:27	2017-06-29 12:37:51
R1-1711725	Summary of channel reciprocity based CSI	ZTE	noted	2017-06-27 15:10:27	2017-07-01 00:57:51
R1-1711726	WF on DMRS port multiplexing in frequency domain	MediaTek Inc.	withdrawn	2017-06-27 15:10:28	
R1-1711727	LDPC design for base graph 1	Huawei, HiSilicon	available	2017-06-27 15:10:28	2017-06-27 15:17:52
R1-1711728	WF on CRC Attachment for CBGs	Ericsson	available	2017-06-27 15:10:28	2017-06-28 13:47:52
R1-1711729	WF on Circular buffer of Polar Code	Ericsson, Qualcomm, MediaTek, LGE	noted	2017-06-27 15:10:28	2017-07-01 00:57:52
R1-1711730	WF on the Number of Assistant Bits for Polar Construction	Ericsson, NTT DOCOMO, Qualcomm, Intel, Tsofun Algorithm, Samsung, LG, Fujitsu	noted	2017-06-27 15:10:28	2017-06-28 13:47:52
R1-1711731	WF on LDPC Code Usage Scenarios	MediaTek, Qualcomm, InterDigital, ZTE	noted	2017-06-27 15:10:28	2017-07-01 00:57:52
R1-1711732	void	ETSI	withdrawn	2017-06-27 15:10:28	
R1-1711733	void	ETSI	withdrawn	2017-06-27 15:10:28	

R1-1711734	void	ETSI	withdrawn	2017-06-27 15:10:28	
R1-1711735	void	ETSI	withdrawn	2017-06-27 15:10:28	
R1-1711736	void	ETSI	withdrawn	2017-06-27 15:10:28	
R1-1711737	void	ETSI	withdrawn	2017-06-27 15:10:28	
R1-1711738	void	ETSI	withdrawn	2017-06-27 15:10:28	
R1-1711739	void	ETSI	withdrawn	2017-06-27 15:10:28	
R1-1711740	void	ETSI	withdrawn	2017-06-27 15:10:28	
R1-1711741	void	ETSI	withdrawn	2017-06-27 15:10:28	
R1-1711742	void	ETSI	withdrawn	2017-06-27 15:10:28	
R1-1711743	void	ETSI	withdrawn	2017-06-27 15:10:29	
R1-1711744	void	ETSI	withdrawn	2017-06-27 15:10:29	
R1-1711745	void	ETSI	withdrawn	2017-06-27 15:10:29	
R1-1711746	WF on time resource indication	OPPO	withdrawn	2017-06-27 15:10:29	
R1-1711747	Shift coefficients design for base graph 1	ZTE	available	2017-06-28 13:41:41	2017-07-01 00:57:52
R1-1711748	Shift coefficients design for base graph 2	ZTE	available	2017-06-28 13:41:42	2017-07-01 00:57:52
R1-1711749	Segmentation of Polar codes	ZTE	available	2017-06-28 13:41:42	2017-07-01 00:57:52
R1-1711750	WF on UL non-codebook based transmission	Huawei, HiSilicon, DOCOMO, Sharp, LGE, Ericsson, China Telecom, Deutsche Telekom, Xinwei, Vodafone, CeWiT, China Unicom, Tejas Networks, CATR, IITH, IITM, Panasonic, ZTE, InterDigital, AT&T, SoftBank, KDDI	noted	2017-06-28 13:41:42	2017-07-01 00:57:52
R1-1711751	On Bit Mapping Design for Polar Codes	Ericsson	available	2017-06-28 13:41:43	2017-06-28 13:47:52
R1-1711752	Polar Code Performance in Fading Channel	Ericsson	available	2017-06-28 13:41:43	2017-06-28 13:47:52
R1-1711753	WF on UL resource allocation for PUSCH with DT-s-OFDM waveform in NR	NEC, NTT DOCOMO, Panasonic, OPPO, Ericsson, Nokia, ASB	noted	2017-06-28 13:41:43	2017-06-29 12:37:52
R1-1711754	WF on NR PDCCH blind decodes	vivo, Samsung	noted	2017-06-28 13:41:43	2017-06-28 13:47:52
R1-1711755	Open issues on SRS design	Sony	revised	2017-06-28 13:41:43	2017-06-28 13:47:52
R1-1711756	WF on Polar rate-matching selection	MediaTek Inc.	withdrawn	2017-06-28 13:41:43	
R1-1711757	Optimization and comparison of Polar code rate-matching design	MediaTek Inc.	available	2017-06-28 13:41:43	2017-06-28 13:47:52
R1-1711758	Correction on the formula of AnnexA	ZTE, Ericsson	agreed	2017-06-28 13:41:43	2017-07-01 00:57:52
R1-1711759	Summary of offline discussion on CSI-RS	Samsung	noted	2017-06-28 13:41:45	2017-06-28 13:47:52
R1-1711760	Correction on Procedure A of spatially-consistency UT mobility modeling	ZTE, Ericsson	agreed	2017-06-28 13:41:45	2017-07-01 00:57:52
R1-1711761	WF on measurement based on SS block	NTT DOCOMO, Ericsson, Huawei, HiSilicon, AT&T	noted	2017-06-28 13:41:46	2017-06-28 13:47:52

R1-1711762	WF on measurement based on CSI-RS	NTT DOCOMO, Ericsson, AT&T	noted	2017-06-28 13:41:46	2017-06-28 13:47:52
R1-1711763	WF on radio link monitoring	NTT DOCOMO, Ericsson, AT&T	noted	2017-06-28 13:41:46	2017-06-28 13:47:52
R1-1711764	WF on Polar codes construction	NTT DOCOMO, Ericsson, Qualcomm, Intel, Tsofun Algorithm, CATT, AT&T	noted	2017-06-28 13:41:46	2017-06-28 13:47:52
R1-1711765	Summary of views on TRS	MediaTek Inc.	noted	2017-06-28 13:41:46	2017-06-29 12:37:52
R1-1711766	WF on TRS	MediaTek, Huawei, HiSilicon, Ericsson, Qualcomm	noted	2017-06-28 13:41:46	2017-07-01 00:57:52
R1-1711767	WF on SRS sequence generation for partial overlapping	LG Electronics, Intel Corporation, ZTE	noted	2017-06-28 13:41:46	2017-06-29 12:37:52
R1-1711768	On bandwidth parts and 'RF' requirements	Ericsson	revised	2017-06-28 13:41:46	2017-06-28 13:47:52
R1-1711769	WF on CSI feedback for NCJT	LG Electronics, Ericsson, Intel	available	2017-06-28 13:41:46	2017-07-01 00:57:52
R1-1711770	WF on DL DMRS for broadcast/multicast PDSCH	LG Electronics, Qualcomm	noted	2017-06-28 13:41:46	2017-06-28 13:47:52
R1-1711771	WF on signaling DMRS configuration	LG Electronics, ZTE	noted	2017-06-28 13:41:46	2017-06-28 13:47:52
R1-1711772	WF on processing time requirements	Qualcomm	revised	2017-06-28 13:41:46	2017-06-29 12:37:52
R1-1711773	WF on PT-RS collision avoidance	LG Electronics, Huawei, CATT, ZTE	noted	2017-06-28 13:41:47	2017-06-29 12:37:52
R1-1711774	Circulant permutation matrix design for LDPC codes	LG Electronics	revised	2017-06-28 13:41:47	2017-06-28 13:47:52
R1-1711775	Circulant permutation matrix design for LDPC codes base graph #2	LG Electronics	revised	2017-06-28 13:41:47	2017-06-28 13:47:52
R1-1711776	WF on PUCCH resource allocation	LG Electronics	available	2017-06-28 13:41:47	2017-07-01 00:57:52
R1-1711777	WF on CW to layer mapping scheme for data channels	Qualcomm, ATT, Ericsson, Samsung, Nokia, ASB, CATT, Interdigital, Intel, Sharp, Verizon, BT, CHTTL, Panasonic, NEC, KDDI	available	2017-06-28 13:41:47	2017-07-01 00:57:52
R1-1711778	Remaining issues on NR DM-RS	Qualcomm	noted	2017-06-28 13:41:47	2017-06-29 12:37:52
R1-1711779	[DRAFT] LS on subcarrier alignment and channel raster	AT&T, Sprint, T-Mobile USA, Huawei, HiSilicon, Samsung, Deutsche Telekom, Ericsson, Intel, China Telecom	revised	2017-06-28 13:41:47	2017-06-28 13:47:52
R1-1711780	Summary on DL PRB bundling	Xinwei	revised	2017-06-28 13:41:47	2017-06-28 13:47:52
R1-1711781	WF on performance comparison of sequences for Polar code	Huawei, HiSilicon	noted	2017-06-28 13:41:47	2017-06-29 12:37:52
R1-1711782	WF on UL transmission without grant	NEC	available	2017-06-28 13:41:47	2017-06-28 13:47:52

R1-1711783	WF on UL DMRS pattern for DFT-S-OFDM	LG Electronics, ZTE, Ericsson, NEC, NTT DOCOMO	noted	2017-06-28 13:41:47	2017-06-28 13:47:52
R1-1711784	WF on DMRS design	MediaTek, Huawei, HiSilicon, China Telecom, ZTE, ASUSTek, CeWiT, Spreadtrum, Tejas Networks, CATR, Deutsche Telekom, IITH, Xinwei, MTI, CHTTL, China Unicom, IITM, ITRI	noted	2017-06-28 13:41:47	2017-06-29 12:37:52
R1-1711785	WF on periodic CSI reporting on short PUCCH	Ericsson, Samsung, Huawei, HiSilicon, CATT	available	2017-06-28 13:41:47	2017-07-01 00:57:52
R1-1711786	WF on unifying wideband and partial band definitions	Ericsson, LGE, Samsung	available	2017-06-28 13:41:47	2017-07-01 00:57:52
R1-1711787	WF on CSI-RS	Samsung, Ericsson, NTT DOCOMO, CATT, LGE	noted	2017-06-28 13:41:47	2017-06-29 12:37:52
R1-1711788	Way forward on further details of bandwidth part operation	Intel, AT&T, Huawei, HiSilicon	noted	2017-06-28 13:41:48	2017-06-28 13:47:52
R1-1711789	Way forward on PRB indexing	Intel, Sharp, ETRI	revised	2017-06-28 13:41:48	2017-06-28 13:47:52
R1-1711790	On NR LDPC design and performance	MediaTek Inc.	available	2017-06-28 13:41:48	2017-06-28 13:47:52
R1-1711791	WF on Antenna Switching for SRS Transmission	Huawei, HiSilicon, Softbank, CMCC, Deutsche Telekom, CATR, Tejas Networks, OPPO, Qualcomm, CeWiT, Sony, ZTE, Xinwei, IITM, China Unicom, IITH, Ericsson, InterDigital, China Telecom, MediaTek	noted	2017-06-28 13:41:48	2017-06-29 12:37:52
R1-1711792	WF on codebook based UL transmission	MediaTek, Nokia, Alcatel-Lucent Shanghai Bell	noted	2017-06-28 13:41:48	2017-07-01 00:57:52
R1-1711793	WF on codeword mapping	MediaTek Inc.	available	2017-06-28 13:41:48	2017-07-01 00:57:52
R1-1711794	WF on polar code sequence	Samsung	noted	2017-06-28 13:41:48	2017-06-29 12:37:52
R1-1711795	On bandwidth parts and 'RF' requirements	Ericsson	noted	2017-06-28 13:41:48	2017-06-28 13:47:52
R1-1711796	1-symbol short PUCCH with 1 or 2 bits UCI	Qualcomm	available	2017-06-28 13:41:48	2017-06-28 13:47:52

R1-1711797	WF on DMRS sequence	Samsung, Ericsson, Qualcomm Incorporated, CATT, Nokia, Alcatel-Lucent Shanghai Bell, Intel, AT&T, NTT DOCOMO, INC., LG Electronics, KT Corp., MediaTek Inc., Mitsubishi Electric Co., Spreadtrum, Fujitsu, Xinwei, KDDI, Panasonic, ITL	noted	2017-06-28 13:41:48	2017-06-29 12:37:52
R1-1711798	Summary of CSI Acquisition Details	NTT DOCOMO	revised	2017-06-28 13:41:48	2017-06-28 13:47:52
R1-1711799	WF on random access association configuration	ZTE	revised	2017-06-28 13:41:48	2017-06-29 12:37:52
R1-1711800	WF on SS block repetition	ZTE, Sierra Wireless	available	2017-06-28 13:41:48	2017-06-29 12:37:52
R1-1711801	WF on power offset of NR-PBCH DMRS and NR-SSS	MediaTek, Huawei, HiSilicon, NTT DOCOMO	noted	2017-06-28 13:41:48	2017-06-28 13:47:52
R1-1711802	WF on further details for bandwidth part	MediaTek, Huawei, HiSilicon	noted	2017-06-28 13:41:48	2017-06-28 13:47:52
R1-1711803	WF on configuration of CSI-RS for CSI acquisition	LG Electronics, Samsung	noted	2017-06-28 13:41:48	2017-06-28 13:47:52
R1-1711804	WF on CDM-8 in CSI-RS for CSI acquisition	LG Electronics, Samsung, CATT, NTT DOCOMO	noted	2017-06-28 13:41:48	2017-06-28 13:47:52
R1-1711805	WF on Single DCI based NCJT	LG Electronics, Intel Corporation, ZTE	available	2017-06-28 13:41:48	2017-06-28 13:47:52
R1-1711806	WF on radio link monitoring in NR	Huawei, HiSilicon, Qualcomm, ATT	noted	2017-06-28 13:41:48	2017-06-28 13:47:52
R1-1711807	Summary of views on multi-TRP & multi-panel transmission	CATT	revised	2017-06-28 13:41:48	2017-06-28 13:47:52
R1-1711808	WF on PDSCH rate matching	LG Electronics, Panasonic, NTT DOCOMO, InterDigital, Intel	available	2017-06-28 13:41:48	2017-06-28 13:47:52
R1-1711809	WF on slot format indication with group common PDCCH	LG Electronics, InterDigital, …	available	2017-06-28 13:41:48	2017-07-01 00:57:52
R1-1711810	Analysis of SSS Proposals	Intel Corporation	noted	2017-06-28 13:41:48	2017-06-28 13:47:52
R1-1711811	WF on CSI measurement details	NTT DOCOMO, ZTE, Nokia, ASB, NEC	available	2017-06-28 13:41:49	2017-07-01 00:57:52
R1-1711812	WF on configuration of a bandwidth part in wideband bandwidth operation	LG Electronics, MediaTek	noted	2017-06-28 13:41:49	2017-06-29 12:37:52

R1-1711813	WF on DM-RS	NTT DOCOMO, Ericsson, Nokia, ASB, ZTE, KT Corp, Sharp, Qualcomm	noted	2017-06-28 13:41:49	2017-06-29 12:37:52
R1-1711814	WF on PT-RS for DFT-S-OFDM	NTT DOCOMO, Ericsson, Nokia, ASB, Panasonic, Spreadtrum, ZTE	noted	2017-06-28 13:41:49	2017-06-29 12:37:52
R1-1711815	WF on PT-RS for CP-OFDM	NTT DOCOMO, Mitsubishi Electric, Huawei, HiSilicon, Nokia, ASB	noted	2017-06-28 13:41:49	2017-06-29 12:37:52
R1-1711816	WF on front-loaded DMRS design for slot aggregation	vivo, Huawei, HiSilicon	noted	2017-06-28 13:41:49	2017-06-29 12:37:52
R1-1711817	WF on LTE-NR DC deployment scenarios to extend NR UL coverage	Orange, Deutsche Telekom, Ericsson, China Unicom, OPPO, Huawei, China Telecom, Nokia, ZTE	noted	2017-06-28 13:41:49	2017-06-29 12:37:52
R1-1711818	WF on UL power control	LG Electronics, Ericsson, InterDigital	noted	2017-06-28 13:41:49	2017-06-29 12:37:52
R1-1711819	WF on PHR for different waveforms	LG Electronics, NTT DOCOMO, InterDigital	noted	2017-06-28 13:41:49	2017-06-29 12:37:52
R1-1711820	[DRAFT] LS on support of multi-TRP transmission in NR	Intel	revised	2017-06-28 13:41:49	2017-06-29 12:37:52
R1-1711821	WF on Configuration of UL Transmission without Grant	Ericsson	withdrawn	2017-06-28 13:41:49	
R1-1711822	Design of combined-and-Nested polar code sequences	Samsung	noted	2017-06-28 13:41:49	2017-06-29 12:37:52
R1-1711823	WF on pre-emption indication	Huawei, HiSilicon, MediaTek, Sequans, NTT DOCOMO, Sony, vivo, ZTE, InterDigital, III	revised	2017-06-28 13:41:49	2017-07-03 14:07:52
R1-1711824	[DRAFT] LS on non-contiguous CA	AT&T	revised	2017-06-28 13:41:49	2017-06-28 13:47:52
R1-1711825	LS on non-contiguous CA	RAN1, AT&T	approved	2017-06-28 13:41:49	2017-06-28 13:47:52
R1-1711826	WF on interleaver design on NR polar codes	LG Electronics	withdrawn	2017-06-28 13:41:50	
R1-1711827	WF on Capacity Enhancement for option 1 of PRACH preamble	LG Electronics, ITL	noted	2017-06-28 13:41:50	2017-06-29 12:37:52
R1-1711828	WF on RACH power control	LG Electronics, ETRI	available	2017-06-28 13:41:50	2017-06-29 12:37:52
R1-1711829	Offline discussions on UL data transmission without grant	NTT DOCOMO	noted	2017-06-28 13:41:50	2017-06-28 13:47:52
R1-1711830	WF on UE-UE CLI measurement	Huawei, HiSilicon, ZTE, MediaTek, Intel, CMCC	noted	2017-06-28 13:41:50	2017-06-29 12:37:52

R1-1711831	WF on pi/2 BPSK with spectrum shaping	IITH, ATT, Qualcomm, Deutsche Telekom, IITM, Reliance Jio, Samsung, Thales, INL, CEWiT, Tejas Networks, DISH, Sony	noted	2017-06-28 13:41:50	2017-06-29 12:37:52
R1-1711832	WF on Pre-DFT Multiplexing of RS and UCI in short duration PUCCH	IITH	available	2017-06-28 13:41:50	2017-06-29 12:37:52
R1-1711833	WF on waveform for long duration PUCCH	IITH, ATT, Deutsche Telekom, IITM, Reliance Jio, DISH, Thales, CEWiT, Tejas Networks, Sony, INL	available	2017-06-28 13:41:50	2017-06-29 12:37:52
R1-1711834	WF on Long PUCCH Format with 1-2 UCI bits	Ericsson, Huawei, HiSilicon, LG, ZTE, MediaTek, Panasonic, WILUS Inc., Intel, Vivo,Cohere Technologies, ETRI, Motorola mobility, Lenovo, CATT	revised	2017-06-28 13:41:50	2017-06-28 13:47:52
R1-1711835	WF on Frequency Hopping for Long PUCCH	Ericsson, MediaTek, Qualcomm, Panasonic, Intel, LG, NTT DOCOMO, Cohere Technologies, WILUS Inc., Huawei, HiSilicon, Samsung	noted	2017-06-28 13:41:50	2017-06-28 13:47:52
R1-1711836	WF on scheduling request for NR	Idaho National Laboratory, KDDI, Lenovo, Motorola Mobility, IITH, CEWIT, IITM, Tejas Networks, Qualcomm	available	2017-06-28 13:41:50	2017-07-01 00:57:52
R1-1711837	Open issues on SRS design	Sony	revised	2017-06-28 13:41:50	2017-06-29 12:37:52
R1-1711838	WF on Beam Reporting	Intel, Huawei, HiSilicon, InterDigital, CATT	available	2017-06-28 13:41:50	2017-07-01 00:57:52
R1-1711839	LS on subcarrier alignment and channel raster	RAN1, AT&T	approved	2017-06-28 13:41:50	2017-06-28 13:47:52
R1-1711840	WF on Frequency Hopping for Multi-slot Long PUCCH	LG Electronics	available	2017-06-28 13:41:50	2017-07-01 00:57:52
R1-1711841	Summary of views on resource for PDSCH and PUSCH rate matching	LG Electronics	noted	2017-06-28 13:41:50	2017-07-01 00:57:52
R1-1711842	WF on UE-to-UE crosslink measurement	CMCC, Spreadtrum	noted	2017-06-28 13:41:50	2017-06-29 12:37:52

R1-1711843	Outputs of offline discussion on RBG size/number determination	OPPO, Nokia, LGE, Samsung, vivo, ZTE, CATR	noted	2017-06-28 13:41:50	2017-06-29 12:37:52
R1-1711844	WF on the number of CBGs	OPPO	available	2017-06-28 13:41:50	2017-06-29 12:37:52
R1-1711845	Summary of AI 5.1.2.1.4 Diversity transmission for UL	Mitsubishi Electric	noted	2017-06-29 12:30:08	2017-07-01 00:57:52
R1-1711846	WF on NR CA	Huawei, HiSilicon, KT, CATR, MediaTek, Nokia, ASB, Ericsson, Intel	noted	2017-06-29 12:30:09	2017-07-01 00:57:52
R1-1711847	WF on SRS switching	Huawei, HiSilicon	available	2017-06-29 12:30:09	2017-07-01 00:57:52
R1-1711848	WF on handling of single UL transmision	NTT DOCOMO, Apple	noted	2017-06-29 12:30:09	2017-06-29 12:37:52
R1-1711849	WF on Preamble sequence for capacity enhancement	Huawei, HiSilicon	noted	2017-06-29 12:30:10	2017-06-29 12:37:52
R1-1711850	WF for NR RLM	CATT	noted	2017-06-29 12:30:10	2017-06-29 12:37:52
R1-1711851	WF on inter-gNB signaling for cross-link interference management	LG Electronics	noted	2017-06-29 12:30:10	2017-06-29 12:37:52
R1-1711852	WF on SRS sequence design	Ericsson, Huawei, HiSilicon, Nokia, ASB, Panasonic, NTT DOCOMO	noted	2017-06-29 12:30:10	2017-07-01 00:57:52
R1-1711853	Activation/deactivation of bandwidth parts	Ericsson	noted	2017-06-29 12:30:10	2017-06-29 12:37:52
R1-1711854	WF on SS Burst set Composition	LG Electronics	revised	2017-06-29 12:30:10	2017-06-29 12:37:52
R1-1711855	Way forward on PRB indexing	Intel, Sharp, Ericsson, MediaTek, NTT DOCOMO, Panasonic, Nokia, ASB, NEC, KT, ETRI	noted	2017-06-29 12:30:10	2017-06-29 12:37:52
R1-1711856	WF on processing time requirements	Qualcomm, ZTE, Deutsche Telekom, Vodafone, Panasonic, Ericsson	revised	2017-06-29 12:30:10	2017-06-29 12:37:52
R1-1711857	Summary of views on multi-TRP & multi-panel transmission	CATT	noted	2017-06-29 12:30:10	2017-06-29 12:37:52
R1-1711858	WF on beam failure recovery request	LG Electronics, Intel, Huawei, HiSilcon, vivo	available	2017-06-29 12:30:10	2017-06-29 12:37:52
R1-1711859	WF on SRS beam sweeping behavior	LG Electronics, Huawei, HiSilicon, Samsung, Ericsson	available	2017-06-29 12:30:10	2017-06-29 12:37:52
R1-1711860	Evaluation of NR-SS	Huawei, HiSilicon	noted	2017-06-29 12:30:10	2017-06-29 12:37:52
R1-1711861	WF on RACH power control mechanism Msg.1 transmission	LG Electronics, NTT DOCOMO	noted	2017-06-29 12:30:10	2017-06-29 12:37:52
R1-1711862	WF on power sharing mechanism	NTT DOCOMO, InterDigital	noted	2017-06-29 12:30:10	2017-06-29 12:37:52
R1-1711863	WF on NR power control framework	NTT DOCOMO INC., Nokia, Intel, InterDigital	noted	2017-06-29 12:30:10	2017-06-29 12:37:52

R1-1711864	Measurement window periodicity, duration and offset of CSI-RS for L3 mobility	Qualcomm	noted	2017-06-29 12:30:10	2017-06-29 12:37:52
R1-1711865	Multiple/repeated PRACH preamble transmission with OCC across preambles	Qualcomm, Interdigital, Samsung, AT&T, Verizon	noted	2017-06-29 12:30:10	2017-06-29 12:37:52
R1-1711866	WF on RACH configuration in RMSI	Huawei, HiSilicon	noted	2017-06-29 12:30:10	2017-06-29 12:37:52
R1-1711867	Observations on PBCH Signaling	Qualcomm	withdrawn	2017-06-29 12:30:10	
R1-1711868	WF on DMRS indication	Samsung	revised	2017-06-29 12:30:10	2017-06-29 12:37:52
R1-1711869	WF on collision avoidance between short PUCCH and SRS	Mitsubishi Electric, AT&T, Panasonic, Samsung, Huawei, HiSilicon, ZTE	noted	2017-06-29 12:30:10	2017-07-01 00:57:52
R1-1711870	NR PRACH capacity enhancement	CATT, Huawei, TCL	noted	2017-06-29 12:30:10	2017-07-01 00:57:52
R1-1711871	WF on radio link monitoring in NR	Huawei, HiSilicon, Qualcomm, ATT, NTT DOCOMO, Intel	revised	2017-06-29 12:30:10	2017-06-29 12:37:52
R1-1711872	LS on UE self-interference	RAN1, vivo	approved	2017-06-29 12:30:10	2017-06-29 12:37:52
R1-1711873	WF on initial bandwidth part	LG Electronics, Ericsson, MediaTek	noted	2017-06-29 12:30:11	2017-06-29 12:37:52
R1-1711874	NR UL MIMO Signaling Mechanism	Ericsson, Nokia, Alcatel-Lucent Shanghai Bell, Qualcomm, CATT, ZTE	noted	2017-06-29 12:30:11	2017-07-01 00:57:52
R1-1711875	WF on PRACH Preamble Format for Short sequence with Option 1	LG Electronics, NTT DOCOMO	noted	2017-06-29 12:30:11	2017-06-29 12:37:52
R1-1711876	WF on multiple Msg1 transmission for contention free case	Samsung, Huawei, Hisilicon, MediaTek, ZTE	noted	2017-06-29 12:30:11	2017-06-29 12:37:52
R1-1711877	[DRAFT] LS on single UL transmission	NTT DOCOMO	revised	2017-06-29 12:30:11	2017-06-29 12:37:52
R1-1711878	LS on single UL transmission	RAN1, NTT DOCOMO	approved	2017-06-29 12:30:11	2017-06-29 12:37:52
R1-1711879	[DRAFT] LS on Beam Aspects of NR RACH	Huawei	revised	2017-06-29 12:30:11	2017-06-29 12:37:52
R1-1711880	LS on Beam Aspects of NR RACH	RAN1, Huawei	approved	2017-06-29 12:30:11	2017-06-29 12:37:52
R1-1711881	Summary of Issues and WFs on Codebook based transmission for UL	Intel	noted	2017-06-29 12:30:11	2017-07-01 00:57:52
R1-1711882	WF on use of SS blocks in beam management	Qualcomm	withdrawn	2017-06-29 12:30:11	
R1-1711883	WF on CBG retransmission	Samsung	revised	2017-06-29 12:30:11	2017-06-29 12:37:52
R1-1711884	Summary of issues on UL non-codebook based transmission	Nokia, Alcatel-Lucent Shanghai Bell	noted	2017-06-29 12:30:11	2017-07-01 00:57:52
R1-1711885	WF on change of SS block frequency position	CMCC	available	2017-06-29 12:30:11	2017-06-29 12:37:52
R1-1711886	TS38.211 v0.0.2 NR; Physical channels and modulation	Ericsson LM	revised	2017-06-29 12:30:11	2017-07-01 00:57:52
R1-1711887	WF on 2-symbol NR-PUCCH	LG Electronics	available	2017-06-29 12:30:13	2017-07-01 00:57:52

R1-1711888	WF on m0 and m1 for NR-SSS	NTT DOCOMO, ITL, Intel, Samsung, InterDigital, Motorola Mobility, Lenovo	agreed	2017-06-29 12:30:13	2017-06-29 12:37:52
R1-1711889	WF on radio link monitoring in NR	Huawei, HiSilicon, Qualcomm, ATT, NTT DOCOMO, Intel, Vivo, LGE	noted	2017-06-29 12:30:13	2017-06-29 12:37:52
R1-1711890	WF on UL frequency selective precoding in UL non-codebook based transmission	Huawei, HiSilicon, LG Electronics	available	2017-06-29 12:30:13	2017-07-01 00:57:52
R1-1711891	WF on PT-RS for DFT-S-OFDM	Samsung, Intel, CATT	noted	2017-06-29 12:30:13	2017-06-29 12:37:52
R1-1711892	Reply LS on PBCH content	RAN2, Huawei	treated	2017-06-29 12:30:13	2017-06-29 12:37:52
R1-1711893	Offline discussions summary on CSI framework	AT&T	noted	2017-06-29 12:30:13	2017-06-29 12:37:52
R1-1711894	WF on remaining issues on PTRS for CP-OFDM - Part 1	Huawei, HiSilicon, InterDigital, Xinwei, NI, Panasonic	noted	2017-06-29 12:30:13	2017-06-29 12:37:52
R1-1711895	WF on remaining issues on PTRS for CP-OFDM - Part 2	Huawei, HiSilicon, InterDigital, Xinwei, Intel, NI, Panasonic, Spreadtrum	noted	2017-06-29 12:30:13	2017-06-29 12:37:52
R1-1711896	WF on UE assistance information for UL beam mangement	MediaTek, Samsung, Intel	available	2017-06-29 12:30:13	2017-07-01 00:57:52
R1-1711897	Offline discussion summary on beam recovery	MediaTek	noted	2017-06-29 12:30:13	2017-07-01 00:57:52
R1-1711898	[DRAFT] LS on power sharing for LTE-NR Dual Connectivity	Ericsson	revised	2017-06-29 12:30:13	2017-06-29 12:37:52
R1-1711899	Way forward on the mapping of SS blocks	Nokia	noted	2017-06-29 12:30:13	2017-06-29 12:37:52
R1-1711900	WF on remaining issues on CSI-RS for mobility with RAN4 impact	Ericsson	available	2017-06-29 12:30:13	2017-06-29 12:37:52
R1-1711901	WF on remaining RLM issues with RAN4 impact	Ericsson	available	2017-06-29 12:30:13	2017-06-29 12:37:52
R1-1711902	WF on CSI-RS resources for L3 mobility	Ericsson	available	2017-06-29 12:30:13	2017-06-29 12:37:52
R1-1711903	WF on SRS for UL beam management	OPPO, Intel, Samsung, Xinwei	available	2017-06-29 12:30:13	2017-07-01 00:57:52
R1-1711904	Summary of views on CSI feedback for Type I and Type II	Ericsson	noted	2017-06-29 12:30:13	2017-07-01 00:57:52
R1-1711905	Summary of CSI Feedback for Open-loop/Semi-open-loop	Ericsson	noted	2017-06-29 12:30:13	2017-07-01 00:57:52
R1-1711906	WF on SS Burst set Composition	LG Electronics, Nokia, InterDigital, British Telecom	noted	2017-06-29 12:30:13	2017-06-29 12:37:52
R1-1711907	Draft Reply LS on reading time index indication for RRM measurements	Intel Corporation	revised	2017-06-29 12:30:13	2017-07-01 00:57:52
R1-1711908	Reserved resource for forward compatibility	Ericsson	available	2017-06-29 12:30:14	2017-07-01 00:57:52
R1-1711909	[DRAFT] LS response on required parameters from RAN4 perspective	Ericsson	revised	2017-06-29 12:30:14	2017-07-01 00:57:52
R1-1711910	[DRAFT] Reply LS on PDCCH design	Ericsson, CATT	revised	2017-06-29 12:30:14	2017-06-29 12:37:52

R1-1711911	WF on pre-emption indication	Huawei, HiSilicon, MediaTek, Sequans, NTT DOCOMO, Sony, vivo, ZTE, InterDigital, III, Intel, LGE, Samsung	noted	2017-06-29 12:30:14	2017-06-29 12:37:52
R1-1711912	WF on Long PUCCH Format with 1-2 UCI bits	Ericsson, Huawei, HiSilicon, LG, ZTE, MediaTek, Panasonic, WILUS Inc., Intel, Vivo,Cohere Technologies, ETRI, Motorola mobility, Lenovo, CATT, Qualcomm	noted	2017-06-29 12:30:14	2017-06-29 12:37:52
R1-1711913	WF on introduction indication in SS block for cell update	CMCC	noted	2017-06-29 12:30:14	2017-06-29 12:37:52
R1-1711914	Overview of WFs on PTRS	Ericsson	noted	2017-06-29 12:30:14	2017-06-29 12:37:52
R1-1711915	WF on PTRS multiplexing with other RSs for CP-OFDM	ZTE	revised	2017-06-29 12:30:14	2017-07-01 00:57:52
R1-1711916	Chairman's notes of AI 5.1.2 MIMO	Ad-Hoc chair (Qualcomm)	endorsed	2017-06-29 12:30:14	2017-07-01 00:57:52
R1-1711917	Chairman's notes of AI 5.1.4 Channel coding	Ad-Hoc chair (Nokia)	endorsed	2017-06-29 12:30:14	2017-07-01 00:57:52
R1-1711918	Chairman's notes of AI 5.1.6 Duplexing	Ad-Hoc chair (Qualcomm)	endorsed	2017-06-29 12:30:14	2017-06-29 12:37:52
R1-1711919	Chairman's notes of AI 5.1.8 NR-LTE co-existence	Ad-Hoc chair (Qualcomm)	endorsed	2017-06-29 12:30:14	2017-06-29 12:37:52
R1-1711920	WF on SRS design in NR	LG Electronics, CATT, Intel Corp., KT Corp., Qualcomm	noted	2017-06-29 12:30:14	2017-06-29 12:37:52
R1-1711921	WF on PDCCH and PDSCH resource sharing	ZTE, Nokia, Ericsson, LG, Panasonic, Qualcomm, Sharp	noted	2017-06-29 12:30:14	2017-07-01 00:57:52
R1-1711922	WF on CSI-RS for BM	Intel, Ericsson, CATT, Samsung, MediaTek, AT&T, NTT Docomo, KT	noted	2017-06-29 12:30:14	2017-06-29 12:37:52
R1-1711923	WF on CSI-RS for BM	Samsung, Intel, AT&T, NTT DOCOMO, ZTE	noted	2017-06-29 12:30:14	2017-06-29 12:37:52
R1-1711924	Summary of CSI Acquisition Details	NTT DOCOMO	noted	2017-06-29 12:30:14	2017-07-01 00:57:52
R1-1711925	Remaining part of email summary for UL transmission without UL grant	LG Electronics	withdrawn	2017-06-29 12:30:14	
R1-1711926	WF on PT-RS pattern in the frequency domain	LG Electronics	revised	2017-06-29 12:30:14	2017-06-29 12:37:52
R1-1711927	WF on gNB response for beam failure request	Huawei, HiSilicon, LG Electronics, Intel	available	2017-06-29 12:30:14	2017-07-01 00:57:52

R1-1711928	WF on PRACH for beam failure recovery request transmission	Huawei, HiSilicon, LG Electronics, Ericsson, CATT, NTT DOCOMO	available	2017-06-29 12:30:15	2017-07-01 00:57:52
R1-1711929	WF on Beam Reporting	Huawei, HiSilicon, Samsung, Intel, Nokia, Oppo, National Instruments	available	2017-06-29 12:30:15	2017-07-03 14:07:52
R1-1711930	WF on SRS Configuration	Huawei, HiSilicon, OPPO	noted	2017-06-29 12:30:15	2017-07-01 00:57:52
R1-1711931	[DRAFT] Reply LS on PDCCH design	Ericsson, CATT	revised	2017-06-29 12:30:15	2017-07-01 00:57:52
R1-1711932	WF on PT-RS pattern in the frequency domain	LG Electronics	noted	2017-06-29 12:30:15	2017-07-01 00:57:52
R1-1711933	WF on HARQ-ACK multiplexing for NR	LG Electronics	available	2017-06-29 12:30:15	2017-07-01 00:57:52
R1-1711934	WF on HARQ-ACK bundling for NR	LG Electronics	available	2017-06-29 12:30:15	2017-07-01 00:57:52
R1-1711935	Summary of Open Issues on Layer Mapping	Samsung	noted	2017-06-29 12:30:15	2017-07-01 00:57:52
R1-1711936	WF on CSI-RS based RACH configuration	Samsung, Ericsson, ZTE, Mediatek Mitsubishi, MTI	noted	2017-06-29 12:30:15	2017-06-29 12:37:52
R1-1711937	Circulant permutation matrix design for LDPC codes	LG Electronics	withdrawn	2017-07-01 00:51:26	
R1-1711938	Circulant permutation matrix design for LDPC codes base graph #2	LG Electronics	withdrawn	2017-07-01 00:51:28	
R1-1711939	WF on the mapping of SS blocks with 30kHz SCS	Huawei, HiSilicon, CATT, CATR, OPPO, MediaTek, Vivo	noted	2017-07-01 00:51:28	2017-07-01 00:57:52
R1-1711940	LS to RAN1 on NR basic handover	RAN2, Ericsson	treated	2017-06-29 00:00:00	2017-06-29 00:00:00
R1-1711941	Way Forward on PTRS	Intel, Huawei, HiSilicon, National Instruments, MediaTek	noted	2017-07-01 00:51:33	2017-07-01 00:57:52
R1-1711942	WF on periodic CSI reporting on short PUCCH	Ericsson, Samsung, Huawei, HiSilicon, CATT	available	2017-07-01 00:51:33	2017-07-01 00:57:52
R1-1711943	Discussion on DMRS sequence for NR PBCH	Intel	noted	2017-07-01 00:51:33	2017-07-01 00:57:52
R1-1711944	Observations on LDPC Shift Coefficients	Qualcomm	noted	2017-07-01 00:51:33	2017-07-01 00:57:52
R1-1711945	WF on random access association configuration	ZTE	noted	2017-07-01 00:51:33	2017-07-01 00:57:52
R1-1711946	WF on DMRS indication	Samsung	noted	2017-07-01 00:51:34	2017-07-01 00:57:52
R1-1711947	Chairman's notes of AI 5.1.9 UL Power Control	Ad-Hoc chair (Qualcomm)	endorsed	2017-07-01 00:51:34	2017-07-01 00:57:52
R1-1711948	[Draft] LS on bandwidth part operation in NR	MediaTek	revised	2017-07-01 00:51:34	2017-07-01 00:57:52
R1-1711949	Reply LS to RAN1 on UL data transmission without UL grant for NR	RAN2, Huawei	postponed	2017-07-01 00:51:35	2017-07-01 00:57:52
R1-1711950	LS to RAN1 on Random Access	RAN2, Samsung	treated	2017-07-01 00:51:35	2017-07-01 00:57:52
R1-1711951	Open issues on SRS design	Sony	noted	2017-07-01 00:51:35	2017-07-01 00:57:52
R1-1711952	Performance evaluation of interference randomization	Qualcomm Inc.	noted	2017-07-01 00:51:35	2017-07-01 00:57:52
R1-1711953	Evaluation of proposed PCMs for BG#1	Huawei, HiSilicon	withdrawn	2017-07-01 00:51:35	

R1-1711954	Evaluation of proposed PCMs for BG#2	Huawei, HiSilicon	withdrawn	2017-07-01 00:51:35	
R1-1711955	Ranking of proposed PCMs for BG#1 and BG#2 based on evaluation results	Huawei, HiSilicon	withdrawn	2017-07-01 00:51:35	
R1-1711956	On Pi/2-BPSK with spectrum shaping	Ericsson	noted	2017-07-01 00:51:35	2017-07-01 00:57:52
R1-1711957	WF on processing time requirements	Qualcomm	noted	2017-07-01 00:51:35	2017-07-01 00:57:52
R1-1711958	WF on CBG retransmission	Samsung, ZTE	noted	2017-07-01 00:51:35	2017-07-01 00:57:52
R1-1711959	WF on DL PRB bundling	Xinwei	revised	2017-07-01 00:51:35	2017-07-01 00:57:52
R1-1711960	Summary on DL PRB bundling	Xinwei	noted	2017-07-01 00:51:35	2017-07-01 00:57:52
R1-1711961	WF on the false alarm rate target of eMBB DCI	Panasonic, Qualcomm, Intel, NTT DOCOMO	withdrawn	2017-07-01 00:51:35	
R1-1711962	Way Forward on network-based beam failure recovery	Huawei, HiSilicon	available	2017-07-01 00:51:35	2017-07-01 00:57:52
R1-1711963	Crosscheck Results for PCM of BG1	Samsung	available	2017-07-01 00:51:35	2017-07-01 00:57:52
R1-1711964	Crosscheck Results for PCM of BG2	Samsung	available	2017-07-01 00:51:35	2017-07-01 00:57:52
R1-1711965	Beam management offline summary	Qualcomm	noted	2017-07-01 00:51:35	2017-07-01 00:57:52
R1-1711966	Reply LS on reading time index indication for RRM measurements	RAN1, Intel	approved	2017-07-01 00:51:35	2017-07-01 00:57:52
R1-1711967	Timing information indicated by DMRS	ZTE	noted	2017-07-01 00:51:36	2017-07-01 00:57:52
R1-1711968	[DRAFT] Reply LS response on NR basic handover	Samsung	revised	2017-07-01 00:51:36	2017-07-01 00:57:52
R1-1711969	Offline discussions on UL data transmission without grant	NTT DOCOMO	noted	2017-07-01 00:51:36	2017-07-01 00:57:52
R1-1711970	WF on RACH preamble format for short sequence with 1 and 2 OFDM symbols	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-07-01 00:51:36	2017-07-01 00:57:52
R1-1711971	WF on QCL assumption in NR	ZTE, ASTRI, Nokia, ASB	available	2017-07-01 00:51:37	2017-07-01 00:57:52
R1-1711972	[DRAFT] Reply LS on PDCCH design	Ericsson, CATT	revised	2017-07-01 00:51:37	2017-07-01 00:57:52
R1-1711973	WF on CSI-RS for BM	Intel, Ericsson, Spreadtrum, MediaTek, Samsung, Verizon	available	2017-07-01 00:51:37	2017-07-01 00:57:52
R1-1711974	Summary of views on multiplexing of different types of RS	Huawei, HiSilicon	noted	2017-07-01 00:51:37	2017-07-01 00:57:52
R1-1711975	LS response on required parameters from RAN4 perspective	RAN1, Ericsson	approved	2017-07-01 00:51:37	2017-07-01 00:57:52
R1-1711976	WF on CSI-RS for beam management	NTT DOCOMO, Ericsson, Samsung	noted	2017-07-01 00:51:37	2017-07-01 00:57:52
R1-1711977	Sequence construction of Polar codes for control channel	Qualcomm Incorporated	withdrawn	2017-07-01 00:51:37	
R1-1711978	LDPC rate compatible design	Qualcomm Incorporated	available	2017-07-01 00:51:38	2017-07-01 00:57:52
R1-1711979	Performance cross-check for PCMs of NR LDPC BG1 and BG2	MediaTek	withdrawn	2017-07-01 00:51:38	
R1-1711980	Performance with L1 CRC polynomial	Qualcomm Incorporated	noted	2017-07-01 00:51:38	2017-07-01 00:57:52
R1-1711981	WF on group common pre-emption indication	Huawei, HiSilicon, Sharp, ZTE, LGE, Sony, Panasonic, MediaTek, InterDigital	noted	2017-07-01 00:51:38	2017-07-01 00:57:52

R1-1711982	WF on LDPC parity check matrices	Nokia	noted	2017-07-01 00:51:38	2017-07-01 00:57:52
R1-1711983	WF on Polar Code Construction With PC bits	Huawei, HiSilicon, CATT, MTK, ZTE, DCM, Accelercomm, Coherentlogix, LG, Spreadtrum, Interdigital, Nokia	noted	2017-07-01 00:51:38	2017-07-01 00:57:52
R1-1711984	[DRAFT] LS on NR initial access and mobility	NTT DOCOMO	revised	2017-07-01 00:51:38	2017-07-01 00:57:52
R1-1711985	[DRAFT] LS on NR initial access and mobility	NTT DOCOMO	revised	2017-07-01 00:51:39	2017-07-01 00:57:52
R1-1711986	WF on PTRS multiplexing with other RSs for CP-OFDM	ZTE	available	2017-07-01 00:51:39	2017-07-01 00:57:52
R1-1711987	Reply LS response on NR basic handover	RAN1, Samsung	approved	2017-07-01 00:51:39	2017-07-01 00:57:52
R1-1711988	WF on beam indication for PDCCH	Samsung	available	2017-07-01 00:51:39	2017-07-01 00:57:52
R1-1711989	[Draft] LS on bandwidth part operation in NR	MediaTek	revised	2017-07-01 00:51:39	2017-07-01 00:57:52
R1-1711990	WF on DL PRB bundling	Xinwei	noted	2017-07-01 00:51:39	2017-07-01 00:57:52
R1-1711991	WF on contents of the group-common PDCCH	CATT, NEC	noted	2017-07-01 00:51:39	2017-07-01 00:57:52
R1-1711992	[DRAFT] Reply LS on PDCCH design	Ericsson, CATT	revised	2017-07-01 00:51:39	2017-07-01 00:57:52
R1-1711993	WF on UE behavior for reserved resource	Samsung	revised	2017-07-01 00:51:39	2017-07-01 00:57:52
R1-1711994	WF on UE power saving with PDCCH monitoring in CDRX	Qualcomm	available	2017-07-01 00:51:39	2017-07-01 00:57:52
R1-1711995	WF on the content of the long PUCCH resource configuration	Ericsson	available	2017-07-01 00:51:39	2017-07-01 00:57:52
R1-1711996	WF on long PUCCH Format for more than 2 UCI bits with multi-user multiplexing	Ericsson	available	2017-07-01 00:51:39	2017-07-01 00:57:52
R1-1711997	Response LS on Support for fake gNB detection mechanisms	RAN1, Nokia	approved	2017-07-01 00:51:39	2017-07-01 00:57:52
R1-1711998	LS on bandwidth part operation in NR	RAN1, MediaTek	approved	2017-07-01 00:51:40	2017-08-12 09:38:54
R1-1711999	LS on power sharing for LTE-NR Dual Connectivity	RAN1, Ericsson	approved	2017-07-01 00:51:40	2017-07-01 00:57:52
R1-1712000	LS on support of multi-TRP transmission in NR	RAN1, Intel	approved	2017-07-01 00:51:40	2017-07-01 00:57:52
R1-1712001	LS on NR initial access and mobility	RAN1, NTT DOCOMO	approved	2017-07-01 00:51:40	2017-07-01 00:57:52
R1-1712002	LS on NR initial access and mobility	RAN1, NTT DOCOMO	approved	2017-07-01 00:51:40	2017-07-01 00:57:52
R1-1712003	[DRAFT] Reply LS on CSI-RS design for beam management	NTT DOCOMO	revised	2017-07-01 00:51:41	2017-07-01 00:57:52
R1-1712004	TS38.211 v0.1.0 NR; Physical channels and modulation	Ericsson LM	endorsed	2017-07-01 00:51:41	2017-07-01 17:35:54
R1-1712005	Reply LS on PDCCH design	RAN1, Ericsson, CATT	approved	2017-07-01 00:51:45	2017-07-01 00:57:52
R1-1712006	WF on UE behavior for reserved resource	Samsung	noted	2017-07-01 00:51:45	2017-07-01 00:57:52
R1-1712007	LS on NR Beam Management	RAN1, Qualcomm	approved	2017-07-01 17:34:26	2017-08-12 09:30:36
R1-1712008	LS on HARQ operation	RAN1, Nokia	approved	2017-08-12 09:33:29	2017-08-12 09:34:07
R1-1712009	Reply LS on CSI-RS design for beam management	RAN1, NTT DOCOMO	approved	2017-08-12 09:33:30	2017-08-12 09:34:07
R1-1712010	LS on a correction to the applicable UL modulation schemes	RAN1, Huawei	approved	2017-08-12 09:33:30	2017-08-12 09:34:07
R1-1712011	TS38.211 v0.1.1 NR; Physical channels and modulation	Ericsson LM	available	2017-07-17 00:00:00	2017-07-17 00:00:00
R1-1712012	TS38.201 v0.0.1 NR; Physical layer; General description	NTT DOCOMO	available	2017-07-17 00:00:00	2017-07-17 00:00:00
R1-1712013	TS38.202 v0.0.1 NR; Physical layer services provided by the physical layer	Qualcomm	available	2017-07-17 00:00:00	2017-07-17 00:00:00
R1-1712014	TS38.212 v0.0.1 NR; Multiplexing and channel coding	Huawei	available	2017-07-17 00:00:00	2017-07-17 00:00:00

R1-1712015	TS38.213 v0.0.1 NR; Physical layer procedures for control	Samsung	available	2017-07-17 00:00:00	2017-07-17 00:00:00
R1-1712016	TS38.214 v0.0.1 NR; Physical layer procedures for data	Nokia	available	2017-07-17 00:00:00	2017-07-17 00:00:00
R1-1712017	TS38.215 v0.0.1 NR; Physical layer measurements	Intel	available	2017-07-17 00:00:00	2017-07-17 00:00:00

Appendix D

3GPP TSG RAN WG1 Meeting #88 **R1-1701553**
Athens, Greece, 13th – 17th February 2017

Source: **MCC Support**

Title: **Final Report of 3GPP TSG RAN WG1 #AH1_NR v1.0.0 (Spokane, USA, 16th – 20th January 2017)**

Document for: **Approval**



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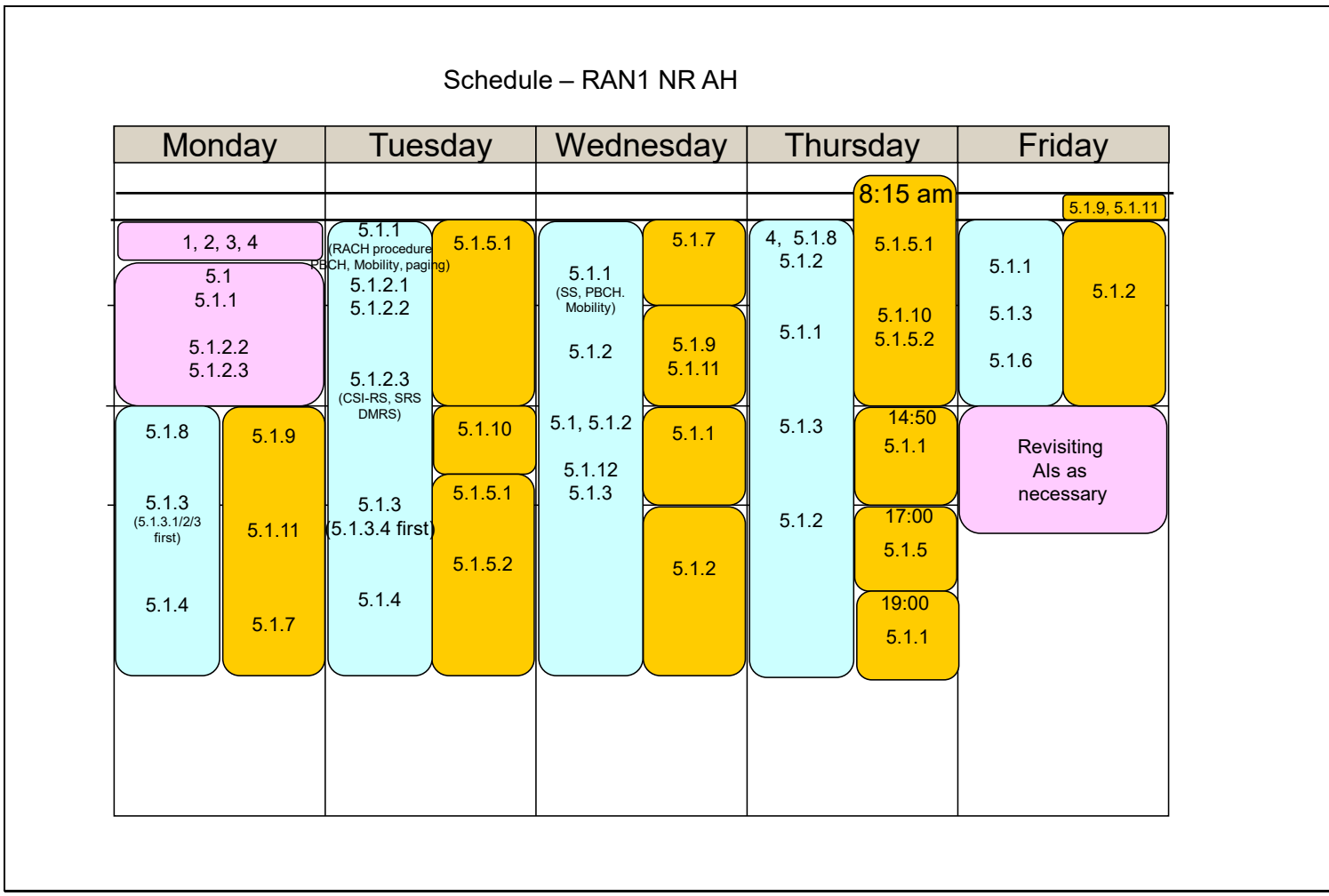
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Main facts summary

3GPP TSG WG RAN1 #AH1_NR meeting, hosted by the North American Friends of 3GPP, was held at the Spokane Convention Center, Spokane, USA.
The meeting started at 9:00 on Monday 16th January and finished at 17:10 on Friday 20th January 2017.
The number of attending delegates, having confirmed their participation through the electronic check-in application, was **358.**
Note that the number of registered was 500.

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 1491, and those documents were categorized as followed.

Agenda Item	Input Document	Treated Document
All	1491	501

Note: The amount of documents includes those discussed during the email discussion session post meeting.

	Contribution is agreed/approved
	Further discussion is required – come-back needed
	Working assumption
	Specific action needed from MCC
	Contribution is for email discussion/approval

1 Opening of the meeting

Mr Satoshi Nagata (RAN1 Chairman) welcomed the participants of the RAN WG1 AH1_NR meeting and opened the meeting at 09:00.
Mr Gary Jones from T-Mobile USA welcomed the delegates on behalf of the North American Friends of 3GPP, AT&T, BlackBerry, Cisco, DISH, Ericsson, Intel, InterDigital Communications, Motorola Solutions, NextNav, Nokia, QUALCOMM, Sprint, T-Mobile USA and Verizon Wireless, and detailed the domestic arrangements for the full week.

1.1 Call for IPR

The attention of the members of this Technical Specification Group was drawn to the fact ***that 3GPP Individual Members have the obligation*** *under the IPR Policies of their respective Organizational Partners to* ***inform their respective*** *Organizational Partners* ***of Essential IPRs they become aware of****.*
The members take note that they are hereby invited:

- *to investigate whether their organization or any other organization owns IPRs which were, or were likely to become Essential in respect of the work of 3GPP.*
- *to notify their respective Organizational Partners of all potential IPRs, e.g., for ETSI, by means of the IPR Information Statement and the Licensing declaration forms (e.g. see the ETSI IPR forms http://webapp.etsi.org/Ipr/).*

1.2 Competition law statement

The Chairman also drew Member's attention to the fact that 3GPP activities are subject to antitrust and competition laws and that compliance with said laws is therefore required of any participant of this WG meeting including the Chairman and Vice Chairmen. In case of question, please contact your legal counsel.
The present meeting will be conducted with strict impartiality and in the interests of 3GPP.
Furthermore, the Chairman reminded Members that timely submission of work items/contributions in advance of WG meetings is important to allow for full and fair consideration of such matters.

1.3 Network usage conditions

The PCG has laid down the following network usage conditions:

Users shall not use the network to engage in illegal activities. This includes activities such as copyright violation, hacking, espionage or any other activity that may be prohibited by local laws.

Users shall not engage in non-work related activities that consume excessive bandwidth or cause significant degradation of the performance of the network.
Since the **network is a shared resource**, users should exercise some basic etiquette when using the 3GPP network at a meeting. It is understood that high bandwidth applications such as downloading large files or video streaming might be required for business purposes, but delegates should be strongly discouraged in performing these activities for personal use. Downloading a movie or doing something in an interactive environment for personal use essentially wastes bandwidth that others need to make the meeting effective. The meeting chairman should remind end users that the network is a shared resource; the more one user grabs, the less there is for another. Email and its attachments already take up significant bandwidth (certain email programs are not very bandwidth efficient). In case of need the chair can ask the delegates to restrict IT usage to things that are essential for the meeting itself.

1. DON'T place your WiFi device in ad-hoc mode
2. DON'T set up a personal hotspot in the meeting room
3. DO try 802.11a if your WiFi device supports it
4. DON'T manually allocate an IP address
5. DON'T be a bandwidth hog by streaming video, playing online games, or downloading huge files
6. DON'T use packet probing software which clogs the local network (e.g., packet sniffers or port scanners)

2 Approval of Agenda

R1-1700001 Draft Agenda of RAN1 Ad-hoc meeting on New Radio RAN1 Chair
Satoshi Nagata (Chairman) proposed the agenda for the meeting, as well the schedule of the week.
Discussion: Intel suggested avoiding the overlap between 5.1.8 and 5.1.9 in Monday's afternoon parallel sessions.
Nokia/Huawei: although they agreed there might be a conflict, preference is to stick to the original schedule.

CATT questioned whether reference signals will be discussed in MIMO session only, yes according to RAN1 Chair but could be reconsidered.
Decision: The agenda is approved.

3 Highlights from RAN Plenary

R1-1700002 Selected highlights from RAN#74 relevant to RAN1 RAN1 Chair
The document was presented by RAN1 chair for information to the group and provides the outcomes of last plenary meeting relevant to RAN1.
Decision: The document is noted.

4 Incoming Liaison Statements related to NR

R1-1700291 Reply LS on NR RACH Procedure RAN2, Huawei
The document was presented by Brian Classon from Huawei and provides the following agreement made by RAN2:
If 2 step RACH is supported:

- The 2-step RACH resources are optionally configurable by the NW

FFS whether it can be configured by broadcast and/or by dedicated signalling.

- NW can configure/restrict the usage of the 2-step RACH for certain cases (e.g. procedures/services/radio condition,etc) (FFS for which cases for which it is possible to configure/restrict the usage)
- RAN2 expects a benefit in latency for the 2 step RACH procedure
- From RAN2 point of view, the 2-step RACH procedure is not restricted to be used with certain UE ID size.
- Can provide RAN1 with the different size of message size and UE ID size for the different scenarios in LTE. Indicate to RAN1 that for some use cases the UE ID only would not be sufficient. For NR we are still studying.

Decision: The document is noted.

R1-1700290 LS on UE capability aspects for LTE/NR tight interworking RAN2, Nokia
The document was presented by Karri Ranta-aho from Nokia and asks RAN1 to provide feedback on the below questions as early as possible (even if the answers may not be complete), prioritizing your response to the questions on LTE/NR tight interworking.

- Q1: Which of the physical layer parameters and RF parameters relevant to LTE/NR tight interworking needs to be coordinated between eNB and gNB (c.f. Table 3)?
- Q2: Is dynamic sharing of HARQ soft buffer feasible between LTE and NR or will the total number of soft-channel bits be semi-statically split between LTE and NR?
- Q3: For NR operation above 6 GHz, is a frequency band viewed as a single wideband carrier or as multiple contiguous component carriers?
- Q4: The LTE UE capabilities support extensive UE implementation flexibility. In particular, the UE can indicate support for a feature (e.g. MIMO layers, CSI processes) per band of a band combination. Is a similar (signalling intense) flexibility assumed to be supported for NR?

Discussion: schedule for sending a reply was debated → Chair would like to target an answer by Feb meeting to RAN2.
Decision: The document is noted.

R1-1701154 UE capability aspects for LTE/NR tight interworking Nokia, Alcatel-Lucent Shanghai Bell

- Proposal 1: Agree on the L1/RF parameters that may be relevant for eNB/gNB coordination based on the list proposed
- Proposal 2: Discuss if a common soft buffer between LTE and NR is considered feasible in the UE architecture, and if so, whether it can be expected from all UEs or if this is to be left for UE implementation choice.
- Proposal 3: Agree on a solution for wide-band operation
- Proposal 4: Similar implementation constraints exist for NR as for LTE, and thus similar flexibility for UE capability signaling is needed per band of a band combination
- Proposal 5: Provide RAN2 with a response LS based on the discussions and agreements of the RAN1 ad hoc

Decision: The document is noted.

R1-1700698 On UE capability aspects for LTE/NR tight interworking Ericsson
The document was presented by Daniel Larsson from Ericsson.

- *Q1:* Further discussion is needed on the total set of physical layer and RF parameters to be able to answer the question.
- *Q2:* Further discussion within the channel coding discussions are needed to be able to determine the answer to the question.
- *Q3:* RAN1 will specify a generic approach that is band agnostic. In that sense the future RAN1 specifications will allow for the tools of multiple contiguous component carriers and large wideband carriers. How to utilize these tools in a band definition would be upto RAN4 to decide.
- *Q4:* RAN1 does not currently see any RAN1 impact whether or not a feature is band or band combination specifically supported. Determining whether or not a feature is a band or band combination specific is a RAN4 decision.

Decision: The document is noted.

R1-1701182 Discussion on UE capability aspects for LTE/NR tight interworking Samsung
The document was presented by Youngbum Kim from Samsung.

- Q1: At least the timing relation, e.g., synchronous/asynchronous operation, between LTE and NR needs to be coordinated.
- Q2: It is not clear yet whether the UE soft buffer between LTE and NR can be shared or not. Nevertheless, soft buffer sharing would have some limitations due to the support of multiple numerologies in NR.
- Q3: Frequency band concept for NR is maintained and the frequency band is viewed as multiple component carriers.
- Q4: The UE capability signalling should support flexible UE implementation. However, it is expected to be able to reduce signalling per band of band combination e.g., by separating baseband processing capability from RF/band specific capability.

Decision: The document is noted.

Continue offline discussion until Wednesday morning – Karri (Nokia) and interested proponents
Wednesday
R1-1701355 [Draft] Response LS on UE capability aspects for LTE/NR tight interworking Nokia
The document was presented by Karri Ranta-aho from Nokia.
Discussion: Preliminary attempt drawing a reply to RAN2; Nokia expects feedback from other companies
Decision: The document is noted. Continue offline.
Thursday: revised in R1-1701477 [Draft] Response LS on UE capability aspects for LTE/NR tight interworking
Discussion: Nokia → same content but includes clarification regarding answer 2
Qualcomm → regarding answer 3, concern with the sentence on maximum bandwidth. See R1-1701360 under 5.1.8.
Decision: The document is noted. Further revised in:

R1-1701479 DRAFT Response LS on UE capability aspects for LTE/NR tight interworking Nokia
Decision: The document is noted and final LS is approved in R1-1701487, assuming the addition of the following agreements in relation to answer 3.

- If it is decided that maximum CC BW is greater than or equal to 400 MHz and smaller than or equal to 1000MHz
  - The maximum number of CCs in any aggregation is [either 8 or 16]
- If it is decided that the maximum CC BW is <=100MHz
  - The maximum number of CCs in any aggregation could be [either 16 or 32]
- If it is decided that the maximum CC BW is greater than 100 MHz and smaller than 400MHz
  - The maximum number of CCs is FFS

LS received from RAN2 in course of the week.
Friday
R1-1701518 LS on PRACH preambles for on demand SI requests RAN2, BlackBerry
The LS requests RAN1 to provide feedback on the following questions:

- Q1: If the same PRACH preamble is transmitted by multiple UEs simultaneously resulting in collision, will the gNB be able to reliably detect the transmitted preamble?
- Q2: If each of the different PRACH preambles is transmitted by multiple UEs resulting in collisions, will the gNB be able to reliably detect the transmitted preambles?
- Q3: How many PRACH preambles/resources will be available in NR?

Discussion: Chair → due to remaining time for SI completion, it would be great if RAN1 could reply as earlier as possible and not wait until next meeting.
Decision: The document is noted. Revisit later on potential answers.
R1-1701538 [Draft]Reply LS on PRACH preambles for on demand SI requests Ericsson
Decision: The document is noted and final LS is approved in R1-1701541 with the following update regarding answer 1:
A1: If multiple UEs transmit the same PRACH preamble resulting in a collision, the gNB might be able to detect the preamble from the combined transmission from multiple UEs, but may not be able to distinguish the UEs. The probability of successful detection depends on the channel conditions.

R1-1701519 Response LS on minimum system information RAN2, LG Electronics
RAN2 agreed that minimum SI is always present and periodically broadcast at a cell, not subject to on-demand SI delivery. Only the other SI can be provisioned via on-demand basis. RAN2 agreed that the minimum SI comprises basic information required for initial access to a cell and information for acquiring any other SI broadcast periodically or provisioned via on-demand basis. In details, RAN2 agreed that the minimum SI includes at least the following parameters:
SFN

- a list of PLMNs
- A cell ID
- Cell camping parameters
- RACH parameters
- Scheduling information for other SI

- SIB type
- Validity information
- SI Periodicity
- SI-window information
- An indicator whether the concerned SI-block is periodically broadcast or provided on demand

• Parameters required for requesting other SI-block(s) (if any needed, e.g. RACH preambles for request), if network allows on demand mechanism.

Note that the minimum SI can include additional parameters on top of the above.
Additional information addresses the initial estimate of the size of the minimum system information for NR.
Decision: The document is noted.

5 NR

5.1 Study on New Radio Access Technology - SID in RP-161596

Additional RAN guidance is existed in RP-162574 and RP-161914

R1-1700590 Draft TR 38.802 Study on New Radio (NR) Access Technology - Physical Layer Aspects NTT DOCOMO, INC.
Discussion: NTT DOCOMO→ not available - comments currently received and/or to be considered through email discussions. Continue offline discussion until Wednesday morning – (NTT DOCOMO).
Wednesday
The document was presented by Kazuaki Takeda from NTT DOCOMO.
Discussion: NTT DOCOMO→ The document includes all comments received so far.
Decision: Agreed as version 1.1.0 in R1-1701422 (by accepting all changes), as basis for further updates.

R1-1700591 Text proposal of TR 38.912 Study on New Radio (NR) Access Technology NTT DOCOMO, INC.
Discussion: The contents are the same as those in TR38.802 – objective is to check the TR structure.
Decision: The document is noted.

R1-1700638 Text Proposal to TR 38.804 on physical layer aspects NTT DOCOMO, INC.
Discussion: For information – same TP is going to be discussed in RAN2 during this week.
Decision: The document is noted.

R1-1700533 Discussion on the options in NR design Panasonic Corporation
R1-1700534 Discussion on the term "eMBB usage", "URLLC usage" and "mMTC usage" in study item Panasonic Corporation
R1-1700589 Workplan for Study on NR Access Technology NTT DOCOMO, INC.

5.1.1 Initial access and mobility

5.1.1.1 Synchronization signal and initial access procedure

R1-1700177 NR Initial Access Procedure with multi-stage synchronization signals CATT
R1-1700546 Discussion on multi-beam based initial access for NR Guangdong OPPO Mobile Telecom.
R1-1700863 Design for beamformed synchronization signals NEC

5.1.1.1.1 SS bandwidth, multiplexing

R1-1700033 Discussion and evaluation on NR-SS multiplexing and bandwidth Huawei, HiSilicon
The document was presented by … from Huawei.

- Proposal 1: The association of the SS-block time index indication and the beam(s) deployed for the SS-block is a network implementation choice. The UE is not aware of the association that is used by the network.
- Proposal 2: The number of NR cell IDs should be at most 504 as in LTE considering the detection complexity and performance as well as the system efficiency.
- Proposal 3: FDM of NR-PSS and NR-SSS should be considered as the first priority.
- Proposal 4: TDM of NR-PSS and NR-SSS should also be considered if the minimum UE bandwidth is not enough for FDM of NR-PSS and NR-SSS.
- Proposal 5: The overall SS block number in the level of ~30 should be considered.
- Proposal 6: The bandwidth of the NR-PSS and NR-SSS can be larger than 1.08 MHz at least for eMBB UEs but is decided only based on synchronization performance and detection complexity.
    - Other criteria, such as RRM measurements from SS, will not be decisive for determining the SS bandwidth.

Decision: The document is noted.

R1-1700292 NR SS bandwidth and multiplexing Ericsson
The document was presented by Havish Koorapaty from Ericsson.
- Proposal 1: Standardize 30kHz for synchronization signal subcarrier spacing in frequency bands below 6GHz, and 120kHz subcarrier spacing for higher frequency bands. For compatibility with LTE, also consider 15kHz subcarrier spacing.
- Proposal 2: No specific CP length definition is needed for the NR-PSS/SSS transmission
- Proposal 3: The bandwidth and time duration reserved for NR-PSS/SSS need to consider the requirements on the target detection rate and periodicity
- Proposal 4: NR-PSS, NR-SSS and NR-PBCH are multiplexed in the time domain
- Proposal 5: NR-PBCH could be demodulated and decoded based on the frequency synchronization and channel estimation derived from NR-SSS on the same ports

Decision: The document is noted.

R1-1700306 NR SS Design: Minimum Bandwidth and Multiplexing AT&T
The document was presented by Thomas Novlan from AT&T.
- Proposal 1: The relationship between NR SS bandwidth and subcarrier spacing should be frequency band agnostic from a RAN1 specification perspective.
- Proposal 2: The NR SS burst bandwidth should scale linearly based on subcarrier spacing with a reference value of 5MHz for 15kHz spacing.
- Proposal 3: The NR SS design should support flexible multiplexing of synchronization signals with other signals/channels and forward compatible introduction of additional SS bursts within a burst set.
- Proposal 4: A given UE should only need to be configured and aware of the signals required for its own cell discovery and synchronization procedures.

Decision: The document is noted.

Conclusion of Monday session: Continue offline discussion until Wednesday – (NTT DOCOMO)

Tuesday session
R1-1701270 WF on NR-SS structure NTT DOCOMO, ITL, Convida Wireless, ZTE, ZTE Microelectronics, InterDigital, Huawei, HiSilicon, Sony
The document was presented by Hiroki Harada from NTT DOCOMO.
- NR defines at least one basic sequence length for each synchronization signal in case of sequence-based synchronization signal design
  - Down-select from following candidates based on subcarrier spacing and bandwidth consideration for synchronization signals
    - Alt.1: sequence length is about 255
    - Alt.2: sequence length is about 127
    - Alt.3: sequence length is about 63
  - NR-SS for different usage scenario (e.g., different frequency range) can be generated by scaling subcarrier spacing value
    - FFS: Other approaches may also be applied, e.g., repetition/concatenation of same or different sequence with the same basic sequence length in frequency domain, repetition/concatenation of same or different sequence with the same basic sequence length in different OFDM symbols, single basic sequence mapped to multiple OFDM symbols, mapping the basic sequence to every N subcarriers, defining additional longer sequence than basic sequence
  - FFS on message-based synchronization signal design

Decision: The document is noted. Modified as follows further to offline session:

Agreements:
- NR defines at least one basic sequence length for each synchronization signal in case of sequence-based synchronization signal design
  - Down-select from following candidates based on at least subcarrier spacing and bandwidth consideration for synchronization signals
    - Alt.1: sequence length is about 255
    - Alt.2: sequence length is about 127
    - Alt.3: sequence length is about 63
    - Note even number is not precluded
    - Note that this is total length of basic sequence that may be constructed by concatenation of multiple sequences like LTE-SSS
  - Striving for the design where NR-SS for different usage scenario (e.g., different frequency range) can be generated by using basic sequence length (e.g., applying different subcarrier spacing value)

- FFS: repetition/concatenation of same or different sequence with the same basic sequence length in frequency domain, repetition/concatenation of same or different sequence with the same basic sequence length in different OFDM symbols, single basic sequence mapped to multiple OFDM symbols, mapping the basic sequence to every N subcarriers, defining additional longer sequence than basic sequence
- FFS on message-based synchronization signal design

R1-1701271 WF on NR-SS subcarrier spacing NTT DOCOMO, Qualcomm, LG Electronics, Samsung, Intel, InterDigital, Sony

The document was presented by Hiroki Harada from NTT DOCOMO.

- For default subcarrier spacing of SS, at least following two frequency range categories are defined
  - Frequency range category #1 is for below 6 GHz
    - Down select default subcarrier spacing value for this category from [15 kHz, 30 kHz]
  - Frequency range category #2 is for range from 6 to 52.6 GHz
    - Down select default subcarrier spacing value for this category from [120 kHz, 240 kHz]
  - FFS on the necessity of finer categorization
- FFS whether PBCH subcarrier spacing is default subcarrier spacing for the respective frequency range category or not

Decision: The document is noted, modified as follows:

Agreements:

- For default subcarrier spacing of SS, at least for evaluation purposes, following two frequency range categories are defined
  - Frequency range category #1 is evaluated for below 6 GHz
    - Evaluate default subcarrier spacing value for this category from [15 kHz, 30 kHz, 60 kHz] until the next meeting
  - Frequency range category #2 is evaluated for range from 6 to 52.6 GHz
    - Evaluate default subcarrier spacing value for this category from [120 kHz, 240 kHz] until the next meeting
  - FFS on the necessity of finer categorization
  - Note: The impact of SS block duration on the achievable latency should be considered in addition to existing criteria
- RAN1 aims to down select default subcarrier spacing from above listed subcarrier spacing values for each agreed frequency range categories
  - Note that final set of frequency categories may include more than the above two categories
- FFS whether PBCH subcarrier spacing is default subcarrier spacing for the respective frequency range category or not

Continue offline discussion until Wednesday – (NTT DOCOMO, Samsung)

Wednesday session

R1-1701272 WF on SS burst set composition Samsung, Ericsson, ZTE, ZTE Microelectronics, Interdigital, Cohere

The document was presented by Young-Han Nam from Samsung.

- For a given frequency band, an SS block corresponds to *N* OFDM symbols based on the default subcarrier spacing, and *N* is a constant.
  - The signal multiplexing structure is fixed in a specification
- UE shall be able to identify at least OFDM symbol index, slot index in a radio frame and radio frame number from an SS block.
  - The signals included in the SS block are FFS between
    - Alt 1: PSS, SSS and PBCH; and
    - Alt 2: PSS, SSS, TSS and PBCH.
    - Note 1: it does not preclude possibility of multiplexing MRS and/or data transmission in the SS block.
    - Note 2: It does not preclude the possibility of skipping PBCH in other SS blocks.
- From UE perspective, an SS burst comprises *L* consecutive SS blocks.
  - *L* corresponds to the number of SS blocks in a burst
  - *L* is FFS between
    - Alt 1: a fixed value specified in a given frequency band;
    - Alt 2: *L* is cell-specifically determined and <= a fixed maximum value specified in a frequency band
- From UE perspective, an SS burst set comprises *nL* SS blocks.
  - *n* is cell-specifically determined and corresponds to the number of bursts in a burst set
    - Maximum number of *n* is fixed in spec in a frequency band.
  - For <6GHz, at least $n = L = 1$ is supported.
    - Note: It doesn't preclude possibility of configuring multiple SS blocks in a burst set for <6GHz
- [Note: By network implementation, actual number of transmitted SS blocks within a burst set can be less than *nL*; and actual number of transmitted SS blocks within a burst can be less than *L*.]

- Note: Maximum possible number of SS blocks in a SS burst set is fixed in the spec, according to these proposals.

Decision: The document is noted.

Agreements:

- For a given frequency band, an SS block corresponds to *N* OFDM symbols based on the default subcarrier spacing, and *N* is a constant.
  - The signal multiplexing structure is fixed in a specification
- UE shall be able to identify at least OFDM symbol index, slot index in a radio frame and radio frame number from an SS block.
  - The signals included in the SS block are FFS between
    - Alt 1: PSS, SSS and PBCH; and
    - Alt 2: PSS, SSS, TSS and PBCH.
    - Note 1: it does not preclude possibility of multiplexing MRS and/or data transmission in the SS block.
    - Note 2: It does not preclude the possibility of skipping PBCH in other SS blocks.

Possible agreements:

- From UE perspective, an SS burst comprises *L* SS blocks
  - *L* is a fixed value specified in a given frequency band
  - FFS: SS blocks are always consecutive or not
- From UE perspective, an SS burst set comprises *nL* SS blocks.
  - *n* is cell-specifically determined and corresponds to the number of bursts in a burst set
    - Maximum number of *n* is fixed in spec in a frequency band.
  - For <6GHz, at least $n = L = 1$ is supported.
    - Note: It doesn't preclude possibility of configuring multiple SS blocks in a burst set for <6GHz
- FFS whether UE has different assumptions in idle and connected modes
- Note that network is not mandated to transmit SS blocks as UE assumed
- Note: Maximum possible number of SS blocks in a SS burst set is fixed in the spec, according to these proposals.

Continue offline discussion – Young-Han (Samsung)

Agreement:

- For initial cell selection, UE may assume default SS burst set periodicity which may be frequency band-dependent.
- UE may assume that a given SS block is repeated with a SS burst set periodicity
  - Note that NR-PBCH contents in a given repeated SS block may change
- A single set of possible SS block time locations is specified per frequency band.
  - FFS whether the set is defined with respect to SS burst set or radio frame
  - FFS whether idle/connected UE can be configured with additional information about which SS blocks in a SS burst set are transmitted

R1-1701367 WF on NR-SS bandwidth NTT DOCOMO, Samsung, InterDigital, AT&T, ZTE, ZTE Microelectronics

The document was presented by Hiroki Harada from NTT DOCOMO.

- For frequency range category #1 (below 6 GHz) where [15 kHz, 30 kHz, 60 kHz] are candidate subcarrier spacing values:
  - Candidate minimum NR carrier bandwidth are [5 MHz, 10 MHz, 20 MHz]
  - Candidate transmission bandwidth of each synchronization signal are about [1.08 MHz, 2.16 MHz, 4.32 MHz, 8.64 MHz]
- For frequency range category #2 (above 6 GHz) where [120 kHz, 240 kHz] are candidate subcarrier spacing values:
  - Candidate minimum NR carrier bandwidth are [20 MHz, 40 MHz, 80 MHz]
  - Candidate transmission bandwidth of each synchronization signal are about [8.64 MHz, 17.28 MHz, 34.56 MHz]
- Note that above frequency range categories may be further divided into different categories with different parameters
- FFS on bandwidth of additional synchronization signal(s) if defined

Decision: The document is noted, modified and agreed as follows:

Agreements:

- For frequency range category #1 (below 6 GHz) where [15 kHz, 30 kHz, 60 kHz] are candidate subcarrier spacing values:
  - Candidate minimum NR carrier bandwidth are [5 MHz, 10 MHz, 20 MHz]
  - Candidate transmission bandwidth of each synchronization signal are about [1.08 MHz, 2.16 MHz, 4.32 MHz, 8.64 MHz]
- For frequency range category #2 (above 6 GHz) where [120 kHz, 240 kHz] are candidate subcarrier spacing values:

  - Candidate minimum NR carrier bandwidth are [20 MHz, 40 MHz, 80 MHz]
  - Candidate transmission bandwidth of each synchronization signal are about [8.64 MHz, 17.28 MHz, 34.56 MHz, 69.12 MHz]
- The above frequency range categories may be further divided into different categories with different parameters
- FFS on bandwidth of additional synchronization signal(s) if defined
- NR minimum carrier bandwidth for carrier which does not support initial access is FFS

Possible agreements:
- Note that for a NR carrier that does not support initial access, other smaller NR carrier bandwidth can be considered
- Note that NR carrier bandwidth of 5 MHz and above may not support initial access
- Note that UE operating bandwidth may be smaller than NR SS bandwidth

Continue offline discussion until Thursday – (Huawei)

Agreement: FFS: UE bandwidth

R1-1701293 **Multiplexing of PSS and SSS Qualcomm, Docomo, Intel, Ericsson, CATT, Sony, MediaTEK, ZTE**
- In both single beam and multi-beam scenario, time division multiplexing of PSS and SSS is supported.

Discussion: Also supported Motorola Mobility, InterDigital, LGE, AT&T, Sierra Wireless
Samsung ok for single beam case only.
Decision: The document is noted.

Agreement: At least for single beam scenario, time division multiplexing of PSS and SSS is supported.

Working assumption: Time division multiplexing of PSS and SSS is supported for multiple beam scenario

R1-1701377 SS block index indication Huawei, HiSilicon, NTT DOCOMO, ZTE, ZTE Microelectronics
Continue offline discussion until Wednesday – (NTT DOCOMO, Samsung)

Friday
R1-1701530 WF on SS-block Index Indication Huawei, HiSilicon, NTT DOCOMO, ZTE, ZTE Microelectronics, Sierra Wireless, Samsung, CATT, InterDigital, Nokia, ASB, Intel, Ericsson
- The time index/indices of an SS block from which UE will derive symbol, slot index in a radio frame is/are to be down-selected from the following alternatives:
  - Alt.1: One time index for every SS-block within an SS-burst set
  - Alt.2: One time index that is specific to each SS-block within an SS-burst, and an SS burst index that is specific to each SS burst within an SS-burst set. SS burst index is common across SS blocks in each SS-burst.
- Possible mechanisms to indicate the SS block index includes
  - Implicit indication by PBCH
  - Explicit indication by PBCH
  - Indication by an additional SS, if such an additional SS is introduced
  - Indication by NR-SS
  - Note that this does not preclude other mechanisms
- By default, the UE may neither assume the gNB transmits the same number of physical beam(s), nor the same physical beam(s) across different SS-blocks within an SS burst set.

Decision: The document is agreed.

Not treated.
R1-1700097 NR-SS: Bandwidth, Multiplexing ZTE, ZTE Microelectronics
R1-1700159 TDM based unified SS block design for both above and below 6 GHz MediaTek Inc.
R1-1700178 NR-SS Bandwidth and multiplexing with NR-PBCH CATT
R1-1700288 Indication of the SS-block index in multi-beam cases Spreadtrum Communications
R1-1700328 Synchronization signal structure Intel Corporation
R1-1700456 Discussion on SS bandwidth and multiplexing LG Electronics
R1-1700608 Discussion and evaluation on NR- PSS/SSS structure NTT DOCOMO, INC.
R1-1700665 On NR synchronization signal design Sony
R1-1700735 Numerology for DL synchronization signals Sharp
R1-1700784 Synchronization signal bandwidth and multiplexing consideration Qualcomm Incorporated
R1-1700884 SS BW and multiplexing Samsung
R1-1701037 Synchronization Signal Structure Innovative Technology Lab Co.
R1-1701041 Synchronization in NR considering beam sweeping ASUSTEK COMPUTER (SHANGHAI)
R1-1701056 SS Block Bandwidth, Numerology and Multiplexing Nokia, Alcatel-Lucent Shanghai Bell

R1-1701070 On transmission bandwidth and multiplexing synchronization signals CMCC

5.1.1.1.2 SS frequency raster

R1-1700422 Frequency raster for synchronization signal and system carrier Intel Corporation

The document was presented by Daewon Lee from Intel.

- Proposal 1: NR channel raster of [100 kHz or 180 kHz] is supported for sub 6 GHz. Down select between 100 kHz and 180 kHz to be done with further analysis.
- Proposal 2: UE is only expected to monitor one synchronization signal within the NR component carrier bandwidth, and can assume all NR cells considered as intra-frequency handover have identical frequency position of the synchronization signal.
- Proposal 3: NR synchronization signal raster and NR channel raster is defined to be identical for below 6 GHz. This can be revisited if minimum system bandwidth is larger than the synchronization signal bandwidth.
- Proposal 4: NR synchronization signal raster and NR channel raster is defined to be identical for above 6 GHz. This can be revisited if minimum system bandwidth is larger than the synchronization signal bandwidth.

Decision: The document is noted.

R1-1700785 Synchronization signal frequency raster consideration Qualcomm Incorporated

The document was presented by Haitong Sun from Qualcomm.

- Proposal 1: The frequency of synchronization signals should be aligned with the subcarriers of data channel. More specifically, the following considerations should be taken into account when designing the synchronization signal frequency raster.
  - The synchronization signal frequency raster is an integer multiple of data subcarrier spacing.
  - The maximum data subcarrier spacing is 120 kHz for below 6 GHz and 240 kHz for above 6GHz.
- Proposal 2: Two band categories can be defined for synchronization signals
  - Band category A: Synchronization signal has synchronization signal bandwidth 4.32MHz and synchronization signal SCS of 30kHz
  - Band category B: Synchronization signal has synchronization signal bandwidth 34.56MHz and synchronization signal SCS of 240kHz
- Proposal 3: The channel raster is either 120 kHz or 300 kHz for below 6GHz, and either 960 kHz or 1.92MHz for above 6GHz.
- Proposal 4: The synchronization signal frequency raster is 36MHz for band category B. In addition, the following options for the synchronization signal frequency raster can be considered for band category A
  - Synchronization signal frequency raster option 1: If the channel raster is 120 kHz, the synchronization signal frequency raster is 4.68MHz for band category A.
  - Synchronization signal frequency raster option 2: If the channel raster is 300 kHz, the synchronization signal frequency raster is 4.5MHz for band category A.
- Proposal 5: Both the channel and sync raster start at 0 Hz for all bands, irrespective of where the band boundaries are.

Decision: The document is noted.

Conclusion of Monday session: Continue offline discussion until Wednesday – Haitong (Qualcomm)

Friday

R1-1701515 WF on Synchronization and Channel Raster Qualcomm, CATT, Samsung, Sierra Wireless

Decision: The document is noted and the following is agreed:

Agreements:

- When the sync bandwidth is smaller than the minimum system bandwidth for a given frequency band, RAN1 strives to make the synchronization signal frequency raster sparser compared to channel raster to reduce UE initial cell selection burden without limiting the NR deployment flexibility
  - FFS If UE is required to search for all the possible synchronization signal frequency locations defined by the synchronization signal frequency raster
- When the sync bandwidth is the same as the minimum system bandwidth for a given frequency band that UE searches, synchronization signal frequency raster is the same as the channel raster
  - FFS If UE is required to search for all the possible synchronization signal frequency locations defined by the synchronization signal frequency raster

Not treated.

R1-1700038 Frequency location of the synchronization signals Huawei, HiSilicon
R1-1700098 NR-SS: Frequency Raster ZTE, ZTE Microelectronics
R1-1700160 Low Density Power Boosted Synchronization Signal for flexible NR frequency raster MediaTek Inc.
R1-1700179 Consideration of NR Raster and UE behavior CATT
R1-1700293 NR SS frequency raster Ericsson

R1-1700307 NR SS Design: Frequency Raster AT&T
R1-1700457 Discussion on SS frequency raster LG Electronics
R1-1700885 SS frequency raster Samsung
R1-1701057 On synchronization signal frequency raster Nokia, Alcatel-Lucent Shanghai Bell

5.1.1.1.3 SS periodicity

R1-1700180 NR SS periodicity CATT
The document was presented by Fang Chen Cheng from CATT.
- Proposal 1: NR-PSS/NR-SSS and NR-PBCH should be TDM multiplexed to minimize the UE detection complexity of synchronization signals and retrieve the system information from NR-PBCH.
- Proposal 2: The number of SS-blocks within a SS-burst should be flexibly determined in the deployment.
- Proposal 3: Considering the shadow fading cycle with ±8 dB standard deviation, the SS-burst periodicity needs to be less than 20 ms to allow the UE detect the NR-PSS/NR-SSS with high probability of detection at SINR = -6 dB
- Proposal 4: The periodicity of SS-burst for channel tracking should not be more than 10 ms to allow accumulation of NR-PSS/NR-SSS for SINR improvement.
- Proposal 5: The periodicity of the SS-burst set should be defined based on long term inter-cell interference scheme and network power saving scheme

Decision: The document is noted.

R1-1700294 NR SS burst set periodicity Ericsson
The document was presented by Asbjorn Grovlen from Ericsson.
- Obs.1: Significant network energy savings can be achieved by having default 80 ms periodicity for the SS burst set helping to meet the technical performance requirements for IMT-2020
- Obs.2: Good single-shot NR-PSS/SSS detection rate and sparser frequency raster for cell search will reduce the NR initial access cell search time
- Obs.3: Introduction of additional signals for connected mode measurements allows unloaded networks to fall back to low energy state transmitting only NR-PSS/SSS used for idle mode mobility measurements
- Adopt 80 ms for the default periodicity of the SS burst set

Decision: The document is noted.

R1-1700329 Periodicity of syncrhonization signals Intel Corporation
The document was presented by Gregory Morozov from Intel.
- SS bursts consists of identical number of SS blocks with same relative transmission timing within the SS burst.
- SS burst set is repeated indefinitely
- In NR, a single value for the default periodicity of SS burst is used for a given carrier frequency.
- At least for below 6 GHz, the default periodicity of SS burst is 5 ms.

Decision: The document is noted.

Conclusion of Monday session: Continue offline discussion until Wednesday – (AT&T)

Wednesday session
R1-1701373 WF on NR SS Periodicity AT&T, NTT DOCOMO
The document was presented by Thomas Novlan from AT&T.
- A large value for the SS burst set periodicity (e.g. 100ms) can be supported at least in case of NR deployments where network assistance signalling of the SS burst set periodicity for a given carrier frequency can be provided.
- FFS the value for the default SS burst set periodicity assumed in the case where network assistance signalling of the SS burst set periodicity cannot be provided.
  - A UE in this case is only expected to perform measurements based on the default SS burst set periodicity
  - Companies are encouraged to investigate the tradeoff between network flexibility/power consumption and UE complexity/power consumption (especially for IDLE mode and initial cell search)

Discussion: Also supported by Orange.
Samsung suggested replacing "FFS the value" (second main bullet) by "A small value"
Ericsson cannot agree with Samsung – FFS means that further study is required to get this bullet agreeable
Decision: The document is noted.

Possible agreements:
- At least one value for the SS burst set periodicity (e.g. [100ms]) can be supported at least in case of NR deployments where network assistance signalling of the SS burst set periodicity for a given carrier frequency can be provided.
- Smaller value for the default SS burst set periodicity (e.g. [10ms]) assumed in the case where network assistance signalling of the SS burst set periodicity cannot be provided
  - A UE in this case is only expected to perform measurements based on the default SS burst set periodicity
  - Companies are encouraged to investigate the tradeoff between network flexibility/power consumption and UE complexity/power consumption (especially for IDLE mode and initial cell search)

Friday

R1-1701500 WF on NR SS Periodicity AT&T, NTT DOCOMO, Samsung, Sierra Wireless

- RAN1 aims to select a default SS burst set periodicity for each agreed frequency range category from the following candidate values:
  - For carrier frequency range #1 (below 6GHz): [5ms, 10ms, 20ms, 40ms, 80ms, 100ms]
  - For carrier frequency range #2 (above 6GHz): [5ms, 10ms, 20ms, 40ms, 80ms, 100ms]
  - Note that final set of frequency categories may include more than the above two categories
- Companies are encouraged to investigate the candidate default SS burst set periodicity values considering at least the following factors:
  - UE IDLE mode and initial cell search power consumption and latency
    - Including single/multi-beam operation at Tx and Rx
  - NW power consumption
  - Inter-RAT/Inter-frequency measurement
  - Forward compatibility and deployment flexibility including standalone and non-standalone NR deployments
  - Benefits and feasibility of SS burst set configuration assistance signaling (e.g. periodicity indication or measurement window) for CONNECTED and/or IDLE UEs
  - NW synchronization requirements/assumptions

Decision: The document is agreed.

Not treated.

R1-1700046 Discussion and evaluation on NR-SS periodicity Huawei, HiSilicon
R1-1700099 NR-SS: Periodicity ZTE, ZTE Microelectronics
R1-1700161 SS Block set periodicity considering beam tracking and initial acquisition MediaTek Inc.
R1-1700308 Periodicty of NR SS AT&T
R1-1700453 Synchronizatoin signal transmission based on multi-beam for NR Potevio
R1-1700458 Discussion on SS periodicity LG Electronics
R1-1700609 Discussion on SS periodicity for NR NTT DOCOMO, INC.
R1-1700666 NR synchronization signal burst set periodicity Sony
R1-1700727 DL synchronization signal structure in NR Sharp
R1-1700786 Synchronization signal periodicity consideration Qualcomm Incorporated
R1-1700871 Considerations on SS periodicity for Synchronization in NR InterDigital Communications
R1-1700886 SS periodicity Samsung
R1-1701058 On Requirements and Design of SS Burst Set Nokia, Alcatel-Lucent Shanghai Bell
R1-1701069 Beam sweeping using multi-width beams CMCC
R1-1701178 Discussion on Synchronization Signal Periodicity ORANGE

5.1.1.1.4 SS sequence design

R1-1700459 NR Synchronization Signal Design LG Electronics

The document was presented by … from LGE.

- Proposal 1: The subcarrier spacing and CP length of NR-SSS is the same as that of the other initial access channels (e.g., broadcast channel). The subcarrier spacing of NR-PSS is wider than that of NR-SSS and the CP length of NR-PSS is shorter than that of NR-SSS.
- Proposal 2: For below 6 GHz, the transmission bandwidth and time duration of NR synchronization signal is similar with that of LTE synchronization signal.
- Proposal 3: The single hypothesis of NR-PSS should be considered and at least cell-ID should be provided in NR-SSS.
- Proposal 4: Common sequence across different default numerologies should be considered

Decision: The document is noted.

R1-1700610 Discussion and evaluation on NR synchronization signal sequence design NTT DOCOMO, INC.

The document was presented by Hiroki Harada from NTT DOCOMO.

- Observation 1: It is beneficial to minimize number of IDs for NR-PSS sequence to minimize UE burden.
- Observation 2: Cell detection performance is almost same in the cases with different numbers of PSS IDs.
- Observation 3: Time-repetitive NR-PSS structure based on comb mapping would be helpful to mitigate residual frequency offset after NR-PSS detection and would provide flexibility for various NR-SS design.
  - Detailed PSS sequence design should be further studied.
- Observation 4: For NR-SSS detection, interleaving two sequences based on M sequence and Zadoff-Chu sequences provides almost the same performance.
- Observation 5: Zadoff-Chu sequence has distorted peak performance in cross-correlation between cyclic-shifted sequences in the presence of residual frequency offset.

- Proposal 1: In order to avoid the PCI confusion issue and to relax corresponding planning effort, number of NR cell IDs should be extended to more than 504 while number of IDs supported by NR-PSS/SSS should be kept to 504 considering detection performance and complexity.
  - FFS carrying remaining part of NR cell ID by using NR-PBCH
- Proposal 2: Single NR-PSS sequence should be considered.
- Proposal 3: Zadoff-Chu based sequence should be applied for NR-PSS
- Proposal 4: M sequence based NR-SSS should be considered.

Decision: The document is noted.

Conclusion of Monday session: Continue offline discussion until Wednesday – (Samsung)

Tuesday session

R1-1701268 WF on number of NR Cell IDs and NR-PSS sequences Samsung, Intel, LG Electronics, NTT DOCOMO, InterDigital, ZTE, ZTE Microelectronics

The document was presented by Hongbo Si from Samsung.

- Down-select the number of NR cell IDs from
  - Alt 1: 504.
  - Alt 2: about 1000 to 2000.
- Down-select from the following alternatives on the number of NR-PSS sequence(s):
  - Alt 1: One.
  - Alt 2: Two.
  - Alt 3: Three.
- Companies are encouraged to evaluate and down-select from the above alternatives in the next meeting.

Decision: The document is noted, modified and agreed as follows:

Agreements:

- Down-select the number of NR cell IDs in PSS and SSS from
  - Alt 1: 504
  - Alt 2: about 1000 to 2000
  - Alt 3: 600
  - Note that other information is not excluded from PSS/SSS
- Down-select from the following alternatives on the number of NR-PSS sequence(s):
  - Alt 1: One
  - Alt 2: Two
  - Alt 3: Three
  - Alt 4: Four
  - Alt 5: Six
- Companies are encouraged to evaluate and down-select from the above alternatives in the next meeting.

Not treated.

R1-1700887 SS sequence design Samsung
R1-1700037 Synchronization signals for NR Huawei, HiSilicon
R1-1700100 NR-SS: Sequence Design ZTE, ZTE Microelectronics
R1-1700162 Candidate Sequences for NR PSS MediaTek Inc.
R1-1700181 Numerology agnostic NR PSS design and performance evaluation results CATT
R1-1700295 NR-PSS/SSS Sequence design Ericsson
R1-1700330 Considerations for synchronization signal sequence Intel Corporation
R1-1700450 Sync signal design for different beam approaches KT Corp.
R1-1700547 Discussion on NR-PSS and NR-SSS design Guangdong OPPO Mobile Telecom.
R1-1700576 Design of NR synchronization signals ETRI
R1-1700787 Synchronization signal sequence design consideration Qualcomm Incorporated
R1-1700847 Initial Synchronization Signal Design in NR InterDigital Communications
R1-1700879 Concatenation based wideband synchronization signal Motorola Mobility
R1-1701038 Considerations on Sequence Design for Synchronization Signal Innovative Technology Lab Co.
R1-1701059 Syncrhonization signal design and performance analysis Nokia, Alcatel-Lucent Shanghai Bell

5.1.1.2 Broadcast signal/channel

R1-1700788 PBCH design consideration Qualcomm Incorporated
R1-1700047 Discussion and evaluation on broadcast channel/signals transmission for beam based initial access Huawei, HiSilicon
R1-1700888 System information delivery Samsung

R1-1701372 WF on NR PBCH contents Samsung, NTT DOCOMO, CATT, Convida Wireless, Sony, ITL, InterDigital

Agreement:

- NR-PBCH contents shall include:
  - At least part of the SFN (system frame number)
    - FFS on the number of bits used to indicate SFN
    - FFS how much of the SFN is indicated explicitly, and how much (if any) is indicated implicitly
  - CRC (FFS number of bits)
  - FFS:
    - In case remaining minimum system information is carried on PDSCH, configuration for PDSCH or control resource set for scheduling PDSCH
    - In case remaining minimum system information is carried on secondary physical broadcast channel, configuation of secondary physical broadcast channel
    - Configuration information for initial uplink transmission; in this case, it may not be necessary to include configuration information for remaining minimum system information
    - Other parameters

R1-1701314 WF on NR-PBCH design LG Electronics, Intel, Nokia, ASB, Samsung, NTT DOCOMO, InterDigital, Mediatek

Agreement:

- No blind detection of NR-PBCH transmission scheme or number of antenna ports is required by the UE
- For NR-PBCH transmission, a single fixed number of antenna port(s) is supported
- For NR-PBCH transmission, a single one of the following transmission schemes is supported; down-selection will be done in RAN1#88 to one of the following transmission schemes:
  - Alt.1: Two antenna port based SFBC
  - Alt.2: Two antenna port based precoder cycling
  - Alt.3: Single antenna port based transmission scheme
- For reference signal of NR-PBCH demodulation, down selection will be done in RAN1#88 to one of the following:
  - Alt.1: Synchronization Signal (e.g. NR-SSS)
  - Alt.2: Self-contained DMRS
    - NOTE: It does not preclude additional channel estimation aid from synchronization signal.
  - Alt.3: MRS multiplexed in an SS block, if MRS is supported in an SS block.
- Numerology: FFS whether NR-PBCH is the same as NR-SSS – decision to be taken at RAN1#88

Friday

R1-1701502 WF on Simulation Assumptions for NR-PBCH LG Electronics, NTT DOCOMO, Ericsson, Samsung, InterDigital, ZTE, ZTE Microelectronics, Intel

Decision: The document is noted and the following is agreed:

Agreements:

- Companies are encouraged to provide evaluation results based on the following assumptions:

Parameter	Value
Channel coding scheme	LTE TBCC Other channel coding schemes are not precluded. (e.g. Polar coding)
Carrier frequency, Channel model, UE speed, Antenna configuration, Number of interfering TRPs	Following evaluation assumptions for initial access
Performance Target	1% BLER @ -6dB (average received SNR)

  - Companies should provide exact values for following parameters:
    - Payload size with CRC & Required number of REs (w/o reference signal)
    - DMRS overhead assumption if used
    - Number of OFDM symbols for NR-PBCH
    - Number of OFDM symbols for SS block
    - Transmission bandwidth for NR-PBCH
    - Periodicity for NR-PBCH
      - Multiplexing of NR-PBCH in the SS block
    - Subcarrier spacing
  - Companies should mention if NR-PBCH implicitly convey other information, e.g. SS block timing
  - Companies should provide frequency and time estimation errors

- Note that above simulation assumptions will not affect the decisions of channel coding scheme of NR-PBCH

Not treated.
R1-1700101 NR-PBCH and Delivery of Minimum SI ZTE, ZTE Microelectronics
R1-1700151 Broadcast channel design for system information acquisition MediaTek Inc.
R1-1700182 NR PBCH and NR physical channel carried system information CATT
R1-1700296 NR Minimum system information delivery Ericsson
R1-1700331 Considerations for NR physical broadcast channel Intel Corporation
R1-1700460 NR PBCH Design LG Electronics
R1-1700535 Relation among BCH, SIBs and subcells Panasonic Corporation
R1-1700611 Discussion on broadcast signal/channel design for NR NTT DOCOMO, INC.
R1-1700667 Consideration on NR broadcast signal/channel Sony
R1-1700846 Broadcast Signal and Channel Design in NR InterDigital Communications
R1-1701042 Signaling of broadcast channel considering multiple numerologies ASUSTEK COMPUTER (SHANGHAI)
R1-1701060 PBCH design Nokia, Alcatel-Lucent Shanghai Bell

5.1.1.3 Paging design

R1-1701441 WF on paging Huawei, HiSilicon, Samsung, CATT, Panasonic, NTT DOCOMO, Fujitsu, LG Electronics, MediaTek
The document was presented by Xi Zhang from Huawei.

- Companies are encouraged to compare the following options for channel design for paging, taking the necessity of beam sweeping into consideration
  - Opt-1: Paging message is scheduled by DCI carried by NR-PDCCH and is transmitted over PCH carried by NR-PDSCH
  - Opt-2: Paging message is transmitted in a non-scheduled physical channel indicated by NR-PBCH
  - Opt-3: Paging message is transmitted over PCH carried by NR-PDSCH without DCI. The resource is semi-statically configured
  - Opt-4: Paging message (e.g., only for SI change indication) is transmitted over NR-PDCCH without NR-PDSCH
- Companies are encouraged to provide their views on
  - Definitions of paging occasion and paging periodicity
  - Content and payload of paging message
- RAN1 sends a LS to RAN2, asking about
  - Paging payload and capacity requirement

Decision: The document is noted; further modified as follows:

Agreements:

- Companies are encouraged to compare the following options for channel design for paging, taking the necessity of beam sweeping into consideration
  - Opt-1: Paging message is scheduled by DCI carried by NR-PDCCH and is transmitted over PCH carried by NR-PDSCH
  - Opt-2: Paging message is transmitted in a non-scheduled physical channel
    - Where the paging indication may be carried by NR-PBCH or some other channel(s)
  - Opt-3: Paging message is transmitted over PCH carried by NR-PDSCH without DCI. The resource is semi-statically configured
  - Opt-4: Paging message (e.g., only for SI change indication) is transmitted over NR-PDCCH without NR-PDSCH
  - Opt-5: Paging message is transmitted by PDSCH and paging indication is transmitted non-scheduled physical channel
- Companies are encouraged to provide their views on
  - Definitions of paging occasion and paging periodicity
  - Content and payload of paging message
  - RAN1 sends a LS to RAN2, asking about paging payload and capacity requirement

Prepare draft LS to RAN2 (if possible within Thursday) in R1-1701495 – Teck (Huawei)
R1-1701495 LS on Paging Requirements RAN1, Huawei
Decision: The LS is approved.

Not treated.
R1-1700536 Paging design related to subcell Panasonic Corporation
R1-1700789 Paging design consideration Qualcomm Incorporated
R1-1700102 Paging in NR ZTE, ZTE Microelectronics

R1-1700048 Multi-beam Paging for NR Huawei, HiSilicon
R1-1700183 NR Paging Channel CATT
R1-1700297 NR Paging design Ericsson
R1-1700461 Discussion on paging design in NR LG Electronics
R1-1700612 Discussion on paging design for NR NTT DOCOMO, INC.
R1-1700865 Discussion on NR paging design Beijing Xiaomi Mobile Software
R1-1700889 Paging channel design Samsung
R1-1701061 Paging in NR Nokia, Alcatel-Lucent Shanghai Bell

5.1.1.4 Physical random access channel and random access procedure

5.1.1.4.1 PRACH design

R1-1700298 NR PRACH design Ericsson
R1-1700309 PRACH Design for NR AT&T
R1-1700034 RACH preamble design for NR Huawei, HiSilicon

R1-1701277 WF on PRACH preamble numerology ZTE, ZTE Microelectronics, Samsung, Nokia, NTT DOCOMO, CATT, Ericsson, LGE
Revised in R1-1701458 **WF on PRACH preamble numerology ZTE, ZTE Microelectronics, Samsung, Nokia, ASB, NTT DOCOMO, CATT, Ericsson, LGE, Huawei, HiSilicon, MediaTek, Qualcomm, Sony, Intel, Sharp, Fujitsu**

Agreed next steps:

- For down selection purpose, until the next meeting do evaluation of the following RACH SCS alternatives at least considering
  - Robustness towards Doppler frequency, Beam sweeping latency, Link budget, Cell size, RACH capacity, frequency offset
- RACH SCS alternatives
  - SCS = [1.25 2.5 5 7.5 10 15 20 30 60 120 240] kHz
    - Note: in case RACH SCS = [15 30 60 120 240] there are two design options:
      - use the same SCS as the subsequent UL data and control
      - use different SCS than the subsequent UL data and control
- The following RACH preamble sequence types are considered
  - Zadoff-Chu
  - M-sequence
  - Zadoff-Chu with cover extension using M-sequence

Note that new designs are not precluded in the future.

R1-1701493 WF on RACH preamble format Samsung, Qualcomm, ZTE, ZTE Microelectronics, NTT DOCOMO, Ericsson, DISH Network, Thales, MediaTek, CATT, Huawei (R1-1701368)

Agreement:
For single/multi-beam operation,

- For multiple/repeated RACH preamble transmissions, consider only option 1, option 2 and option 4
  - Option 1: CP is inserted at the beginning of the consecutive multiple/repeated RACH OFDM symbols, CP/GT between RACH symbols is omitted and GT is reserved at the end of the consecutive multiple/repeated RACH symbols
  - Option 2/4: The same/different RACH sequences with CP is used and GT is reserved at the end of the consecutive multiple/repeated RACH sequences
    - Study:
      - Multiplexing with different orthogonal cover codes
      - Independent RACH sequences in a RACH preamble
- For supporting various coverage and forward compatibility, flexibility in the length of CP/GT and the number of repeated RACH preambles and RACH symbols is supported
- Note: specific use of these three options may depend on RACH subcarrier spacing and TRP beam correspondence

R1-1701486 WF on PRACH preamble format definition NTT DOCOMO, Ericsson, CATT, Qualcomm, Samsung, Intel, ZTE, ZTE Microelectronics, Sony, Huawei, HiSilicon, Sharp, Nokia, ASB, LG Electronics, DISH Network

Agreement:

- NR defines that:

  - a random access preamble format consists of one or multiple random access preamble(s),
  - a random access preamble consists of one preamble sequence plus CP, and
  - one preamble sequence consists of one or multiple RACH OFDM symbol(s)
- UE transmits PRACH according to the configured random access preamble format

Not treated.

R1-1700561	Consideration on the resource configuration of PRACH for UEs with/without TX/RX reciprocity	Lenovo
R1-1700890	PRACH design	Samsung
R1-1700103	PRACH Design Considerations	ZTE, ZTE Microelectronics
R1-1700184	On NR RACH Preamble Design	CATT
R1-1700332	PRACH preamble and resource allocation	Intel Corporation
R1-1700613	Views on random access channel for NR	NTT DOCOMO, INC.
R1-1700650	NR Physical Random Access Channel	Nokia, Alcatel-Lucent Shanghai Bell
R1-1700653	Discussion on PRACH configuration in NR	Fujitsu
R1-1700790	PRACH design consideration	Qualcomm Incorporated
R1-1701199	Discussion on NR PRACH Preamble	LG Electronics
R1-1701378	WF on PRACH design	Huawei, HiSilicon, CATT

5.1.1.4.2 4-step RA procedure

R1-1700651 NR Random Access Procedure Nokia, Alcatel-Lucent Shanghai Bell

The document was presented by … from Nokia.

- Observation 1: In single-beam DL and UL configuration (both gNB and UE), power ramp-up may be used for preamble re-transmission.
- Proposal 1: Whether to prioritize power ramp up, TX beam switch or PRACH preamble resource selection during random access procedure when no RAR is detected is up to UE as long as the UE follows the PRACH configuration and transmit power control rules.
- Proposal 2: UE re-starts power ramping-up process when the UE changes the preferred DL beam.
- Observation 2: gNB is unaware TX/RX beam correspondence capabilities of UEs that may start performing initial access into the cell.
- Observation 3: Lack of Tx/Rx correspondence at the UE, increases the complexity of the initial access procedure, increases access latency and leads to unnecessary interference.
- Observation 4: In case the UE doesn't have Tx/Rx correspondence, transmitting multiple preambles during the same RACH sweep reduces the initial access latency.
- Proposal 3: gNB provides a signal quality metric in the Random Access Response, to allow the UE to select the best UL Tx beam.
- Proposal 4: The network broadcasts to the UEs the maximum number of preambles that can be independently sent by one UE during a full RACH sweep.
- Observation 5: Having a many-to-one mapping between RACH preamble occasions and the RAR reception window, can lead to following drawbacks
  - Increases RACH procedure latency
  - Increases RACH procedure collision rate
  - UE ambiguity in determining the best UL Tx beam.
- Proposal 5: There is a one-to-one mapping between the RACH preamble occasions and the RAR reception window. During each RACH preamble occasion, the UE uses a single UL Tx beam.

Decision: The document is noted.

R1-1700463 Discussion on RACH procedure LG Electronics

The document was presented by Eunsun Kim from LGE.

- Proposal 1: Selection of RACH resource can be based on the M-RS(Measurement RS) in idle mode.
- Proposal 2: Baseline is to allow a single RACH procedure per UE
- Proposal 3: NR RACH design should not be optimized considering UEs without beam correspondence.
- Proposal 4: A RACH resource is composed by a CP length based on preamble format and the number of repetition signalled from RACH configuration
- Proposal 5: PRACH preamble repetition is for the purpose of both of coverage extension and beam scanning at TRP side.
- Proposal 6: Since UE's received direction is determined by the selection of RACH resource, no additional signalling on the msg. 3 transmission beam direction is required in RAR.
- Proposal 7: PRAMBE_ TRANSMISSION_COUNTER should be per UE irrespective of which RACH resource is used for the PRACH preamble transmission and the DL pathloss for OLPC should be estimated per RACH resource.
- Proposal 8: It should be UE choice whether the UE choose different RACH resource or not for its PRACH preamble transmission

Decision: The document is noted.

Thursday session

R1-1701462 WF on terminologies in 4-step RACH procedure LG Electronics ,Qualcomm, NTT DOCOMO, Samsung, Motorola Mobility, CATT (Revision of R1-1701358)

Agreed Definition:

- For 4-step RACH procedure, a RACH transmission occasion is defined as the time-frequency resource on which a PRACH message 1 is transmitted using the configured PRACH preamble format with a single particular tx beam

Agreement: For 4-step RACH procedure,

- NR at least supports transmission of a single Msg.1 before the end of a monitored RAR window
- NR 4-step RACH procedure design should not preclude multiple Msg.1 transmissions until the end of RAR window if need arises

Proposal:

- RAN1 understanding on the PRACH preamble retransmission (i.e. msg. 1 retransmission) condition is the same as that from LTE specification point of view for discussion purpose, for example,
  - PRACH preamble transmission after previous random access procedure is not successfully completed
    - PRACH preamble transmission if UE didn't receive successful RAR until the expiration of RAR window
    - PRACH preamble transmission if UE fails in contention resolution during RACH procedure
    - The number of retransmissions is constrained by the maximum number of preamble transmissions configured by network
- FFS whether it is possible for a UE to send multiple PRACH transmissions before waiting to receive an RAR

R1-1701419 4-step RACH procedure ZTE, ZTE Microelectronics, Nokia, Alcatel-Lucent Shanghai Bell, Samsung, Huawei, HiSilicon, Sony (Revision of R1-1701274)

R1-1701365 WF on NR RACH Msg. 1 Re-transmission Samsung, Nokia, ASB, ZTE, ZTE Microelectronics, NTT DOCOMO, Mitsubishi Electric, MediaTek

Agreement: For NR RACH Msg. 1 retransmission at least for multi-beam operation:

- NR supports power ramping.
  - If the UE conducts beam switching, working assumption that one of the alternatives below will be selected (configurability between multiple alternatives may be considered if clear benefit is shown):
    - Alt 1: the counter of power ramping is re-set.
    - Alt 2: the counter of power ramping remains unchanged.
    - Alt 3: the counter of power ramping keeps increasing.
    - Other alternatives or combinations of the above are not precluded.
  - If UE doesn't change beam, the counter of power ramping keeps increasing.
  - Note: UE may derive the uplink transmit power using the most recent estimate of path loss.
  - The detail of power ramping step size is FFS.
- Whether UE performs UL Beam switching during retransmissions is up to UE implementation
  - Note: which beam UE switches to is up to UE implementation

R1-1701366 Multiple RARs Samsung, ZTE, ZTE Microelectronics, NTT DOCOMO
Decision: Continue discussion at RAN1#88

Not treated.

R1-1700049 RACH procedures and resource configuration Huawei, HiSilicon
R1-1700104 4-step Random Access Procedure ZTE, ZTE Microelectronics
R1-1700185 Discussion on NR 4-step RA Procedure CATT
R1-1700299 NR Four-step random access procedure Ericsson
R1-1700304 On RACH retransmission Mitsubishi Electric Co.
R1-1700310 4-Step RA Procedure for NR AT&T
R1-1700333 Considerations for random access procedure Intel Corporation
R1-1700431 RACH in Gradual UE-specific (GUS) initial access CMCC
R1-1700548 Discussion on Random Access Procedure for NR Guangdong OPPO Mobile Telecom.
R1-1700614 Discussion on 4-step random access procedure for NR NTT DOCOMO, INC.

R1-1700654 Discussion on RAR in NR Fujitsu
R1-1700669 On Multiple Beams RACH Procedure Sony
R1-1700702 Random access procedure INTERDIGITAL COMMUNICATIONS
R1-1700736 RACH procedure for multi-Tx beam operation Sharp
R1-1700791 4 step RACH procedure consideration Qualcomm Incorporated
R1-1701250 Discussion on RACH procedure and resources Cohere Technologies (R1-1700859)
R1-1700891 NR 4-step random access procedure Samsung
R1-1701472 WF on RACH association ZTE, ZTE Microelectronics

5.1.1.4.3 2-step RA procedure

Note that 2-step RACH procedure will be discussed at this adhoc meeting only

R1-1700792 2 step RACH procedure consideration Qualcomm Incorporated
The document was presented by Haitong Sun from Qualcomm.
- Proposal 1: Consider 2-step RACH procedure.
- Proposal 2: Consider fallback mechanisms for switching from 2-step RACH to 4-step RACH procedure.

Decision: The document is noted.

R1-1700172 On 2-step random access procedure in NR MediaTek Inc.
The document was presented by … from MediaTek.
- Observation 1: 2-step RACH and contention-based PUSCH are conceptually the same.
- Observation 2: The legacy LTE SR procedure can't meet the requirement of 4ms UL user plane latency.
- Observation 3: 2-step RACH has the potential to achieve the requirement of 4ms UL user plane latency.
- Observation 4: 2-step RACH can significantly reduce up to 41% control plane latency for RRC Connection Resume.
- Observation 5: After introducing 2-step RACH, it is processing time that dominates the control plane latency.
- Observation 6: 2-step RACH data signal can use the same subcarrier spacing, cyclic prefix as well as guard time as preamble signal to support asynchronous UL data transmission.
- Observation 7: To achieve lower receiver complexity, asynchronous 2-step RACH can use DMRS with higher density to avoid extra TA compensation at network.
- Observation 8: Asynchronous 2-step RACH can use the estimated timing advance at receiver to relax the requirement of DMRS density ad achieve lower overhead DMRS design.
- Proposal 1: 2-step RACH should be supported for NR to achieve latency requirement.

Decision: The document is noted.

R1-1700105 2-step Random Access Procedure ZTE, ZTE Microelectronics
The document was presented by … from ZTE.
- Obs.1: If 2-step RACH used for UL synchronization, the TA measurement accuracy should fulfil different scenarios.
- Obs.2: Whether the detection rate and false alarm rate should be the same between the preamble and payload should be studied.
- Obs.3: The target SNR and cell radius supported by 2-RACH payload should be studied.
- Obs.4: The collision of 2-step RACH should be evaluated and solved.
- Obs.5: Spreading can mitigate the collision of payload in Msg1 of 2-step RACH.
- Proposal: The non-orthogonal access scheme should be considered in the 2-step RACH evaluation.

Decision: The document is noted.

Conclusion of Monday session: Continue offline discussion until Wednesday – (Mediatek, Huawei, (ZTE)

Possible agreements:
- 2-step RACH should be supported for NR to achieve latency requirement
- 2-step RACH should be supported at least for small cell scenario

Tuesday session
R1-1701275 WF on 2-step RACH ZTE, ZTE microelectronics, MediaTek
The document was presented by Shupeng Li from ZTE.
- 2-step RACH can reduce latency and signaling overhead
- Considering the potentials 2-step RACH could achieve, further study is needed , specifically for the following details
  - Use scenarios
    - Cell size, asynchronized and/or synchronized cases
    - Operation frequency
    - eMBB, mMTC, URLLC,…
  - Basic channel structure
    - Preamble

        - Preamble + payload
        - Payload only
        - Note: The payload content is FFS
    - Channel design for payload needs to consider collision issue
        - Suitable MCSs
        - w or w/o spreading
        - DMRS design
    - Resource configuration and mapping between preamble and payload
    - Mechanism to fall back to 4-step RACH
- FFS:Forward compatibility of 2-step RACH to be considered during Rel-14 study

Decision: The document is noted.

Conclusion:
- For RAN1 point of view, further study is needed for 2-step RACH
- RAN1 has no plan to spend 2-step RACH in Rel-14 SI timeframe

Not treated.

R1-1700035	Further consideration on two-step RACH	Huawei, HiSilicon
R1-1700186	Further considerations on a 2-step RA procedure	CATT
R1-1700300	NR Two-step random access procedure	Ericsson
R1-1700311	2-Step RA Procedure for NR	AT&T
R1-1700426	Discussion on 2-step RA procedure issues	ITRI
R1-1700464	Discussion on 2 step RACH	LG Electronics
R1-1700577	On 2-step RA procedure for NR	ETRI
R1-1700587	Design considerations for 2-step RACH	HTC Corporation
R1-1700652	On 2-step Random Access Procedure	Nokia, Alcatel-Lucent Shanghai Bell
R1-1700668	Discussions on 2 Steps RACH Procedure	Sony
R1-1700703	2-step random access procedure	INTERDIGITAL COMMUNICATIONS
R1-1700880	Physical channel design for 2-step RACH	Motorola Mobility
R1-1700892	NR 2-step random access procedure	Samsung

5.1.1.5 Mobility procedure

Focus on measurements

R1-1701393 WF on DL RS for RRM measurement Huawei, HiSilicon, Intel, ZTE, ATT, Qualcomm, Ericsson, MediaTek, LG, NTT DOCOMO
- The following always-on signals are used for RRM measurement for L3 mobility in IDLE mode:
    - NR synchronization signal, or
    - NR synchronization signal, and additional DM-RS for PBCH if DM-RS is supported for PBCH, or
        - Note: How to use DM-RS for RRM measurement is up to UE implementation
    - DM-RS for PBCH if DM-RS is supported for PBCH
- For CONNECTED mode RRM measurement for L3 mobility, the following RS can be used if needed, in addition to IDLE mode RS:
    - FFS: CSI-RS,
    - FFS: MRS

Discussion: Samsung → would like that common RS is used for IDLE and CONNECTED (as shown in R1-1700894)
OK if adding a note that possibility of multiplexing RS is not precluded.
Decision: The document is noted.

R1-1700894 Mobility RS, measurements and procedure Samsung
Decision: The document is noted.

Agreements:
- The following always-on signals are used for RRM measurement for L3 mobility in IDLE mode:
    - NR synchronization signal, or
    - NR synchronization signal, and additional DM-RS for PBCH if DM-RS is supported for PBCH, or
        - Note: How to use DM-RS for RRM measurement is up to UE implementation
    - DM-RS for PBCH if DM-RS is supported for PBCH
    - Note that down selection will be needed if DM-RS for PBCH is supported
- For CONNECTED mode RRM measurement for L3 mobility, the following RS can be used if needed, in addition to IDLE mode RS:
    - FFS: CSI-RS,

- FFS: RS separately designed from CSI-RS
- Note that possibility of multiplexing of wideband RS in SS block is not precluded

R1-1701497 **[DRAFT] LS on NR Mobility Intel, Huawei**
Decision: The document is noted and final LS is approved in R1-1701501 by adding RAN1 meeting schedule information and format refinement.

Continue offline discussion – (Samsung, Huawei, LGE)

R1-1701376 **WF on Mobility Samsung, NTT DOCOMO**
The document was presented by Young-Han Nam from Samsung.

- Both cell-level and beam-level RRM measurement quantities are supported.
- At least for CONNECTED mode, for beam-level measurement quantities, UE uses NR-SS to acquire physical cell ID and at least MRS to measure beam strength.
- MRS is a separately designed RS from NR-SSS, and used at least for beam-level RRM measurement in CONNECTED mode
  - MRS can be transmitted on multiple beams
  - Maximum number of antenna ports for MRS is [8].
  - At least some of MRS mapping/configuration parameters (e.g., number of MRS antenna ports, RE mapping, time locations (periodicity and offset), number of antenna ports, BW, scrambling, etc.) are configured/derived cell-specifically.
- The following aspects need to be further studied
  - Use of MRS for time/frequency tracking and estimation of QCL parameters
  - MRS can be turned off.
  - Association of MRS time frequency resources with beam(s)
  - Part of MRS is multiplexed in SS block
  - Whether MRS is a CSI-RS or an RS multiplexed in SS blocks

Decision: The document is noted.

Possible agreements:

- RSRP can be derived from IDLE mode RS
- FFS: Both cell-level and beam-level RSRP are supported
  - FFS how to derive association between cell and beam
- At least for CONNECTED mode, for beam-level measurement quantities, UE uses NR-SS to acquire physical cell ID and at least MRS to measure beam strength.
- MRS is a separately designed RS from NR-SSS, and used at least for beam-level RRM measurement in CONNECTED mode
  - MRS can be transmitted on multiple beams
  - Maximum number of antenna ports for MRS is [8].
  - At least some of MRS mapping/configuration parameters (e.g., number of MRS antenna ports, RE mapping, time locations (periodicity and offset), number of antenna ports, BW, scrambling, etc.) are configured/derived cell-specifically.
- The following aspects need to be further studied
  - Use of MRS for time/frequency tracking and estimation of QCL parameters
  - MRS can be turned off.
  - Association of MRS time frequency resources with beam(s)
  - Part of MRS is multiplexed in SS block
  - Whether MRS is a CSI-RS or an RS multiplexed in SS blocks

Thursday afternoon
R1-1701520 **WF on Mobility Samsung**

Agreement:

- RSRP(s) can be measured from the IDLE mode RS.
  - One RSRP value is measured from the IDLE mode RS per SS block.
    - FFS: UE measures one RSRP value from multiple SS blocks in an SS burst set
  - The measured values are referred to "SS-block-RSRP"
    - It is RAN1's understanding that "SS-block-RSRP" may correspond to the "beam quality" in RAN2 agreements in multi-beam case, at least in IDLE mode.
- RSRP(s) can be measured from the additional RS for CONNECTED mobility if such additional RS are defined (note that this is not yet agreed in RAN1)
  - FFS: How to derive RSRP value(s) utilizing the antenna ports and resource(s) of the RS
  - FFS: Association of the measured qualities in CONNECTED mode to the "beam quality" in RAN2 agreement in CONNECTED mode

- Note: It is up to RAN2 how to derive cell-level quality from the measured value(s) for L3 mobility

Agreement: The additional RS for mobility if defined can be transmitted on multiple beams.

Summary of next steps:

- At least the following aspects need to be further studied for the additional RS for L3 mobility in CONNECTED mode
  - To acquire synchronization for RSRP measurement, consider the following options until RAN1#88:
    - Option 1: UE uses NR-SS
    - Option 2: UE uses the additional RS
    - Option 3: UE uses NR-SS and the additional RS
  - Maximum number of antenna ports
  - Configuration/derivation of mapping/configuration parameters (e.g., number of antenna ports, RE mapping, time locations (periodicity and offset), number of antenna ports, BW, scrambling, etc.)
    - Option 1: Cell-specific
    - Option 2: Non-UE-specific, e.g., beam-specific, or UE-group-specific
    - Option 3: UE-specific
    - Option 4: Combinations of above
  - Use of the RS for fine time/frequency tracking and estimation of QCL parameters
  - The RS can be turned off.
  - Association of time frequency resources with beam(s) if needed
  - The RS can be used for PBCH demodulation
  - Down-selection from MRS-1, MRS-2, MRS-3 and CSI-RS

Aim for downselection at RAN1#88.

R1-1701345 WF on UL based mobility Huawei, HiSilicon, Qualcomm, Sony, Ericsson, Deutsche Telekom, China Unicom, Telefonica
Also supported by Vodafone
Proposal:

- UL measurement for mobility is supported in NR for UEs at least in RRC Active state, in addition to DL-based mobility

Conclusion: FFS.

Not treated.

R1-1700036 UL based RRM measurement for mobility Huawei, HiSilicon
R1-1700106 Idle mode RRM Measurements ZTE, ZTE Microelectronics
R1-1700107 Connected mode RRM Measurements ZTE, ZTE Microelectronics
R1-1700148 Mobility RS for DL RRM Measurement MediaTek Inc.
R1-1700187 NR measurements and mobility management in IDLE and CONNECTED modes CATT
R1-1700188 Mobility management based on UL Signals CATT
R1-1700273 Support beam operation for NR mobility vivo
R1-1700289 Discussion on the UL signal transmission in multi-beam cases Spreadtrum Communications
R1-1700301 NR Synchronization signals for idle and connected mode mobility Ericsson
R1-1700302 Synchronization signal options for active mode mobility RS Ericsson
R1-1700312 RRM Measurement for IDLE mode and CONNECTED mode UE AT&T
R1-1700334 Considerations for NR mobility Intel Corporation Huawei, HiSilicon
R1-1700432 On separating RSs for L3 mobility, L1/L2 mobility and data-related transmission CMCC
R1-1700451 Discussion on mobility procedure KT Corp.
R1-1700465 Discussion on UL based measurement LG Electronics
R1-1700466 Discussion on RRM measurement in NR LG Electronics
R1-1700537 Mobility procedure and subcell Panasonic Corporation
R1-1700615 Discussion on mobility procedure for NR NTT DOCOMO, INC.
R1-1700616 Discussion on RS design for NR inter-cell RRM measurement NTT DOCOMO, INC.
R1-1700670 UL mobility for NR Sony
R1-1700671 Cell quality measurements for DL mobility Sony
R1-1700739 UL based mobility design and performance evaluation Qualcomm Incorporated
R1-1700793 DL based Mobility measurement consideration Qualcomm Incorporated
R1-1700870 Discussion on the MRS design and RRM measurement Shenzhen Coolpad Technologies
R1-1700893 Mobility support for RRC Inactive UEs Samsung
R1-1701049 Discussion on NR RRM measurements for IDLE and CONNECTED states China Unicom
R1-1701062 Considerations on DL and UL mobility in NR Nokia, Alcatel-Lucent Shanghai Bell
R1-1700403 Analysis and evaluation on RS configuration for RRM measurement of connected and idle UEs Huawei, HiSilicon

R1-1701063 DL Signals for Mobility Measurements and mobility schemes in NR Nokia, Alcatel-Lucent Shanghai Bell

5.1.1.6 Other

R1-1700005 On numerology determination during initial access Huawei, HiSilicon
R1-1700303 RACH procedure in non-standalone operation Mitsubishi Electric Co.
R1-1700404 On the size of UE identity Huawei, HiSilicon
R1-1700701 A framework for initial access for NR INTERDIGITAL COMMUNICATIONS
R1-1701064 Cell Identification in NR Nokia, Alcatel-Lucent Shanghai Bell
R1-1701065 On gNB Energy Consumption Nokia, Alcatel-Lucent Shanghai Bell

5.1.2 MIMO

R1-1701175 Multi-antenna requirements for NR Ericsson

5.1.2.1 Multi-antenna scheme

*Including codeword-to-layer mapping, closed-loop/*open-loop/semi-open-loop MIMO and transmit diversity, *NW coordination, advanced receiver, etc.*

R1-1700338 Study on the number of codewords for NR Intel Corporation
The document was presented by Alexey Davydov from Intel. Provide study results for the number of CWs focusing on the SU-MIMO and NC-JT scenarios with maximum of two MIMO layers. Based on the performance results it has been observed that two MIMO layers should be supported with single CW.
Decision: The document is noted.

R1-1700469 Discussion on diversity achieving schemes LG Electronics
The document was presented by … from LGE.

- Proposal 1: Beam/precoder cycling transmission technique based on semi-OL feedback should be considered in NR for both DL and UL,
- Proposal 2: The set of cycling beams/precoders can be narrowed down based on long-term channel information, UE mobility information (e.g., speed, direction, etc.) or gNB indication.
- Proposal 3: For transparent scheme, proper size of time/frequency resource for beam cycling needs to be determined by taking into account diversity gain and impact on DMRS design.
- Proposal 4: Transparent scheme should be considered unless performance gap from non-transparent scheme is not significant.
- Proposal 5: Primary design target of (semi-)OL MIMO is for rank 1 and rank 2 transmissions.

Decision: The document is noted.

R1-1700797 UL MIMO transmission schemes Qualcomm Incorporated
The document was presented by … from Qualcomm.

- Proposal 1: DFT-S-OFDM based waveform shall be used for single-stream transmission when the UE is link budget limited, for both single-stream only transmission and the rank-1 transmission in a multi-stream transmission with rank-adaption.
- Proposal 2: For uplink spatial multiplexing with rank adaption, a UE can be dynamically indicated with one of CP-OFDM or DFT-S-OFDM waveform for rank-1 transmission.
- Proposal 3: Study OTA UE calibration solutions for non-codebook based UL MIMO transmission at below 6GHz.
- Proposal 4: Adopt STBC as one option of the open-loop transmission scheme for PUSCH with DFT-S-OFDM based waveform.
- Proposal 6: Adopt CDD as one option of the open-loop transmission scheme for PUSCH with DFT-S-OFDM based waveform.
- Proposal 5: NR UL MIMO shall support single antenna port transmission using DFT-S-OFDM based waveform.
- Proposal 7: Frequency selective precoding is not supported for UL MIMO with CP-OFDM waveform when the transmission ports is 2.

Decision: The document is noted.

R1-1701279 Way Forward on number of CWs for NR ZTE, ZTE Microelectronics, ASTRI, AT&T, CATT, Xinwei
The document was presented by Ruyue Li from ZTE.

- At least for DL multi-layer transmission (i.e. number of layers>1), the number of codewords per one scheduled physical data channel in NR can be configurable at least between 1 and 2.
  - Number of codeword and CW-layer mapping should be indicated to UE for PDSCH transmission.
  - Support UE reporting to assist network configuration on the number of codewords and CW-layer mapping per UE.
  - FFS: Other configurability

Decision: The document is noted.

Possible agreements:
- At least for DL multi-layer transmission (i.e. number of layers>2), the number of codewords per one scheduled physical data channel in NR can be configurable at least between 1 and 2.
  - Number of codeword and CW-layer mapping should be indicated to UE for PDSCH transmission.
  - Support UE reporting to assist network configuration on the number of codewords & CW-layer mapping per UE.
  - FFS: Other configurability
  - FFS: Number of layer = 2

R1-1701291 WF on Number of Codewords for NR Samsung, KT Corporation, Ericsson

The document was presented by Eko Onggosanusi from Samsung.
- NR supports single CW per PDSCH/PUSCH assignment per UE
  - One UL- or DL-related DCI includes one MCS and one HARQ-related (NDI and RV) fields
  - One CQI calculated for all layers regardless of RI value
- The number of PDSCH/PUSCH assignments a UE can receive in a scheduling time unit (slot) is a UE capability
  - E.g. for NC-JT use case

Decision: The document is noted.

Possible agreements:
- NR supports single CW per PDSCH/PUSCH assignment per UE for 1 and 2 layers
  - One UL- or DL-related DCI includes one HARQ-related (NDI and RV) fields
    - FFS: the number of CQIs
  - FFS: 3 and more layers
- The number of PDSCH/PUSCH assignments a UE can receive in a scheduling time unit (slot) is a UE capability
  - E.g. for NC-JT use case

R1-1701311 WF on DL transmission scheme Samsung, Intel, LGE
- For NR, remove the misleading association between Scheme 1/2 and 'closed-loop'/'open-loop'/'semi-open-loop' and simplify the description as follows:
  - Transmission scheme 1 (TS 1): data and DMRS are transmitted with the same precoding matrix
    - Demodulation of data at the UE does not require knowledge of the precoding matrix used at the transmitter
  - Transmission scheme 2 (TS 2): diversity-based scheme where data and DMRS may or may not be restricted to be transmitted with the same precoding matrix
    - Demodulation of data at the UE may or may not require knowledge of the relation between DMRS ports and data layers
- For Transmission scheme 2, down selection(s) on DMRS based transmission schemes will be done in RAN1#88
  - For rank 1,
    - Precoder cycling with transparent DMRS
    - Small-delay CDD with transparent DMRS
    - DMRS based SFBC with non-transparent DMRS
  - For rank>1,
    - Precoder cycling with transparent DMRS
      - Layer shifting may or may not be applied
    - Small-delay CDD with transparent DMRS
    - Large-delay CDD with non-transparent DMRS

Decision: The document is noted.

Agreements:
- For Transmission scheme 2, down selection(s) on DMRS based transmission schemes will be done in RAN1#88 at least for rank 1
  - For rank 1,
    - Precoder cycling with transparent DMRS
    - Precoder cycling with non-transparent DMRS
    - Small-delay CDD with transparent DMRS
    - DMRS based SFBC
  - For rank>1,
    - Precoder cycling with transparent DMRS
    - Precoder cycling with non-transparent DMRS
    - Layer shifting
    - Precoder cycling with transparent DMRS and layer shifting

- Small-delay CDD with transparent DMRS
- Large-delay CDD with non-transparent DMRS

R1-1701312 **WF on PRB bundling Samsung, ZTE, ZTE Microelectronics**

- For NR, support configurable PRG Size for DMRS
  - Down selection(s) will be done in RAN1#88 with the following:
    - Specified value which is system BW dependent
    - Specified value which is UE dependent
    - Contiguous scheduled PRBs to UE when at least X contiguous PRBs are allocated to the UE where X FFS
    - Semi-statically configured contiguous PRBs that correspond to the UE-specific RF BW
    - Dynamic selection of semi-statically configured PRBs
    - One PRB
- For DMRS channel estimation, study continuous precoding in time domain with the following:
  - Semi-static measurement window
  - Dynamic indication of precoding sets
  - Support of continuous precoding when eNB supports slot aggregation
- Study multiplexing of DMRS ports using time domain OCC within aggregated slots

Decision: The document is noted. Continue offline discussion.

R1-1701323 **WF on PRB bundling Samsung, ZTE, ZTE Microelectronics**

Agreements:

- For the DL, NR supports configurable PRG size for data DMRS
  - FFS: Signaling for the configuration of PRG size (semi-static or dynamic)
  - FFS: available options/schemes.
- FFS: continuous precoding in time domain for DMRS channel estimation with the following examples:
  - Semi-static measurement window
  - Dynamic indication of precoding sets
  - Support of continuous precoding when gNB supports slot aggregation
  - Contiguous time allocations
- FFS: multiplexing of DMRS ports using time domain OCC between aggregated slots
  - Note: Consider impact of DMRS pattern
  - Note: Other code is not precluded.

Thursday session

R1-1701398 **WF on UL MIMO transmission Huawei, HiSilicon, Intel**

Agreements:

- Support at least the following UL transmission schemes for data in NR
  - Scheme A: Codebook based UL transmission
    - Support frequency selective precoding for CP-OFDM when the number of transmission port is greater than X (FFS: Value of X).
    - Study codebook design including single-stage and multi-stage, e.g., W1W2 structure, codebook
    - Study the following DL signaling, e.g.,
      - One level DCI
      - Two level DCI
      - MAC CE
      - DCI associated with PDSCH (like UCI associated with PUSCH in LTE)
  - Scheme B: Non-codebook based UL transmission
    - Support frequency selective precoding for CP-OFDM when the number of transmission port is greater than Y (FFS: Value of Y).
    - Support the indication of DL measurement RS for UE to calculate candidate precoder
    - Study the mechanisms for UL precoder determination, e.g. precoded SRS based, non-precoded SRS based, hybrid precoded and non-precoded SRS based
  - Diversity-based transmission schemes
    - FFS: Whether the scheme has specification impact or not
  - FFS: Merging of the schemes
- Support rank determination by gNB
- Support PRB bundling for CP-OFDM
  - Study configurability of PRG size for CP-OFDM
  - Study the PRG size

- FFS: Single port transmission is supported for the UE capable for multiple antenna port transmission.

R1-1701333 WF on Number of Codewords for NR Samsung, Ericsson, Intel Corporation, Qualcomm, Nokia, Alcatel-Lucent Shanghai Bell, CATT, KT Corporation, Verizon, Softbank Corp

The document was presented by Eko Onggosanusi from Samsung.

- NR supports single CW per PDSCH/PUSCH assignment per UE for 1 and 2 layers
  - One UL- or DL-related DCI includes one HARQ-related (NDI and RV) fields
    - FFS: the number of CQIs and MCS fields in DCI
  - FFS: number of CWs for 3 and more layers

Discussion: Above proposal (so-called alt.1) is lso supported by InterDigital, LGE, ETRI, NTT DOCOMO.

- Alt 2: NR supports configurability regarding the number of CWs for 1 and 2 layers
  - Supported by Huawei, HiSilicon, Xinwei, ZTE, ZTE Microelectronics, AT&T, ASTRI, NI
- Alt 3: NR supports 2 CWs for 2 layers
  - Supported by Huawei, HiSilicon

Decision: The document is noted.

Agreements:

- RAN1 will down select among the followings and select one alternative in the next meeting
  - Alt. 1: NR supports single CW per PDSCH/PUSCH assignment per UE for 1 and 2 layers
    - One UL- or DL-related DCI includes one HARQ-related (NDI and RV) fields
      - FFS: the number of CQIs and MCS fields in DCI
    - FFS: number of CWs for 3 and more layers
  - Alt. 2: NR supports configurability regarding the number of CWs for 1 and 2 layers
  - Alt. 3: NR supports 2 CWs for 2 layers

R1-1701287 WF on Evaluation Assumptions for Advanced Receivers based on Network Coordination Samsung, Huawei, Intel, ZTE, Orange

Agreements:

- The following additional five antenna array configurations for TRP are encouraged to evaluated as optional:
  - (M,N,P,Mg,Ng) = (8,8,2,1,1) with 16 CSI-RS ports
  - (M,N,P,Mg,Ng) = (8,4,2,1,1) with 8 CSI-RS ports
  - (M,N,P,Mg,Ng) = (8,2,2,1,1) with 4 CSI-RS ports
  - (M,N,P,Mg,Ng) = (8,1,2,1,1) with 2 CSI-RS ports.
  - (M,N,P,Mg,Ng) = (1,1,2,1,1) with 2 CSI-RS ports.
- Agreed pages 6, 7 by adding “optional” to each low in the yellow color parts

R1-1701380 WF on CW to layer mapping and RE mapping for data channels Qualcomm, Ericsson, Intel, Interdigital

- *For the DL/UL data channels, layer mapping to physical resources is happening across layer first, then across subcarriers and then across OFDM symbols.*
- *For the DL/UL data channels, RAN1 to study the option of introducing a per-OFDM-symbol subcarrier interleaver in the codeword to layer mapping procedure.*

Decision: The document is noted. Continue offline discussion.

Friday

Agreement: For the DL/UL data channels, study whether/how the interleaving is performed in the codeword to layer mapping procedure (e.g., a per-OFDM-symbol subcarrier interleaver in the codeword to layer mapping procedure, etc.)

- This may or may not be connected with coding design

R1-1701457 WF on nonlinear precoding Mitsubishi Electric, Huawei, HiSilicon, InterDigital, NTT DOCOMO, IITH, CeWiT, IITM, Tejas Networks, AT&T

The document was presented by Fumihiro Hasegawa from Mitsubishi.

- At least the following schemes are considered for the study
  - nonlinear precoding (NLP) schemes, e.g., Tomlinson-Harashima precoding, vector perturbation
  - hybrid precoding schemes (e.g., semi-dynamic or dynamic switching between linear precoding and NLP)
- Consider the following evaluation assumptions:
  - MU-MIMO DMRS in R1-1700480, multiple access in TR38.802, COMP coherent joint transmission, other evaluation assumptions are not precluded
- Consider the following issues related to performance evaluation

  - Abstraction methods for SLS, channel estimation error modeling, etc
- Study the impact of the following impairments/implementation aspects on NLP:
  - Channel estimation error, CSI feedback error, SRS reciprocity error, ordering process of users at transmitter, receiver implementation, complexity of implementation of NLP, etc.
- Study spec impact including following:
  - Signaling methods for NLP: indication of filter types, indication of use of linear/nonlinear precoding, etc.
  - DMRS designs for NLP
  - Other studies on spec. impact are not precluded

Discussion: several companies (Mitsubishi Electric, Huawei, …) would like capturing their analysis of nonlinear precoding in TR 38.802.
Decision: The document is noted. RAN1 recommends to continue discussions about R1-1701457 in the future meeting.

Friday session

R1-1701397 Multi-panel-based UL MIMO Huawei, HiSilicon, Xinwei

Agreements:

- Study whether or not support non-coherent transmission scheme in uplink MIMO transmission to improve the reliability and capacity
  - Study multiple timing advance for one component carrier (example scenario: multiple antenna ports / beams at UE pointing to different directions)
    - Antenna port / beam indication in timing advance commands
    - Multiple timing advance commands for one component carrier
  - Study multiple power control for multiple antenna ports/beams
    - Antenna port / beam indication in power control commands
    - UE reporting of the capability of multiple power control
  - Study whether or not there is spec impact

R1-1701342 WF on Evaluation assumption for NW coordination Huawei

R1-1701511 WF on coordinated Tx scheme Huawei, HiSilicon, Samsung, CATT, LGE, AT&T

Agreements:

- Support NR downlink transmission of same NR-PDSCH data stream(s) from multiple TRPs at least with ideal backhaul, and different NR-PDSCH data streams from multiple TRPs with both ideal and non-ideal backhaul:
  - Note: the case of supporting same NR-PDSCH data stream(s) may or may not have spec impact (to be further studied especially comparing performance/complexity relative to standard-transparent operation)
  - Study how to perform resource scheduling especially with respect to whether to use one or more NR-PDCCH for a UE
    - Consider, e.g., backhaul conditions, UE complexity, feasibility of NR-PDCCH demodulation if from multiple TRPs, NR-PDCCH overhead, performance, etc.
- Study network coordination schemes with ideal & non-ideal backhaul links, considering
  - Fast CSI acquisition
    - e.g. coordinated TRPs obtain CSIs through physical air interface
    - e.g. SRS configuration exchanging between different TRPs
  - Other techniques are not precluded

Not treated.

R1-1700050 Discussion on DMRS-based open loop transmission scheme for DL data channelHuawei, HiSilicon
R1-1700051 Discussion on transmission parameter sets Huawei, HiSilicon
R1-1700052 Discussion on network coordination schemes with non-ideal backhaul links in NR Huawei, HiSilicon
R1-1700053 Non-linear precoding for downlink multiuser MIMO Huawei, HiSilicon
R1-1700065 Considerations on multi-panel based uplink transmission Huawei, HiSilicon
R1-1700117 Aspects of DL MIMO Transmission ZTE, ZTE Microelectronics
R1-1700118 Aspects of UL MIMO Transmission ZTE, ZTE Microelectronics
R1-1700119 Multi-TRP Transmission considering advanced receiver ZTE, ZTE Microelectronics
R1-1700120 Discussion on interference issues in NR ZTE, ZTE Microelectronics
R1-1700215 On codeword-to-layer mapping CATT
R1-1700216 On DL transmission schemes CATT
R1-1700217 On non-coherent and coherent MIMO CATT
R1-1700218 Dicussion on network coordination CATT
R1-1700219 On precoding granularity CATT

R1-1700220 On UL transmission schemes CATT
R1-1700221 Discussion on UL frequency selective precoding CATT
R1-1700313 Flexible Transport Block, Codeword and Layer Mapping Concepts fot NR AT&T
R1-1700335 On DMRS based DL (open Loop and semi-open Loop) MIMOIntel Corporation
R1-1700336 On UL Frequency Selective Precoding Intel Corporation
R1-1700337 On Interference Measurement Intel Corporation
R1-1700339 On codeword to MIMO layer mapping Intel Corporation
R1-1700340 On MIMO layer adaptation Intel Corporation
R1-1700407 Analysis on interference estimation for open loop transmission scheme Huawei, HiSilicon
R1-1700408 Discussion on UL MIMO transmission Huawei, HiSilicon
R1-1700409 Discussion on UL MU-MIMO between CP-OFDM and DFT-s-OFDM Huawei, HiSilicon
R1-1700410 Evaluation of DPS-based coordinated transmission scheme Huawei, HiSilicon
R1-1700411 Evaluation of non-coherent JT-based coordinated transmission scheme Huawei, HiSilicon
R1-1700412 Number of codewords for physical data channel Huawei, HiSilicon
R1-1700413 PRB bundling size for DL data precoding Huawei, HiSilicon
R1-1700434 Discussion and evaluation on spatial-based and panel-based MU-MIMO transmission schemes CMCC
R1-1700467 Discussion on UL-MIMO LG Electronics
R1-1700468 Discussion on intra/inter-TRP CoMP LG Electronics
R1-1700592 DL MIMO transmission schemes for beam management NTT DOCOMO, INC.
R1-1700593 Higher-order MU-MIMO for NR NTT DOCOMO, INC.
R1-1700594 Non-linear precoding for NR NTT DOCOMO, INC.
R1-1700648 PAPR preserving transmit diversity for DFTsOFDM Mitsubishi Electric RCE
R1-1700710 Impact of UE Calibration in a Reciprocity-based UL MIMO Transmission InterDigital Communications
R1-1700711 Non-linear Precoding for NR InterDigital Communications
R1-1700712 Reciprocity-based UL Beamformed Transmit Diversity InterDigital Communications
R1-1700713 On Enhanced Frequency Selective Precoding for MIMO Transmission InterDigital Communications
R1-1700740 On codebook based UL MIMO transmission with non-precoded SRS Ericsson
R1-1700741 On codebook based UL MIMO transmission with precoded SRS Ericsson
R1-1700742 Robust UL Transmission Schemes Ericsson
R1-1700743 Robust Transmission Schemes for PDSCH Ericsson
R1-1700744 About the number of codewords Ericsson
R1-1700745 UL transmission in NR Ericsson
R1-1700746 On PDSCH and PUSCH to RE Mapping Ericsson
R1-1700747 On PRB bundling for NR Ericsson
R1-1700777 Evaluation Results and Considerations on Number of Codewords Beijing Xinwei Telecom Techn.
R1-1700778 Evaluation and Disucssion on PRB Bundling Size Beijing Xinwei Telecom Techn.
R1-1700795 CW to layer mapping Qualcomm Incorporated
R1-1700796 DL MIMO transmission schemes Qualcomm Incorporated
R1-1700798 Discussion on PRB bundling Qualcomm Incorporated
R1-1700799 Network OTA reciprocity calibration and phase synchronization Qualcomm Incorporated
R1-1700873 Views on abstraction techniques of nonlinear precoding schemes for SLS Mitsubishi Electric Co.
R1-1700876 Performance evaluation of nonlinear precoding schemes with channel estimation Mitsubishi Electric Co.
R1-1700877 Views on possible specification impacts of nonlinear precoding schemes Mitsubishi Electric Co.
R1-1700895 Transmission schemes, transmission modes and control signaling Samsung
R1-1700896 DMRS-based spatial multiplexing for DL NR MIMO Samsung
R1-1700897 DMRS-based spatial multiplexing for UL NR MIMO Samsung
R1-1700899 DMRS-based precoder cycling and simulation results Samsung
R1-1700900 Discussions on open- and semi-open-loop transmissions for NR Samsung
R1-1700901 Initial results on network coordination Samsung
R1-1700902 Discussions on NR network coordination Samsung
R1-1700903 Transmission and reception of coordinated interference cancellation Samsung
R1-1700904 Network coordination for coordinated interference cancellation Samsung
R1-1700905 Physical layer abstraction method for coordinated interference cancellation Samsung
R1-1700906 Evaluation assumption for advanced receivers based on network coordination Samsung
R1-1700907 Initial evaluation results for advanced receivers based on network coordination Samsung
R1-1701068 Hybrid beamforming and transmit diversity scheme CEWiT
R1-1701071 On the number of codewords in NRNokia, Alcatel-Lucent Shanghai Bell
R1-1701072 UE advanced receiver utilization in NR Nokia, Alcatel-Lucent Shanghai Bell
R1-1701073 Impact of Antenna Panel Array Structures in UMa 30GHz Nokia, Alcatel-Lucent Shanghai Bell
R1-1701074 High-level principles for beam coordination and Link Adaptation in NRNokia, Alcatel-Lucent Shanghai Bell
R1-1701075 Non-coherent Multi-node Transmission for URLLC in the 5G New Radio Nokia, Alcatel-Lucent Shanghai Bell
R1-1701076 Decoupled control and data transmission for NR Nokia, Alcatel-Lucent Shanghai Bell
R1-1701077 On the support of open-loop transmission in NR Nokia, Alcatel-Lucent Shanghai Bell

R1-1701078 DL transmission mode configuration for NR Nokia, Alcatel-Lucent Shanghai Bell
R1-1701079 UL MIMO transmission in NR Nokia, Alcatel-Lucent Shanghai Bell
R1-1701080 On the support for frequency selective precoding in UL MIMO Nokia, Alcatel-Lucent Shanghai Bell
R1-1701082 DL SU-MIMO Performance Characteristics in UMa 30GHz Nokia, Alcatel-Lucent Shanghai Bell
R1-1701083 DL MU-MIMO Performance Characteristics in UMa 30GHz Nokia, Alcatel-Lucent Shanghai Bell
R1-1701084 Network Coordination to support advanced receivers Nokia, Alcatel-Lucent Shanghai Bell
R1-1701085 Interference Aware Inter Cell Rank Coordination Nokia, Alcatel-Lucent Shanghai Bell
R1-1701086 Nonlinear Precoding for Interference Mitigation in HetNets Nokia, Alcatel-Lucent Shanghai Bell
R1-1701087 On MU MIMO non-linear precoding in NR Nokia, Alcatel-Lucent Shanghai Bell
R1-1701201 Codeword-to-layer mapping for DL and UL NR MIMO Samsung
R1-1701483 Performance Results for COMP Coherent JT Performance with THP (Cloud RAN) IITH, IITM, CEWIT, Tejas Networks

5.1.2.2 Beam management and CSI acquisition

Including UE reporting
Note that only the linear combination based CSI feedback is continued to study including the contents (e.g., channel covariance matrix) to be represented by the linear combination codebook will be studied for type II (enhanced) CSI feedback

R1-1700748 On robust beam management Ericsson
The document was presented by Stephen Grant from Ericsson.
- Observation 1: Using multiple beam-pair links can improve the robustness in beam-based systems
- Observation 2: There is a need to handle BPL failure in a quick and efficient way to maintain high and reliable performance for the users.
- Proposal 1: An active beam pair link is supported for which the UE is monitoring PDCCH
- Proposal 2: One or more monitored beam-pair links is supported to improve the robustness and to discover new links
- Proposal 3: Support configurable PDCCH reception on monitored BPLs as a mean for increase robustness against BPL blocking.

Decision: The document is noted.

R1-1700803 Beam recovery procedures Qualcomm Incorporated
The document was presented by Muhammad Islam from Quacomm.
- Proposal 1: NR supports scheduling request and beam recovery request region in RACH slot in multi-beam scenario.
- Proposal 2: NR supports higher number of cyclic shifts in each SR/beam recovery request subcarrier region compared to the number of cyclic shifts in RACH subcarrier region. NR decides this number based on the duration of SR/beam recovery request preamble and expected delay spread of the cell.
- Proposal 3: NR supports gNB allotting dedicated SR or beam recovery request resources to UEs.
- Proposal 4: NR shall support beam recovery request and scheduling request when gNB and UE are UL synchronized and gNB and UE are UL out-of-sync.
- Proposal 5: NR shall support beam recovery request and scheduling request through the beam recovery request and scheduling request regions when gNB and UEs are UL synchronized.
- Proposal 6: If beam correspondence is available at gNB, NR supports UE mapping a good DL SYNC resource to the symbol index of scheduling request or beam recovery request in RACH slot.
- Proposal 7: If beam correspondence is not available at gNB, NR supports UE conveying its best DL TX beam ID through a combination of the selected subcarrier region and the cyclic shift of scheduling request/beam recovery request preamble.
- Proposal 8: NR shall support beam recovery request and scheduling request using contention-based RACH when gNB and UE are UL out-of-sync.

Decision: The document is noted.

R1-1700128 On RS and CSI report settings ZTE, ZTE Microelectronics
The document was presented by Ruyue Li from ZTE.
- Proposal 1: To support efficient resource sharing among CSI-RS resources for interference and channel measurement, IM settings and RS settings should be merged.
- Proposal 2: Configuration of CSI report resource pooling should be contained in CSI settings.
- Proposal 3: NR should support flexible CSI report resource indication based on CSI report resource pooling.
- Proposal 4: CSR configuration should be contained in CSI settings.
- Proposal 5: CSR should be used to support flexible codebook configuration in NR.

Decision: The document is noted.

R1-1700919 Discussions on periodic and semi-persistent CSI reporting for NR Samsung
The document was presented by … from Samsung.
- Support only Type I feedback for P-CSI in NR

- Support both Type I and Type II feedback for S-CSI in NR
- P-CSI and S-CSI procedure for NR should be designed by considering following proposals:
  - Support level-2 CSI-RS transmission with relatively low CSI-RS overhead for P-CSI
  - Support both level-1 and level-2 CSI-RS transmission for S-CSI.
  - When CSI-RS transmission is not available, CSI reporting based on other RS needs to be considered.
  - Consider only wideband/partial band CQI feedback with no PMI/single PMI.
  - Excessive inter-subframe dependency should be avoided.
- For the activation and deactivation of S-CSI, MAC CE signalling should be supported.
- For the configuration of P-CSI, configuration of CSI reporting setting, RS setting and measurement setting via higher layer signalling should be supported.
- For the configuration of S-CSI, dynamic signalling of measurement setting should be supported.
  - Configuration of CSI reporting setting, RS setting via higher layer should be supported.

Decision: The document is noted.

R1-1700414 Design for Type I Feedback Huawei, HiSilicon

The document was presented by Min Zhang from Huawei.

- Proposal 1: A dual-stage W_1 W_2 codebook-based PMI feedback should be supported in NR, where
  - W_1 consists of a common subset of basis for all subbands
  - W_2 consists of coefficients for each subband
- Proposal 2: A set of basis are generated based on configurations, which includes
  - Antenna configuration, i.e. N1, N2
  - Oversampling parameter configuration, i.e. O
- Proposal 3: The wideband W_1 codebook-based feedback with orthogonal constraints constitutes
  - Index for optimal orthogonal basis
  - Indices for selected columns in the optimal orthogonal basis
- Proposal 4: The wideband W_1 codebook-based feedback with orthogonal constraints should be supported as baseline, and W_1 based feedback without orthogonal constraints can be further studied.
- Proposal 5: Subband W2 codebook calculation based on an orthogonal basis should be studied in NR MIMO.
- Proposal 6: If the selected W1 consists of non-orthogonal basis, orthogonalization method of the non-orthogonal W1 should be studied.
- Proposal 7: Rank k>1 W1 codebook design should be studied in order to reduce the overall feedback overhead in NR.
- Proposal 8: The subband W_2 codebook-based feedback constitutes
  - Amplitude information of the beam coefficients
  - Phase information of the beam coefficients

Decision: The document is noted.

R1-1700342 CSI for Type II feedback Intel Corporation

The document was presented by … from Intel.

- Consider orthogonal DFT basis for channel covariance matrix compression.
  - UE feedbacks the best M orthogonal DFT basis vectors along with corresponding covariance matrix entities

Decision: The document is noted.

Continue offline discussion about the followings

- Beam recovery/Link failure related issues until Tuesday – Qualcomm (Sundar)/Huawei/Intel
- Robust transmission including Beam management for control channel until Tuesday – DOCOMO/Intel (Wookbong)
- CSI feedback until Wednesday
  - Type I – Huawei (Min)/ZTE/CATT
  - Type II – Ericsson (Mark)
  - CSI framework – Samsung (Eko)/AT&T/DOCOMO/Xinwei/CMCC
- Interference measurement until Wednesday – LG/Nokia (Dan)
- UL beam management until Wednesday – MTK (Brianz)
- Beam management until Wednesday
  - Beam indication procedure - Samsung (Boon)/ZTE
  - Beam correspondence – Samsung/MTK/CMCC/DOCOMO (Osawa)
  - Beam reporting – Samsung/ZTE (Ruyue)
- UL CSI acquisition until Wednesday – LG (Jonghyun)
- Reciprocity based CSI acquisition – Huawei (Leiming)

Tuesday session

Possible agreements:

- Network triggered beam reporting and UE triggered link recovery should be supported
- Network explicitly configures to UE with resources for UL[/DL] transmission of signals for recovery purpose
  - FFS: Triggering condition of recovery signal
  - Support configurations of resources in the regions where the base station [or UE] can listen from all or partial directions, e.g., random access region
- For the UE triggered link recovery, the message from the UE to gNB is:
  - FFS: Preferably non contention based for time SYNCed UEs. For UEs not SYNCed, contention based approach is preferable
  - Message from UE to gNB should be received in a region where the base station can listen from all or partial directions, e.g. beam sweep
  - Link recovery mechanism(s) should consider tradeoff between performance and RS overhead
- Support transmission of some RS and/or control channel and/or data channel, (e.g. periodic CSI-RS signals which are beam swept. NR-SSS) on DL/UL for allowing the UE/gNB to monitor the beams
- Note that link recovery is used in the situation where the all the agreed links between gNB and UE are unavailable or broken

Continue offline discussion until Wednesday.

Thursday

R1-1701481 WF on Beam Recovery in multi-beam NR systems Qualcomm, Nokia, ASB, Xinwei, Intel, Interdigital

Also supported by LG, Ericsson, OPPO

Possible agreements:

- UE triggered beam recovery should be supported
  - FFS: Network triggered beam recovery
- Network explicitly configures to UE with resources for UL transmission of signals for recovery purpose
  - Support configurations of resources where the base station is listening from all or partial directions, e.g., random access region
- FFS: Triggering condition of recovery signal associated UE behavior of monitoring RS/control channel/data channel
- Support transmission of DL signal for allowing the UE to monitor the beams for identifying new potential beams
  - FFS: Transmission of a beam swept control channel is not precluded
  - Beam recovery mechanism(s) should consider tradeoff between performance and DL signaling overhead

Friday

Agreements:

- NR supports that UE can trigger mechanism to recover from beam failure
- Network explicitly configures to UE with resources for UL transmission of signals for recovery purpose
  - Support configurations of resources where the base station is listening from all or partial directions, e.g., random access region
- FFS: Triggering condition of recovery signal (FFS new or existing signals) associated UE behavior of monitoring RS/control channel/data channel
- Support transmission of DL signal for allowing the UE to monitor the beams for identifying new potential beams
  - FFS: Transmission of a beam swept control channel is not precluded
  - This mechanism(s) should consider tradeoff between performance and DL signaling overhead

Possible agreements:

- NR-PDCCH transmission supports robustness against beam pair link blocking
  - UE can be configured to monitor NR-PDCCH on different beam pair link(s) with different time resources
    - FFS: UE may be configured to monitor NR-PDCCH on different beam pair link(s) in different OFDM symbols in the same or different slot
  - UE can be configured to monitor NR-PDCCH on M beam pair links simultaneously, where
    - [M = 1 or 2, or M≥1]. Maximum value of M may depend at least on UE capability.
    - [FFS: other values M]
    - [FFS: UE may choose one beam out of M for NR-PDCCH reception]
  - [FFS: The definition of monitoring NR-PDCCH on beam pair link(s).]
  - Parameters related to [UE Rx beam setting for] monitoring NR-PDCCH on multiple beam pair links are configured by higher layer signaling [or dynamic signaling] [and/or considered in the search space design]
    - FFS: Required parameters

Continue offline discussion until Wednesday

Agreements (further to offline):

- NR-PDCCH transmission supports robustness against beam pair link blocking
  - UE can be configured to monitor NR-PDCCH on M beam pair links simultaneously, where
    - M≥1. Maximum value of M may depend at least on UE capability.
    - FFS: UE may choose at least one beam out of M for NR-PDCCH reception
  - UE can be configured to monitor NR-PDCCH on different beam pair link(s) in different NR-PDCCH OFDM symbols
    - FFS: NR-PDCCH on one beam pair link is monitored with shorter duty cycle than other beam pair link(s).
    - FFS: time granularity of configuration, e.g. slot level configuration, symbol level configuration
    - FFS: Note that this configuration applies to scenario where UE may not have multiple RF chains
  - FFS: The definition of monitoring NR-PDCCH on beam pair link(s).
  - Parameters related to UE Rx beam setting for monitoring NR-PDCCH on multiple beam pair links are configured by higher layer signaling or MAC CE and/or considered in the search space design
    - FFS: Required parameters
    - FFS: Need to support both higher layer signaling and MAC CE

Wednesday session

R1-1701321 WF on beam reporting Samsung, KT

Decision: The document is noted, modified as follows:

Agreements:

- UE measurement based on RS for beam management (at least CSI-RS) composed of K (= total number of configured beams) beams and reporting measurement results of N selected beams:
  - N is not necessarily fixed number
  - FFS: whether/how to configure and/or indicate the values of N
  - Note: The above procedure based on RS for mobility purpose is not precluded.
- Reporting information at least include
  - Measurement quantities for N beam (s)
    - FFS: Detailed reporting contents, e.g., CSI, RSRP or both
    - FFS: How to select N beam(s)
    - FFS: how to identify the subset
  - Information indicating N DL Tx beam(s), if N < K
    - FFS: the details on this information, e.g., CSI-RS resource IDs, antenna port index, a combination of antenna port index and a time index, sequence index, etc.

R1-1701324 WF on Type II CSI Codebook Ericsson, Samsung

Decision: The document is noted, modified as follows:

Agreements:

- The following two categories of Type II CSI are considered:
  - Category 1: Precoder feedback
  - Category 2: Covariance matrix feedback
  - Category 3: Hybrid CSI feedback i.e. Type II CSI codebook can be used in conjunction with LTE-Class-B-type-like CSI feedback (e.g. based on port selection/combination codebook)
- For Category 1, study the following candidates.
  - Scheme 1-1:
    - Support dual-stage W = W1W2 codebook for Type II codebook for single-panel
    - For W1: orthogonal basis based on, e.g. DFT beams
      - Freely select $L \in \{2,3,4,[6,8]\}$ beams out of the group (L is configurable)
        - FFS: down selection of L
      - Beam selection is wideband
    - For W2: L beams are combined in W2 independently per layer with common W1
      - Subband reporting of phase quantization
      - FFS: alphabet size for phase quantization
    - Beam amplitude scaling can be wideband or subband reporting
      - With subband reporting, independent amplitude on different polarizations and layers
      - FFS: different wideband amplitude on different polarizations and/or layers
      - FFS: either configurability or down selection between wideband or subband
      - FFS: the number of bits for quantization
    - $\boldsymbol{B} = \left[\boldsymbol{b}_{k_1^{(0)},k_2^{(0)}} \ldots \boldsymbol{b}_{k_1^{(L-1)},k_2^{(L-1)}}\right]; \mathbf{B}^{\mathrm{H}}\mathbf{B} = \mathbf{I};$

- $\boldsymbol{P}_{r,l} = L \times L$ diagonal matrix with diagonal elements in [0,1] which correspond to amplitudes of L coefficients for polarization r and layer l
- $\mathbf{c}_{r,l} = \left[c_{r,l,0}, \ldots, c_{r,l,L-1}\right]^T$, phase combining coefficients
  - For rank 1: $\boldsymbol{W} = \begin{bmatrix} \widetilde{\boldsymbol{w}}_{0,0} \\ \widetilde{\boldsymbol{w}}_{1,1} \end{bmatrix} = \boldsymbol{W_1 W_2}$,
  - For rank 2: $\boldsymbol{W} = \begin{bmatrix} \widetilde{\boldsymbol{w}}_{0,0} & \widetilde{\boldsymbol{w}}_{0,1} \\ \widetilde{\boldsymbol{w}}_{1,0} & \widetilde{\boldsymbol{w}}_{1,1} \end{bmatrix} = \boldsymbol{W_1 W_2}$
    - $\widetilde{\boldsymbol{w}}_{r,l} = \boldsymbol{B P}_{r,l} \boldsymbol{c}_{r,l} = \sum_{i=0}^{L-1} \boldsymbol{b}_{k_1^{(i)} k_2^{(i)}} \cdot p_{r,l,i} \cdot c_{r,l,i}$; $r = 0,1$, $l = 0,1$
  - $\boldsymbol{b}_{k_1,k_2}$ is a 2D DFT beam where
  - $k_1 = O_1 n_1 + q_1, \;\; n_1 = 0,1,\ldots N_1 - 1, \;\; q_1 = 0,1,\ldots,O_1 - 1$
  - $k_2 = O_2 n_2 + q_2, \;\; n_2 = 0,1,\ldots N_2 - 1, \;\; q_2 = 0,1,\ldots,O_2 - 1$
  - $2N_1N_2$ corresponds to the number of CSI-RS ports
- $0 \le p_{r,l,i} \le 1$ beam amplitude scaling factor for beam i and on polarization r and layer l (diagonal elements of P)
  - FFS if $p_{r,1,i}=p_{r,2,i}$(common amplitude on layers), or $p_{0,l,i}=p_{1,l,i}$(common amplitude on polarization)
- $c_{r,l,i}$ beam combining coefficient (phase) for beam i and on polarization r and layer l

$$c_{r,l,i} = \exp\left(\frac{j2\pi n}{2^N}\right) \forall r, l, i; \; N \in \{2,3,4\}$$

  - Further refinement on details can be done

– Scheme 1-2: similar to Scheme 1-1 except for
- $\boldsymbol{P}_{r,l} = L \times L$ diagonal matrix with diagonal elements in [0,1] which correspond to amplitudes of L coefficients for port group r and layer l
- $\mathbf{c}_{r,l} = \left[c_{r,l,0}, \ldots, c_{r,l,L-1}\right]^T$, phase combining coefficients
  - For rank 1: $\mathbf{W} = \begin{bmatrix} W_{0,0} \\ W_{1,0} \\ W_{2,0} \\ W_{3,0} \end{bmatrix} = \mathbf{W_1 W_2}$,
  - For rank 2: $\mathbf{W} = \begin{bmatrix} W_{0,0} & W_{0,1} \\ W_{1,0} & W_{1,1} \\ W_{2,0} & W_{2,1} \\ W_{3,0} & W_{3,1} \end{bmatrix} = \mathbf{W_1 W_2}$
    - $\widetilde{\boldsymbol{w}}_{r,l} = \boldsymbol{B P}_{r,l} \boldsymbol{c}_{r,l} = \sum_{i=0}^{L-1} \boldsymbol{b}_{k_1^{(i)} k_2^{(i)}} \cdot p_{r,l,i} \cdot c_{r,l,i}$; $r = 0,1,2,3$, $l = 0,1$
  - $\boldsymbol{b}_{k_1,k_2}$ is a 2D DFT beam where
  - $k_1 = O_1 n_1 + q_1, \;\; n_1 = 0,1,\ldots M_1 - 1, \;\; q_1 = 0,1,\ldots,O_1 - 1$
  - $k_2 = O_2 n_2 + q_2, \;\; n_2 = 0,1,\ldots M_2 - 1, \;\; q_2 = 0,1,\ldots,O_2 - 1$
  - $N_1=2M_1$, $N_2=M_2$ or $N_1=M_1$, $N_2=2M_2$
  - $2N_1N_2$ corresponds to the number of CSI-RS ports
- $0 \le p_{r,l,i} \le 1$ beam amplitude scaling factor for beam i and on port group r and layer l (diagonal elements of P)
  - FFS if $p_{r,1,i}=p_{r,2,i}$(common amplitude on layers), or $p_{0,l,i}=p_{1,l,i}=p_{2,l,i}=p_{3,l,i}$ (common amplitude on port group)
- $c_{r,l,i}$ beam combining coefficient (phase) for beam i and on port group r and layer l

$$c_{r,l,i} = \exp\left(\frac{j2\pi n}{2^N}\right) \forall r, l, i; \; N \in \{2,3,4\}$$

  - Further refinement on details can be done

– Scheme 1-3: similar to Scheme 1-1 except for
- W1 consists of orthogonal DFT beams
  - $\boldsymbol{W}_1 = \begin{bmatrix} \boldsymbol{B}_1 & \boldsymbol{B}_2 \\ \boldsymbol{B}_1 & -\boldsymbol{B}_2 \end{bmatrix}$ $\boldsymbol{B}_i = \left[\boldsymbol{b}^i_{k_1^{(0)},k_2^{(0)}}, \ldots, \boldsymbol{b}^i_{k_1^{(L-1)},k_2^{(L-1)}}\right]$; $\boldsymbol{B}_i^H \boldsymbol{B}_i = \mathbf{I}$
  - $\boldsymbol{b}^i_{k_1,k_2}$ is a 2D DFT beam where
    - $k_1 = O_1 n_1^i + q_1^i, n_1^i = 0,1,\ldots N_1 - 1, q_1^i = 0,1,\ldots,O_1 - 1$
    - $k_2 = O_2 n_2^i + q_2^i, n_2^i = 0,1,\ldots N_2 - 1, q_2^i = 0,1,\ldots,O_2 - 1$
    - Rotation factors q_1^i, q_2^i common for all beams in $\boldsymbol{B}_i$

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- W2
  - Beams are combined on subband
  - For layer l, $W^l = W_1 W_2^l, W_2^l = [c_{l,0}, \ldots, c_{l,2L-1}]^T, l = 0,1,2,\ldots$.
    - $c_{l,0} = 1$ and $c_{l,i} = Pi \exp\left(\frac{j2\pi n}{N_i}\right) \forall l, i; N_i, Pi \in \{FFS\}$;
    - Same or different number of quantization bits for N_i or Pi
- Scheme 1-4: similar to Scheme 1-1 except for
  - W1 consists of non-orthogonal DFT beams
    - $W_1 = \begin{bmatrix} B_1 & B_1 \\ B_2 & -B_2 \end{bmatrix}$ $B_i = [b_0^i, \ldots, b_{L-1}^i]$;
    - b_j^i is a 2D DFT beam and $b_j^2 = \emptyset b_j^1$, where $\emptyset \in \{FFS\}$ and reported on wideband
  - W2
    - Beams are combined on subband
    - For layer l, $W^l = W_1 W_2^l, W_2^l = [c_{l,0}, \ldots, c_{l,2L-1}]^T, l = 0,1,2,\ldots$.
      - $c_{l,0} = 1$ and $c_{l,i} = Pi \exp\left(\frac{j2\pi n}{N_i}\right) \forall l, i; N_i, Pi \in \{FFS\}$;
      - Same or different number of quantization bits for N_i or Pi
- Scheme 1-5: similar to Scheme 1-1 except for
  - W1 consists of orthogonal DFT beams selected from configured beam groups
  - W2: L beams are combined in W2 with common W1
    - Coefficients for all layers and beams are designed jointly to achieve inter-layer orthogonality, i.e., for L beams (beam 0 – beam L-1), R layers (layer 1 – layer R) and two pols (pol 0 – pol 1)

$$W_2 = \begin{bmatrix} p_{0,1,0}c_{0,1,0} & \cdots & p_{0,R,0}c_{0,R,0} \\ \vdots & \ddots & \vdots \\ p_{1,1,L-1}c_{1,1,L-1} & \cdots & p_{1,R,L-1}c_{1,R,L-1} \end{bmatrix}, W_2^H W_2 = I$$

- Other candidates are not precluded

- For Category 2, study the following candidates:
  - Scheme 2-1: UE feedbacks the best M orthogonal DFT basis vectors along with corresponding covariance matrix entities
    - UE selects best $u(\theta_1, \phi_1)$ from the specified NR Type I, and then find the remaining vectors $u(\theta_i, \phi_i)$ to construct **U** matrix accordingly which fulfils $\mathbf{U}^H\mathbf{U} = \mathbf{I}$, $\mathbf{U} = [u(\theta_1, \phi_1)\, u(\theta_2, \phi_2) \ldots u(\theta_{Nt}, \phi_{Nt})]$.
    - UE feedbacks best M indices and $\mathbf{A}(\pi(1{:}M), \pi(1{:}M))$ values where $\mathbf{A}=\mathbf{U}^H\mathbf{Cov}\mathbf{U}$ and **Cov** is wideband covariance matrix.
  - Scheme 2-2: Use the same codebook as Category 1 to quantize M (≥1) dominant eigenvectors of the (sample) covariance matrix
  - Other candidates are not precluded
- For Category 3, study the following candidates:
  - W1: Long term CSI W1 can be acquired by the following approaches
    - W1 codebook in Category 1 e.g orthogonal DFT beams selected from configured beam groups
    - Beam selection based on beamformed CSI-RS (e.g. DFT beams based)
    - Channel reciprocity
  - NOTE that RSRP-like report may be used instead of CQI
  - Some restrictions should be considered in Beam/Beam group based feedback
    - E.g. To avoid two or more selected DFT beams corresponding to one path, the direction difference should be sufficient for any two selected beams.
    - Other restriction is not precluded
  - FFS: Criteria for beam selection
    - Both CQI and RSRP-like reporting should be studied.
  - FFS : How to determine the number of reported beams
    - Both Configured by gNB and determined by UE can be considered
    - W2: Full CSI feedback based on beamformed CSI-RS and ports selection/combination codebook (Class-B-like codebook). (NOTE: W1 and W2 are derived from different set of CSI-RS resources)

R1-1701338 WF on Type I CSI Codebook Huawei, HiSilicon

Decision: The document is noted, modified as follows:

Agreements:

- For Type I for single panel case with two-stage, i.e. W1W2, codebook-based PMI feedback,
  - B_i in W1 consists of a set of L DFT beams

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- For all ranks: FFS value(s) of L
- FFS: Orthogonal or non-orthogonal beams
- Select from following alternatives:

Alt 1: $\boldsymbol{W}_1 = \begin{bmatrix} \boldsymbol{B}_1 & \boldsymbol{B}_2 \\ \boldsymbol{B}_1 & -\boldsymbol{B}_2 \end{bmatrix}, \boldsymbol{B}_i = [\boldsymbol{b}_0^i, .., \boldsymbol{b}_{L-1}^i]$;

Alt 2: $\boldsymbol{W}_1 = \begin{bmatrix} \boldsymbol{B}_1 & \boldsymbol{B}_1 \\ \boldsymbol{B}_2 & -\boldsymbol{B}_2 \end{bmatrix}, \boldsymbol{B}_i = [\boldsymbol{b}_0^i, .., \boldsymbol{b}_{L-1}^i]$;

Alt 3: $\boldsymbol{W}_1 = \begin{bmatrix} \boldsymbol{B} & 0 \\ 0 & \boldsymbol{B} \end{bmatrix}, \boldsymbol{B} = [\boldsymbol{b}_0, .., \boldsymbol{b}_{L-1}]$;

Alt4: $W_1 = \begin{bmatrix} B & & & \\ & B & & \\ & & B & \\ & & & B \end{bmatrix}$, B as Alt 3

- Other alternatives are not precluded
- Note: the above matrices are constructed with 2D DFT precoders

- W2 is constructed, by down-selecting from following alternatives:
  - Alt 1: co-phasing only; beam selected wideband (in W1).
  - Alt 2: basis combination coefficient based on L basis based W1
  - Alt 3: beam selection and co-phasing from L-beam based W1
  - Alt 4: LTE-Class-B-type-like CSI feedback (e.g. based on port selection/combination codebook) (NOTE: W1 and W2 are derived from different set of CSI-RS resources)
  - Other alternatives are not precluded

R1-1701299 **WF on unified framework for beam management and CSI acquisition LG Electronics, AT&T, CATT, Ericsson, NTT DOCOMO**

- NR supports the previously agreed CSI framework for the purposes of both CSI acquisition and beam management.

Decision: The document is noted.

Possible agreements:

- NR supports the previously agreed CSI framework including RS, measurement, reporting settings for the purposes of both CSI acquisition and beam management
  - FFS on necessary different aspects for beam management

Continue offline discussion until Wednesday

Thursday

R1-1701480 **WF on DL beam management framework LG Electronics, AT&T, CATT, Ericsson, NTT DOCOMO**

Possible agreements:

- DL beam management is at least supported by the agreed framework (i.e., N≥1 Reporting settings, M≥1 Resource settings, and 1 Measurement setting, where the Measurement setting includes L ≥1 links)
  - Reporting setting supports beam reporting for DL beam management, including at least: Configuration for reporting CSI-RS resource selection and quality-related metric
    - Details FFS
  - P-1 and P-2 can be supported with configuring Reporting/Resource/Measurement settings.
  - P-3 can be supported at least with configuring Resource setting.
  - FFS on RSs used for resource setting

Friday

R1-1701546 **WF on framework for DL beam mangement LG Electronics, Ericsson, NTT DOCOMO**

- Strive for applying agreed CSI framework (i.e., resource, measurement, and reporting settings) for the purpose of DL beam management.
  - FFS: Whether or not any setting(s) need to be designed separately.
  - FFS: Content of each setting
  - FFS: Configuration of each setting
  - FFS: Link between settings
  - Note: It does not imply same setting has to be configured for CSI acquisition and beam management.
  - Note: Introduction of new setting(s) is not precluded.
  - Note: P-1 and P-2 can be supported with configuring reporting, resource, and measurement settings.
  - Note: P-3 can be supported at least with configuring resource setting.

Decision: The document is noted.

R1-1701292 **WF on CSI Framework for NR Samsung, Ericsson, LG Electronics, NTT DOCOMO, ZTE, ZTE Microelectronics, KT Corporation, Huawei, HiSilicon, Intel Corporation**

- Refine the agreement on RS and IM settings as follows:

  - "RS setting" is renamed as "Resource setting", comprising configuration for signal for channel and/or interference measurement
  - Remove "IM setting"
- Terminology clarification
  - A UE can be configured with N≥1 CSI reporting settings, M≥1 Resource settings, and 1 CSI measurement setting, where the CSI measurement setting includes L ≥1 links
  - Each of the L links corresponds to a CSI reporting setting and a Resource setting
- At least the following configuration parameters are signaled via RRC at least for CSI acquisition:
  - N, M, and L – indicated either implicitly or explicitly
  - In each CSI reporting setting, at least: reported CSI parameter(s), CSI Type (I or II) if reported, codebook configuration including codebook subset restriction, time-domain behavior, frequency granularity for CQI and PMI, measurement restriction configurations for desired signal measurements and interference measurements
  - In each Resource setting:
    - A configuration of S≥1 CSI-RS resource set(s)
      - Note: each set corresponds to different selections from a "pool" of all configured CSI-RS resources to the UE
    - A configuration of K_s ≥1 CSI-RS resources for each set s, including at least: mapping to REs, the number of ports, time-domain behavior, RS frequency span, RS power, mapping to OFDM symbol in a slot
  - In each of the L links in CSI measurement setting: CSI reporting setting indication, Resource setting indication, quantity to be measured (either channel or interference)
    - One CSI reporting setting can be linked with one or multiple Resource settings
    - Multiple CSI reporting settings can be linked with the same Resource setting
- At least the following are dynamically selected by L1 or L2 signaling
  - One or multiple CSI reporting settings within the CSI measurement setting
  - One or multiple CSI-RS resource sets selected from at least one Resource setting
  - One or multiple CSI-RS resources selected from at least one CSI-RS resource set

Decision: The document is noted.

Agreements:

- Refine the agreement on RS and IM settings as follows:
  - "RS setting" is renamed as "Resource setting", comprising configuration for signal for channel and/or interference measurement
  - Remove "IM setting"
- Terminology clarification
  - A UE can be configured with N≥1 CSI reporting settings, M≥1 Resource settings, and 1 CSI measurement setting, where the CSI measurement setting includes L ≥1 links
  - Each of the L links corresponds to a CSI reporting setting and a Resource setting
- At least the following configuration parameters are signaled via RRC at least for CSI acquisition:
  - N, M, and L – indicated either implicitly or explicitly
  - In each CSI reporting setting, at least: reported CSI parameter(s), CSI Type (I or II) if reported, codebook configuration including codebook subset restriction, time-domain behavior, frequency granularity for CQI and PMI, measurement restriction configurations
  - In each Resource setting:
    - A configuration of S≥1 CSI-RS resource set(s)
      - Note: each set corresponds to different selections from a "pool" of all configured CSI-RS resources to the UE
    - A configuration of K_s ≥1 CSI-RS resources for each set s, including at least: mapping to REs, the number of ports, time-domain behavior, etc.
  - In each of the L links in CSI measurement setting: CSI reporting setting indication, Resource setting indication, quantity to be measured (either channel or interference)
    - One CSI reporting setting can be linked with one or multiple Resource settings
    - Multiple CSI reporting settings can be linked with the same Resource setting
- At least following are dynamically selected by L1 or L2 signaling, if appilicable
  - One or multiple CSI reporting settings within the CSI measurement setting
  - One or multiple CSI-RS resource sets selected from at least one Resource setting
  - One or multiple CSI-RS resources selected from at least one CSI-RS resource set
- FFS until the next meeting about details of dynamic triggering

R1-1701313 **WF on Periodic/Semi-Persistent/Aperiodic CSI Reporting NTT DOCOMO, Intel, LGE, Mitsubishi, Sharp, Softbank**

Decision: The document is noted. Also supported by InterDigital.

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Agreements:

- For periodic CSI-RS,
  - Semi-persistent CSI reporting is activated/deactivated by MAC CE and/or DCI
  - Aperiodic CSI reporting is triggered by DCI
    - FFS: Necessity of additional signaling with MAC CE
- For semi-persistent CSI-RS,
  - Periodic CSI reporting is not supported.
  - Semi-persistent CSI reporting is activated/deactivated by MAC CE and/or DCI
    - Semi-persistent CSI-RS is activated/deactivated by MAC CE and/or DCI
    - FFS: Relationship of signaling between CSI reporting and CSI-RS transmission
  - Aperiodic CSI reporting is triggered by DCI
    - Semi-persistent CSI-RS is activated/deactivated by MAC CE and/or DCI
    - FFS: Necessity of additional signaling with MAC CE
- For aperiodic CSI-RS,
  - Periodic [and semi-persistent] CSI reporting is not supported
  - Aperiodic CSI reporting is triggered by DCI
    - Aperiodic CSI-RS is triggered by DCI and/or MAC CE
    - FFS: Relationship of signaling between CSI reporting and CSI-RS transmission, e.g., common DCI signaling between CSI reporting and CSI-RS transmission
    - FFS: Necessity of additional signaling with MAC CE
- Note that further down selection can be done later between MAC CE and DCI in above bullets
- Note that it is possible to dynamically trigger RS and reports through links in the measurement setting

R1-1701356 WF on timings for aperiodic CSI-RS and aperiodic CSI reporting LG Electronics, Samsung, Ericsson, ZTE, ZTE Microelectronics
Decision: The document is noted.

Agreements:

- NR supports mechanism(s) to trigger aperiodic CSI-RS and aperiodic CSI reporting simultaneously.
  - FFS: signaling details (e.g. single DCI or separate DCI)
  - FFS: method(s) for interference measurement
  - FFS: reference resource of aperiodic CSI reporting
- For aperiodic CSI-RS timing offset X, support X=0 at least, if aperiodic CSI-RS triggering is done by DCI
  - FFS: supporting other values of X
  - Note: 'aperiodic CSI-RS timing offset X' refers to the time gap between aperiodic CSI-RS triggering and aperiodic CSI-RS transmission w.r.t. number of slots.
- For CSI reporting timing offset Y that is fixed or configurable by the network but with certain restriction on lower limit of Y to provide sufficient CSI computation time.
  - Candidate values of Y are fixed or pre-determined by certain rule(s).
    - Rule is FFS (e.g. number of CSI measurement/RS/reporting settings, CSI feedback type, number of ports, nearest CSI-RS transmission timing, UE capability, etc.)
  - Note: 'aperiodic CSI reporting timing offset Y' refers to the time gap between aperiodic CSI reporting triggering and aperiodic CSI reporting w.r.t. number of slots.
  - FFS Y is fixed or configurable
  - FFS configuration is done by DCI and/or MAC CE and/or higher layer signaling

R1-1701317 WF on UL Beam Management MediaTek, LG, InterDigital, vivo, Xinwei, ZTE, ZTE Microelectronics, Intel, ITRI, Huawei, HiSilicon, CMCC, OPPO, Ericsson, DOCOMO

- NR supports NW-controlled UL beam management procedure(s)
- Details of UL beam management procedure(s) are FFS and study should include at least
  - Signal(s) for UL beam management procedure(s)
    - E.g., SRS, PRACH preamble, UL DMRS
    - Additional contents can also be included, e.g., beam reporting
  - Method(s) and content for TRP to indicate selected UE Tx beam and configure UE sweeping
  - Impact of beam correspondence Status
    - E.g., When to use UL beam management mechanism(s)
    - E.g., Procedures such as U-1, U-2, U-3, and beam correspondence based procedure
  - UE capability reporting
    - E.g., capability of analog beamforming
  - Consider the cases when UL and DL are from the same TRP and from different TRPs

Discussion: Also supported by Samsung.
Decision: The document is noted. Continue offline.

Working assumption:

- NR supports at least one NW-controlled mechanism for beam management for UL transmission(s)
  - Details are FFS, including at least the following study:
    - Signal(s) for the mechanism(s) if necessary
      - E.g., SRS, PRACH preamble, UL DMRS
      - Additional contents can also be included, e.g., beam reporting
    - Method(s) and content for TRP to indicate selected UE Tx beam and configure UE sweeping
    - Impact of beam correspondence Status
      - E.g., When to use the mechanism(s)
      - E.g., Procedures such as U-1, U-2, U-3, and beam correspondence based procedure
    - UE capability reporting
      - E.g., capability of analog beamforming
    - Consider the cases when UL and DL are from the same TRP and from different TRPs
    - Conditions when the mechanism is particularly useful

R1-1701351 WF on beam correspondence NTT DOCOMO, Samsung, Mitsubishi Electric, MediaTek, Sharp, OPPO, MTI

Agreement:

- For the definition of beam correspondence:
  - Confirm the previous working assumption of the definition
    - Note: this definition/terminology is for convenience of discussion
  - The detailed performance conditions are up to RAN4

Agreement:

- Support capability indication of UE beam correspondence related information to TRP
  - FFS details including capability definition, case(s) (if any) when the indication is not necessary

R1-1701394 WF on SRS for UL beam management LG Electronics, Intel, MediaTek

Agreements:

- For NR UL, support transmissions of SRS precoded with same and different UE Tx beams within a time duration
  - Detailed FFS, including the resulting overhead, time duration (e.g., one slot), and configuration, e.g., in the following:
    - Different UE Tx beam: FFS per SRS resource and/or per SRS port
    - Same UE Tx beam across ports: for a given SRS resource and/or a set of SRS resources
    - FFS: The SRS resources can be mapped in TDM/FDM/CDM manner.
    - FFS: overhead reduction schemes such as IFDMA or larger subcarrier spacing
    - FFS gNB can indicate selected SRS port/resource for UE after receiving the SRS.

Thursday session
R1-1701371 WF on interference measurement method Nokia, ASB, Intel, InterDigital, ITL, KT, LG Electronics, Samsung

Agreements:

- For NR, support at least two types of resources used for interference measurement in CSI configuration based on the following candidates:
  - ZP CSI-RS, NZP CSI-RS, DMRS
    - Including independent or joint usage of any combination of the above three candidates
  - Selection is to be done in RAN1#88

R1-1701286 WF on CRI reporting Samsung, CATT, Ericsson, DOCOMO

Agreements:

- When a UE is configured with K>1 NZP CSI-RS resources, a UE can report a set of N UE-selected CSI-RS-resource-related indices
  - FFS: The name of the corresponding CSI reporting parameter
  - FFS: Maximum value of N (support of N=1 only is not precluded)

- FFS: What other CSI parameter(s) are reported together with the CSI-RS-resource-related indices, if any, and joint reporting mechanism (in case of multiple reporting parameters)
- FFS: Extension of this feature to other types of Resources

R1-1701499 WF on Type II Codebook Samsung, Ericsson, Huawei, HiSilicon

Agreements:

- Support at least one scheme taken from Category 1, 2, and/or 3 for Type II CSI
  - Possible down selection can be performed throughout Phase I WI
    - If more than one schemes is supported, these schemes should be complementary
    - This includes further refinement within each category
    - Note: other schemes within each category are not precluded
  - Descriptions for Category 1 and 2 are given in the following slides
    - For the purpose of summary in TR38.802
- Category 1: precoder feedback based on linear combination codebook
  - Dual-stage W = W1W2 codebook
    - W1 consists of a set of *L* orthogonal beams, e.g. 2D DFT beams
      - The set of *L* beams is selected out of a basis, e.g. oversampled 2D DFT beams
      - Beam selection is wideband
    - W2: *L* beams are combined in W2 with common W1
      - Subband reporting of phase quantization of beam combining coefficients
    - Beam amplitude scaling quantization can be configured for wideband or subband reporting
- Category 2: covariance matrix feedback
  - A quantized/compressed version of covariance matrix is reported by the UE
    - Quantization/compression is based on a set of *M* orthogonal basis vectors
    - Reporting can include indicators of the *M* basis vectors along with a set of coefficients
    - FFS: basis set
- Category 3: Hybrid CSI feedback
  - Type II Category 1 or 2 CSI codebook can be used in conjunction with LTE-Class-B-type-like CSI feedback (e.g. based on port selection/combination codebook)
    - The LTE-Class-B-type-like CSI feedback can be based on either Type I or Type II CSI codebook

R1-1701403 WF on codebook design for DL multi-panel MIMO in NR Huawei, HiSilicon, Intel

Agreements:

- At least Type I CSI feedback should support multi-panel scenarios by choosing one of the two following alternatives:
  - Alt1: only wideband co-phasing factor across panels
  - Alt2: wideband and subband co-phasing factor across panels
- At least the following criteria should be used:
  - Performance-overhead tradeoff
  - Description of design goal, e.g. for channel compensation or hardware impairments
- FFS: How to capture this feature (co-phasing factor across panels) in codebook design
  - Examples: in W3 with W1W2W3, W1W3W2 or W3W1W2 structure, W1W2 where multi-panel co-phasing is included in either W1 or W2
  - Other examples are not precluded

R1-1701281 WF on Hybrid CSI ZTE, ZTE Microelectronics, ASTRI, CATR, China Telecom, China Unicom, CMCC, InterDigital, NTT DOCOMO

Agreements:

- The CSI acquisition framework (including CSI measurement, Resource, and CSI reporting settings) supports configurations that provide CSI similar to Rel.14 eFD-MIMO hybrid CSI mechanisms 1 and 2, e.g.
  - Long-term CSI for a number of antenna ports or multiple NZP CSI-RS resources
  - Short-term CSI for a number of antenna ports with one or more NZP CSI-RS resources
  - The number of ports for long-term and short-term CSIs can be the same or different
- Contents of the CSI report are FFS
- This is achieved without introducing new features into the agreed upon CSI acquisition framework

R1-1701325 WF on Reciprocity based CSI acquisition Huawei, HiSilicon, IITH, CEWIT, IITM, Tejas Networks, Sony, Fujitsu, Softbank, Interdigital, National Instruments

Possible agreements:
- Support DL CSI feedback for different degree of channel reciprocity, e.g.,
  - For full channel reciprocity
    - Study explicit interference/channel feedback: e.g., Interference covariance matrix, diagonal elements of interference covariance matrix, CSI of multiple TRPs
    - Study implicit interference feedback: e.g., Interference PMI feedback
  - For partial channel reciprocity, e.g., more Rx ports than Tx ports at UE
    - Study partial CSI feedback for eNB to acquire full CSI
- Support DL CSI-RS and SRS transmission in the same slot for fast CSI acquisition

Friday

R1-1701531 WF on Reciprocity based CSI Acquisition Huawei, HiSilicon, Fujitsu, IITH, CEWIT, IITM, Tejas Networks, Softbank, Xinwei

Agreements:
- Study the following DL CSI feedback for different degree of channel reciprocity,
  - For full channel reciprocity
    - Explicit interference feedback: e.g., Interference covariance matrix, diagonal elements of interference covariance matrix
    - Implicit interference feedback: e.g., Interference PMI feedback
    - Explicit channel feedback: e.g., CSI of multiple TRPs
  - For partial channel reciprocity (e.g., more Rx ports than Tx ports at UE)
    - Partial CSI feedback for eNB to acquire full CSI
- Study whether or not to support CSI-RS and SRS transmission in the same slot (e.g., for fast CSI acquisition)
  - Study if a limitation on the number of SRS and/or CSI-RS ports due to UE complexity, slot duration of different numerology are needed.

R1-1701400 WF on UL codebook design in NR Huawei, HiSilicon, Samsung

Possible agreement: For UL, NR supports SRS port selection codebook

R1-1701328 WF on UL CSI acquisition LG Electronics, Huawei, HiSilicon, InterDigital, KT Corporation, Samsung

Possible agreements:
- For UL CSI acquisition, UE can be configured with multiple SRS resources, where
  - UE can be configured to transmit SRS ports in a configured SRS resource. Adopt at least one of alternative(s) below:
    - Alt.1: UE applies gNB-transparent precoder (e.g., determine Tx beam for each SRS port)
    - Alt.2: UE should apply a precoder according to gNB indication with details FFS (e.g., Tx beam for each SRS port is indicated by gNB)
    - Other schemes are not precluded.
  - gNB can indicate a selected SRS resource for which the UE should transmit UL data on the same antenna ports of the indicated SRS resource.
    - PMI for data transmission (if indicated in the scheduling grant) should also be applied across the antenna ports.

Friday

Agreements:
- For UL CSI acquisition, UE can be configured with multiple SRS resources, where
  - UE can be configured to transmit SRS in each configured SRS resource. Adopt at least one of alternative(s) below:
    - Alt.1: UE applies gNB-transparent Tx beamformer to SRS (e.g., UE determines Tx beam for each SRS port)
    - Alt.2: UE should apply a Tx beamformer to SRS according to gNB indication with details FFS (e.g., Tx beam for each SRS port is indicated by gNB)
    - Alt.3: Other possible scheme (not precluded)

R1-1701503 Way Forward on Beam Reporting for NR MIMO ZTE, ZTE Microelectronics, Ericsson, Intel, MediaTek, Nokia, ASB, Samsung

Working assupmtions:
- Support at least one of these two alternatives of beam reporting:
  - Alt 1: UE reports information about TRP Tx Beam(s) that can be received using selected UE Rx beam set(s).
    - where a Rx beam set refers to a set of UE Rx beams that are used for receiving a DL signal
      - Note: It is UE implementation issues on how to construct the Rx beam set.

- One example: each of Rx beam in a UE Rx beam set corresponds to a selected Rx beam in each panel.
- For UEs with more than one UE Rx beam sets, the UE can report TRP Tx Beam(s) and an identifier of the associated UE Rx beam set per reported TX beam
- NOTE: Different TRP Tx beams reported for the same Rx beam set can be received simultaneously at the UE.
- NOTE: Different TRP TX beams reported for different UE Rx beam set may not be possible to be received simultaneously at the UE

- Alt 2:UE reports information about TRP Tx Beam(s) per UE antenna group basis
  - where UE antenna group refers to receive UE antenna panel or subarray
  - For UEs with more than one UE antenna group, the UE can report TRP Tx Beam(s) and an identifier of the associated UE antenna group per reported TX beam
  - NOTE: Different TX beams reported for different antenna groups can be received simultaneously at the UE.
  - NOTE: Different TX beams reported for the same UE antenna group may not be possible to be received simultaneously at the UE

- FFS: How UE antenna group or Rx beam set is captured in the specification

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Friday session

R1-1701506 WF on beam indication Samsung, Ericsson, KT Corp., Verizon, NTT DOCOMO, AT&T, LGE

Agreements:

- For reception of DL control channel, support indication of spatial QCL assumption between an DL RS antenna port(s), and DL RS antenna port(s) for demodulation of DL control channel
  - FFS: signaling method
  - Note: Indication may not be needed for some cases:
- For reception of DL data channel, support indication of spatial QCL assumption between DL RS antenna port(s) and DMRS antenna port(s) of DL data channel
  - FFS: which DL RS(s) to use for this purpose
  - Different set of DMRS antenna port(s) for the DL data channel can be indicated as QCL with different set of RS antenna port(s)
  - Option 1: Information indicating the RS antenna port(s) is indicated via DCI
    - FFS: whether the information indicating the RS antenna port(s) will be assumed only for the scheduled "PDSCH" or until the next indication
  - Option 2: Information indicating the RS antenna port(s) is indicated via MAC-CE, and will be assumed until the next indication
  - Option 3: Information indicating the RS antenna port(s) is indicated via a combination of MAC CE and DCI
  - At least one option is supported
    - FFS: whether to support either or both options
  - FFS: whether the information indicating the RS antenna port(s) for DMRS ports for DL control channel also applies to DMRS ports for DL data channel
  - Note: Indication may not be needed for some cases:

R1-1701276 WF on UE assistant CSI reporting setting selection ATT, ZTE
R1-1701504 WF on beam management for DL control channel and data channel ZTE, ZTE Microelectronics, ASTRI, Intel
R1-1701514 Way Forward on Evaluation for Beam Management ZTE, ZTE Microelectronics, Ericsson, Nokia, ASB

Email discussion until the next meeting – Ruyue (ZTE)

Not treated.

R1-1700039 Discussion on downlink beam measurement and UE reporting procedure Huawei, HiSilicon
R1-1700040 Beam diversity for data and control channels Huawei, HiSilicon
R1-1700041 Discussion on link recovery procedure for beam blockage Huawei, HiSilicon
R1-1700042 Enhanced CRI reporting for NR MIMO Huawei, HiSilicon
R1-1700043 Discussion on beam management aspects for UL MIMO Huawei, HiSilicon
R1-1700044 Beam management across multiple carriers Huawei, HiSilicon
R1-1700045 DL beam management with reduced overhead Huawei, HiSilicon
R1-1700054 CSI measurement and reporting for coordinated transmission schemes Huawei, HiSilicon
R1-1700055 Consideration on interference measurement for downlink CSI acquisition Huawei, HiSilicon
R1-1700056 Independent and joint control of CSI-RS transmission and CSI reporting for NR MIMO Huawei, HiSilicon

R1-1700057 Considerations on two-level configuration of CSI acquisition settings Huawei, HiSilicon
R1-1700058 Mechanism of shared CSI-RS transmission Huawei, HiSilicon
R1-1700059 Discussion on reciprocity based DL CSI feedback Huawei, HiSilicon
R1-1700060 Discussion on DL CSI feedback for SFBC Huawei, HiSilicon
R1-1700061 Discussion on UL CSI acquisition Huawei, HiSilicon
R1-1700062 UL codebook design in NR Huawei, HiSilicon
R1-1700066 DL Codebook design for multi-panel structured MIMO in NR Huawei, HiSilicon
R1-1700121 High level views on beam management for NR MIMO ZTE, ZTE Microelectronics
R1-1700122 Group based beam management ZTE, ZTE Microelectronics
R1-1700123 Beam related indication for DL and UL beam management ZTE, ZTE Microelectronics
R1-1700124 UE reporting for beam management ZTE, ZTE Microelectronics
R1-1700126 Beamforming procedure considering high frequency channel characteristics ZTE, ZTE Microelectronics
R1-1700127 Discussion on evaluation assumptions for beam management ZTE, ZTE Microelectronics
R1-1700130 Linear combination based CSI feedback design for NR MIMO ZTE, ZTE Microelectronics
R1-1700131 Beam management for DL control channel ZTE, ZTE Microelectronics
R1-1700132 Discussion on beam recovery mechanism ZTE, ZTE Microelectronics
R1-1700143 Channel Reciprocity Based Massive MIMO for FDD ZTE, ZTE Microelectronics
R1-1700145 Linear combination codebook design for multiple panels ZTE, ZTE Microelectronics
R1-1700147 Beam selection and CSI acquisition for NR MIMO ZTE, ZTE Microelectronics
R1-1700163 Considerations on beam correspondence MediaTek Inc.
R1-1700192 Beam management for control and data channel CATT
R1-1700193 QCL between CSI-RS for beam management CATT
R1-1700201 Discussion on beam reporting CATT
R1-1700223 On Type II feedback CATT
R1-1700224 Discusison on CSI reporting CATT
R1-1700225 Discussion on beam recovery CATT
R1-1700226 Consideration on beam reciprocity CATT
R1-1700227 Further discussion beam management CATT
R1-1700274 Discussion on beam management for NR MIMO vivo
R1-1700286 On the explicit feedback for NR Spreadtrum Communications
R1-1700314 Further Evaluation of Component Based NR-MIMO Feedback AT&T
R1-1700320 UE Assisted UCI Format Selection for NR AT&T
R1-1700341 Further discussion on NR Type I codebook design Intel Corporation
R1-1700343 Discussion on codebook for multi-panel support Intel Corporation
R1-1700344 On NR CSI acquisition signaling Intel Corporation
R1-1700345 Further discussion on network initiated beam recovery in NR Intel Corporation
R1-1700346 On Beam State Reporting Intel Corporation
R1-1700348 Reference Signal and Procedure for UL Beam Management Intel Corporation
R1-1700349 On UE initiated beam recovery Intel Corporation
R1-1700396 Discussion on DL Beam Management National Taiwan University
R1-1700405 QCL indication of downlink control channel and beam management reference signals Huawei, HiSilicon
R1-1700415 Design for Type II Feedback Huawei, HiSilicon
R1-1700435 Digital codebook design principle for NR MIMO CMCC
R1-1700436 Discussion on UE triggered beam reporting for beam recovery CMCC
R1-1700470 Discussion on DL and UL beam management procedure LG Electronics
R1-1700471 Discussion on providing robustness for beamformed systems LG Electronics
R1-1700472 On beam relationship between control channel and data channel LG Electronics
R1-1700473 Discussion on CSI timing LG Electronics
R1-1700474 Discussion on interference measurement LG Electronics
R1-1700475 Discussion on CSI feedback LG Electronics
R1-1700476 Discussion on CSI acquisition framework LG Electronics
R1-1700538 Beam management and subcell Panasonic Corporation
R1-1700549 Beam association relationship between data and control channels Guangdong OPPO Mobile Telecom.
R1-1700550 Discussion on Beam Management in NR Guangdong OPPO Mobile Telecom.
R1-1700595 Views on beam recovery for NR NTT DOCOMO, INC.
R1-1700596 CSI Acquisition Schemes for NR NTT DOCOMO, INC.
R1-1700597 CSI Feedback Types for NR MIMO NTT DOCOMO, INC.
R1-1700598 Hybrid beamforming for NR NTT DOCOMO, INC.
R1-1700599 Definition of beam correspondence and beam correspondence determination mechanism NTT DOCOMO, INC.
R1-1700655 Discussion on paging in NR Fujitsu
R1-1700672 Joint DL/UL beam management operation for NR Sony
R1-1700723 Considerations on beam recovery for NR InterDigital Communications
R1-1700749 On UL beam management Ericsson
R1-1700750 On beam grouping Ericsson

R1-1700751 Type I CSI Feedback Ericsson
R1-1700752 Type II CSI Feedback Ericsson
R1-1700753 About interference measurements Ericsson
R1-1700754 On measurement restriction Ericsson
R1-1700755 CSI Framework Ericsson
R1-1700756 CSI reporting configurations Ericsson
R1-1700757 Lightweight CSI feedback Ericsson
R1-1700758 On Type I CSI feedback extension to multi-panel operation Ericsson
R1-1700759 Preliminary simulation results on system performance with 64 ports Ericsson
R1-1700760 On Supported Codebook Sizes Ericsson
R1-1700761 On Dynamic Signalling for Aperiodic and Semi-Persistent CSI-RS Ericsson
R1-1700762 On CSI-RS Pooling and Resource Allocation Ericsson
R1-1700763 DL beam management overview Ericsson
R1-1700764 CSI feedback for beam management Ericsson
R1-1700765 On UE initiated beam recovery Ericsson
R1-1700779 Further Discussion on CSI Aquisition Settings and Beam Management Beijing Xinwei Telecom Techn.
R1-1700800 Beam management for NR Qualcomm Incorporated
R1-1700801 Discussion on CSI acquisition Qualcomm Incorporated
R1-1700855 On Type I CSI feedback for NR InterDigital Communications
R1-1700856 On CSI Measurement for NR InterDigital Communications
R1-1700909 CSI acquisition for UL NR MIMO Samsung
R1-1700910 Type II CSI reporting for NR Samsung
R1-1700911 Type I CSI reporting for NR Samsung
R1-1700912 Codebook design framework for NR MIMO Samsung
R1-1700913 Simulation results for explicit (Type II) CSI reporting for NR MIMO Samsung
R1-1700914 UL MIMO codebook Samsung
R1-1700915 Overview of beam management for > 6GHz Samsung
R1-1700916 Cell-specific measurements for beam management for > 6GHz Samsung
R1-1700917 Rx beam mode for beam management Samsung
R1-1700918 Beam management for control channel Samsung
R1-1700920 Discussions on aperiodic CSI reporting for NR Samsung
R1-1700921 Discussions on channel and interference measurements for NR Samsung
R1-1700922 Discussions on service specific CSI for NR Samsung
R1-1700923 Discussion on UE initiated beam switching Samsung
R1-1700924 Discussion on NW initiated beam switching Samsung
R1-1700925 Discussion on beam correspondence Samsung
R1-1700926 Discussion on UL beam management Samsung
R1-1701088 On beam grouping reporting in NR Nokia, Alcatel-Lucent Shanghai Bell
R1-1701089 Beam management - DCI monitoring Nokia, Alcatel-Lucent Shanghai Bell
R1-1701090 Beam Measurements and TX/RX Beam Correspondence Nokia, Alcatel-Lucent Shanghai Bell
R1-1701091 Beam Management – Beam Reporting Nokia, Alcatel-Lucent Shanghai Bell
R1-1701092 Beam Recovery in NR Nokia, Alcatel-Lucent Shanghai Bell
R1-1701093 Multi-beam control channel transmission Nokia, Alcatel-Lucent Shanghai Bell
R1-1701094 Beam Management – Beam Reciprocity Impacts Nokia, Alcatel-Lucent Shanghai Bell
R1-1701095 On the need for UL beam management Nokia, Alcatel-Lucent Shanghai Bell
R1-1701096 DRX and Beam Management Nokia, Alcatel-Lucent Shanghai Bell
R1-1701097 On the impact of number of UE panels Nokia, Alcatel-Lucent Shanghai Bell
R1-1701098 On type I CSI feedback in NR Nokia, Alcatel-Lucent Shanghai Bell
R1-1701099 On the CSI timing relationhips Nokia, Alcatel-Lucent Shanghai Bell
R1-1701100 On the channel and interference estimation in NR Nokia, Alcatel-Lucent Shanghai Bell
R1-1701138 Initial results on number of beams to be maintained Nokia, Alcatel-Lucent Shanghai Bell
R1-1701188 Beam grouping evaluation for beam management ZTE, ZTE Microelectronics
R1-1701189 On Type I codebook design for NR MIMO ZTE, ZTE Microelectronics
R1-1701190 Hybrid CSI feedback for NR MIMO ZTE, ZTE Microelectronics
R1-1701192 Discussion on DL Beam Management Intel Corporation
R1-1701194 CSI acquisition for DL NR MIMO Samsung
R1-1701278 WF on beam recovery in multi-beam NR systems Qualcomm, Nokia, ASB, Xinwei, Intel
R1-1701280 Way Forward on Beam Reporting for NR MIMO ZTE, ZTE Microelectronics, ASTRI, Mediatek, Intel, Nokia, ASB
R1-1701295 WF on CSI-RS and Codebook Size for NR Ericsson, Intel, Samsung, Nokia, ASB, CATT, Kathrein-Werke KG, NTT DOCOMO, AT&T, Verizon Wireless, Sprint, Deutsche Telekom, Xilinx, KT, Orange, Mitsubishi
R1-1701352 WF on code book design for DL multi-panel MIMO Huawei, HiSilicon

5.1.2.3 Reference signals and QCL

5.1.2.3.1 CSI-RS

Limit to 1 contribution per 1 company/organization/university for beam management and CSI acquisition, independently

R1-1701304 WF on CSI-RS design principle LG Electronics, Xinwei, Intel

- In NR, a UE can be configured with a CSI-RS resource configurations with up to x-port CSI-RS.
  - Supported values of x include 1, 2, 4, 8, 12, 16, 24 and 32.
    - Same QCL between any ports within the same CSI-RS resource
- N port CSI-RS pattern is composed of aggregation of multiple M port CSI-RS patterns (N>M).
  - A CSI-RS RE pattern is defined within a slot
  - A CSI-RS RE pattern can span multiple configurable consecutive OFDM symbols
    - FFS: non-consecutive symbols
  - Value(s) of M will be down-selected among 1, 2 or 4.
- In NR, OCC length of y is supported.
  - Supported values of y include 2, 4
    - FFS on y=8.
  - Details are FFS

Decision: The document is noted. Continue offline.

R1-1701282 WF on beam-related indication for CSI-RS measurement ZTE, ZTE Microelectronics, ASTRI, Xinwei, vivo, Docomo

- QCL is supported for connection between different CSI-RS resources
  - E.g. Two different CSI-RS resources corresponding CSI-RS in P-1 and P-2 respectively. Rx beams for P-2 is determined based on QCL information from P-1.
  - Partial QCL parameters (e.g., only spatial QCL parameter at UE side) should be considered.
- For downlink, NR supports CSI-RS measurement with and without beam-related indication,
  - When beam-related indication is provided, information pertaining to UE-side beamforming/receiving procedure used for CSI-RS-based measurement can be indicated through QCL to UE
  - QCL information includes spatial parameter(s) at UE side of CSI-RS ports
  - FFS: information other than QCL

Decision: The document is noted. Continue offline.
Wednesday: Revised in R1-1701381

Agreements:

- Indication of QCL between the antenna ports of two CSI-RS resources is supported.
  - By default, no QCL should be assumed between antenna ports of two CSI-RS resources.
  - Partial QCL parameters (e.g., only spatial QCL parameter at UE side) should be considered.
- For downlink, NR supports CSI-RS reception with and without beam-related indication,
  - When beam-related indication is provided, information pertaining to UE-side beamforming/receiving procedure used for CSI-RS-based measurement can be indicated through QCL to UE
  - QCL information includes spatial parameter(s) for UE side reception of CSI-RS ports
    - FFS: information other than QCL

R1-1701300 WF on CSI-RS for beam management Intel, Qualcomm, ZTE

- For P-1, study whether the CSI-RS can be multiplexed with other physical channel or signals.
- Support sub-time unit partition with shorter OFDM symbol length
  - Down select from the following options:
    - IFDMA
    - Larger subcarrier spacing
  - FFS: whether the CSI-RS structure should be utilized for P-1/P-2/P-3
  - FFS: whether DMRS can have the same structure for P-3
- Study overhead savings when combining CSI-RS sweeps P-3 with P-1 or P-2 sweeps.
- Study how to support UE with higher beam switch time in those cases

Decision: The document is noted. Continue offline.

Wednesday session
R1-1701402 WF on CSI-RS design principle LG Electronics, Ericsson (revision of R1-1701304)

Agreements:

- The CSI-RS RE mapping pattern of one N-port CSI-RS resource is composed of one or multiple CSI-RS RE mapping patterns of CSI-RS resources of equal or smaller number of ports, [e.g., 2, 4, or 8]
    - A CSI-RS RE mapping pattern is defined within a slot
    - FFS: A CSI-RS RE mapping pattern can span multiple configurable consecutive/non-consecutive OFDM symbols
    - FFS on mapping of ports to the CSI-RS RE mapping pattern
    - Density per port in terms of RE per port per PRB is configurable supports for density greater than 1 is not precluded

Thursday session

R1-1701484 Way Forward on CSI-RS for Beam Management Intel, Qualcomm, Ericsson, Nokia, Alcatel-Lucent Shanghai Bell, Verizon Wireless, CATT, MTK, NTT Docomo, CMCC, ZTE, ZTE Microelectronics, KT

Possible agreements:

- Support sub-time unit shorter than 1 OFDM symbol in a reference numerology.
    - Support at least one of the following options:
        - IFDMA
        - Larger subcarrier spacing
    - FFS: whether the above structure should be utilized for P-1, P-2 and/or P-3
- Consider overhead savings when combining P-3 with P-1 or P-2 CSI-RS beam sweeps.
- Consider UE beam switch latency.

Friday session

R1-1701536 Way Forward on CSI-RS for Beam Management Intel, Qualcomm, Ericsson, Nokia, Alcatel-Lucent Shanghai Bell, Samsung, Verizon Wireless, CATT, MTK, NTT Docomo, CMCC, ZTE, ZTE Microelectronics, KT, LG, vivo

Agreements:

- Beam management overhead and latency are to be considered during the CSI-RS design for NR beam management, considering the following possible candidate solutions:
    - Opt1. IFDMA
    - Opt2. Larger subcarrier spacing
    - Other solutions are not precluded
    - FFS: whether the above structure should be utilized for P-1 and/or P-2 and/or P-3.
- Other aspects considered during the CSI-RS design for NR beam management include, e.g. CSI-RS multiplexing, UE beam switch latency and UE implementation complexity (e.g. AGC training time), coverage of CSI-RS, etc.
- Note that it does not imply prioritizing different aspects in CSI-RS design

Not treated

R1-1700070 CSI-RS design for CSI acquisition Huawei, HiSilicon
R1-1700477 Considerations on NR CSI-RS design for beam management LG Electronics
R1-1700069 CSI-RS design for beam management Huawei, HiSilicon
R1-1700133 On CSI-RS for CSI acquisition ZTE, ZTE Microelectronics
R1-1700134 On CSI-RS for beam management ZTE, ZTE Microelectronics
R1-1700228 Discussion on CSI-RS for CSI CATT
R1-1700229 Discussion on CSI-RS for beam management CATT
R1-1700315 Design and Evaluation of CSI-RS for NR MIMO with Mixed Numerology Support AT&T
R1-1700350 CSI-RS Structure for Beam Management Intel Corporation
R1-1700351 Further discussion on CSI-RS for NR Intel Corporation
R1-1700478 Considerations on NR CSI-RS design for CSI acquisition LG Electronics
R1-1700551 CSI-RS design for NR Guangdong OPPO Mobile Telecom.
R1-1700559 Discussion of CSI-RS for beam management Lenovo
R1-1700600 CSI-RS design for NR NTT DOCOMO, INC.
R1-1700674 Views on CSI-RS design for NR Sony
R1-1700714 On CSI-RS design for NR InterDigital Communications
R1-1700766 On CSI-RS design Ericsson
R1-1700804 Discussion on CSI-RS design Qualcomm Incorporated
R1-1700927 CSI-RS for beam management Samsung
R1-1700928 Discussions on CSI-RS design for NR MIMO Samsung
R1-1701101 On the CSI-RS configurations for NR CSI acquisition Nokia, Alcatel-Lucent Shanghai Bell
R1-1701102 On CSI-RS Design for DL Beam Management Nokia, Alcatel-Lucent Shanghai Bell
R1-1701327 WF on CSI-RS design Huawei

5.1.2.3.2 DMRS

R1-1700479 Summary of [87-28] email discussion on DMRS design for DL data channel LG Electronics
The document was presented by Hyunsoo Ko from LGE.

Decision: The document is noted.

R1-1700480 Summary of [87-29] email discussion on Simulation assumption for NR DMRS LG Electronics
The document was presented by Hyunsoo Ko from LGE.
Discussion: Intel→ still an issue (on using the full buffer traffic model from the email discussion) – insisted that the email discussion was concluded with non consensus on traffic model to use for DM-RS demodulation, not properly captured in the summary.
Decision: The document is noted.

R1-1700806 Discussion on DL DMRS design Qualcomm Incorporated
The document was presented by Alexandros Manolakos from Qualcomm.

- Proposal 1: Design a limited set of uniformed DMRS patterns for all scalable numerology options.
- Proposal 2: NR supports configurable DMRS patterns based on some limited set of available patterns.
- Proposal 3: Data and RS frequency domain multiplexing is supported.
- Proposal 4: NR supports comb-based DMRS patterns for the DL data channel where cyclic shifts are used for port multiplexing inside each comb.
- Proposal 5: Patterns with comb offsets (time-domain staggering) should be studied. Further study is also needed in down selecting the number of combs and the comb offsets.
- Proposal 6: In a self-contained slot, NR supports a front-loaded DMRS pattern at symbol indices {3} and {3,4} (starting counting at 1).
- Observation 1: In a self-contained slot, using a 2-symbol DMRS pattern at symbol indices {3,6} can provide additional robustness to mobility, compared to a DMRS pattern in symbol 3, or {3, 4} (starting counting at 1).
- Proposal 7: NR supports a 2-symbol front-loaded DMRS pattern at symbol indices {3,6} (starting counting at 1).
- Proposal 8: In a no-self-contained slot, NR supports a 2-symbol DMRS pattern at symbol indices {3,12} (starting counting at 1).
- Proposal 9: In a no-self-contained slot, NR supports a 4-symbol DMRS pattern at symbols indices {3,6,9,12} or {3,6,10,13} (starting counting at 1). Further study is needed for downselection.
- Proposal 10: DMRS sequence should be resource specific, instead of UE specific.

Decision: The document is noted.

R1-1701103 On the DL DMRS structure for NR physical data channels Nokia, Alcatel-Lucent Shanghai Bell
The document was presented by … from Nokia.

- Proposal 1: NR DMRS resources should be placed equally in frequency as it would ensure better estimation of channel correlation in frequency and low-complexity channel estimation filter due to uniformity in frequency domain.
- Proposal 2: Any empty resources on the OFDM symbol containing DMRS could be used for data.
- Proposal 3: The basic design criteria for the higher rank design structure should have the multiple DMRS ports on the same symbol at the beginning or as close as possible in the beginning of data symbol transmission for faster processing.
- Proposal 4: Configuring multiple ports for either single user with multiple ports (SU-MIMO) or multiple user with single/multiple ports (MU-MIMO) should use FDM up to number 4 (number of users * number of DMRS ports) and OCC of length 2 + FDM up to number 8 (number of users * number of DMRS ports).
- Proposal 5: For MU-MIMO beyond 8 ports, additional DM-RS symbol(s) composed of FDM4 + OCC of length 2 should be supported.
- Proposal 6: If significant gains are observed with any of the two following alternatives for DMRS patterns in comparison to basic front-loaded DMRS pattern for practical high-speed scenario, then only they should be configured:
  - Front-loaded DMRS + PTRS
  - Front-loaded DMRS + Additional DMRS with a spacing of 7 OFDM symbol
- Proposal 7: Impact of increasing the bundling size for high-speed scenarios should be analyzed and configurable PRB bundling size can be considered for different scenarios.

Decision: The document is noted.

R1-1701209 WF on DMRS NTT DOCOMO, INC.

- The number of DMRS patterns to be supported should be minimized.
  - FFS: The number of DMRS patterns
- Basic DMRS should be located at the front of data channel.
  - Basic DMRS is mapped over 1 or 2 OFDM symbols
- FDM (including comb), CDM (including OCC and Cyclic shift) should be considered in basic DMRS port multiplexing for up to 8-port.
- For higher Doppler frequency support, the additional DMRS should be supported.
  - Candidate set of additional DMRS is 1, 2, and 3 OFDM symbol(s)

- FFS: Pattern details
- Same pattern proposed in DL DMRS should be introduced in UL DMRS.

Decision: The document is noted. Continue offline discussion until Tuesday –(DOCOMO, Huawei)

Tuesday session

Agreements:

- For the design of front-loaded DMRS, Alt. 1 is agreed as a working assumption.
  - Alt. 1: Front-loaded DMRS is mapped over 1 or 2 adjacent OFDM symbols.
    - FFS: Further down-selection between 1 and 2, if necessary
    - Companies are encouraged to propose further details
  - Companies are encouraged to provide comparison between Alt. 1 and Alt. 2.
    - Alt. 2: Design in R1-1700352 (Front-loaded DMRS is mapped over 3 or 4 adjacent OFDM symbols).
- Additional DMRS can be configured for the later part of the slot.
  - FFS: Density reduction compared to front-loaded DMRS
- DMRS configuration can be up to the max. number of DMRS ports.
- Note: DMRS design should take into account channel estimation accuracy for low-to-high SINR scenario, throughput performance for SU and MU-MIMO, DMRS overhead, receiver complexity, receiver implementation, support of the use cases/features, UL/DL symmetry, etc.
- FFS: Relative timing relationship between front-loaded DMRS and NR-PDSCH
  - Option 1: The first symbol of front-loaded DM-RS is fixed regardless of the first symbol of NR-PDSCH.
  - Option 2: The first symbol of front-loaded DM-RS is no later than the first symbol of NR-PDSCH.

R1-1701294 WF on DL DM-RS Huawei, HiSilicon, IITH, CEWIT, IITM, Tejas Networks, Ericsson, Nokia, NTT DOCOMO, Mitsubishi, Softbank, Fujitsu, Xinwei

The document was presented by Leimin Zhang from Huawei.

- Support maximal 16 DL layers for MU-MIMO transmission
  - FFS until next meeting:
    - Option 1: with 16 orthogonal DMRS ports or
    - Option 2: with non-orthogonal DMRS ports in addition to 8 orthogonal ports

Decision: The document is noted. Continue offline discussion until Tuesday –(NTT DOCOMO, Huawei)

Agreement:

- Study the following options:
  - Option 1: with 16 orthogonal DMRS ports or
  - Option 2: with non-orthogonal DMRS ports in addition to 8 orthogonal ports
  - Other options are not precluded.

Friday session

R1-1701461 Observation of DMRS evaluation Huawei, HiSilicon, MediaTek Inc., Mitsubishi Electric, vivo, CATT, Xinwei, Ericsson, AT&T, CMCC

Conclusion:

- Companies are encouraged to provide additional evaluation results in next meeting.
- Observations are to be drawn based on additional evaluation results with further aligned simulation assumptions
  - FTP traffic model is baseline, full-buffer traffic model is optional
    - Each company is to report assumption of the traffic model

Not treated.

R1-1700067	Design of DL DMRS for data transmission	Huawei, HiSilicon
R1-1700068	Evaluation results of DMRS design for DL data channel	Huawei, HiSilicon
R1-1700071	UL DMRS design for data transmission	Huawei, HiSilicon
R1-1700135	Discussion on downlink DMRS design	ZTE, ZTE Microelectronics
R1-1700136	Discussion on uplink DMRS design	ZTE, ZTE Microelectronics
R1-1700137	Simulation results for downlink DMRS	ZTE, ZTE Microelectronics
R1-1700175	DMRS pattern analysis and evaluation	MediaTek Inc.
R1-1700230	Discussion on DMRS design for DL	CATT
R1-1700231	Discussion on DMRS design for UL	CATT
R1-1700275	Discussion on DMRS configurations	vivo
R1-1700316	Design of DM-RS for NR MIMO	AT&T
R1-1700352	Downlink DM-RS design for NR	Intel Corporation
R1-1700353	Uplink DM-RS design for NR	Intel Corporation

R1-1700437 DMRS density for high speed scenario CMCC
R1-1700481 DL DMRS Design LG Electronics
R1-1700483 UL DMRS Design LG Electronics
R1-1700606 Views on DMRS NTT DOCOMO, INC.
R1-1700715 Considerations on UL DM-RS design for NR InterDigital Communications
R1-1700780 DMRS Design and Evaluation Results Beijing Xinwei Telecom Techn.
R1-1700805 Discussion on UL DMRS design Qualcomm Incorporated
R1-1700844 Pilot Scrambling Sequences for DMRS Port Multiplexing Cohere Technologies
R1-1700874 DMRS designs for NR MIMO Mitsubishi Electric Co.
R1-1700875 Performance evaluations of DMRS designs for NR MIMO Mitsubishi Electric Co.
R1-1700929 PRB bundling and precoding granularity in UL DMRS Samsung
R1-1700930 Precoding granularity of NR DMRS Samsung
R1-1700931 Evaluation results for NR DMRS patterns Samsung
R1-1701104 DL DMRS patterns link performance evaluation Nokia, Alcatel-Lucent Shanghai Bell
R1-1701173 On UL DMRS design Ericsson
R1-1701174 On DL DMRS design Ericsson
R1-1701193 Evaluation results for DM-RS Intel Corporation
R1-1701196 Discussion on DMRS design for high speed scenario ETRI
R1-1701197 Evaluation of DL DMRS design Qualcomm Incorporated
R1-1701200 Evaluation Result of NR DMRS LG Electronics
R1-1701375 WF on DMRS configuration Samsung, CATT

5.1.2.3.3 RS for phase tracking

R1-1701379 WF on PT-RS Huawei, HiSilicon, Ericsson, National Instruments, Nokia, Alcatel-Lucent Shanghai Bell, ETRI, Intel, NTT DOCOMO, Panasonic
Also supported by LG.

Agreements:

- Regarding PT-RS for CP-OFDM, the following is supported
  - For a given UE, the designated PT-RS is confined in scheduled resource as a baseline
    - Whether/how to share DL PT-RS among UEs is FFS
  - Presence of PT-RS in scheduled resource is UE-specifically configured/indicated
  - Multiple PT-RS densities defined in time/frequency domain are supported
  - UE can assume same precoding for a DM-RS port and a PT-RS port
    - Among which ports and mapping rules (fixed and/or configurable, etc) are FFS
  - Number of PT-RS ports can be fewer than number of DM-RS ports in scheduled resource
- Study the following for PT-RS, taking overhead and forward compatibility into account
  - Details on frequency domain patterns/densities
  - How to indicate presence/patterns of PT-RS
    - E.g., implicitly indicated based on association with numerology/MCS/number of allocated PRBs/UE category
    - E.g., explicit indication by L1/L2/L3 signaling
  - Port multiplexing methods
    - E.g., non-orthogonal multiplexing within PT-RS ports and with data
  - Using PT-RS for CFO/Doppler estimation
  - QCL relationship between PT-RS and DM-RS
  - Joint transmission of CSI-RS and PT-RS for improving CSI acquisition accuracy
  - Others are not precluded

Friday session
R1-1701435 WF on PT-RS for DFTsOFDM Mitsubishi Electric, CATT, InterDigital, Intel, Qualcomm
The document was presented by Cristina Ciochina-Duchesne from Mitsubishi.

- Support PT-RS for DFTsOFDM
  - FFS the exact pattern (e.g. pre-DFT insertion, post-DFT insertion)

Discussion: Also supported by Sony.
NTT DOCOMO concern that PT-RS increases the receiver complexity and PAPR
Decision: The document is noted. The following is agreed:

Agreements:

- NR considers frequency offset and PN compensation for DFTsOFDM
  - FFS the exact method (e.g. pre-DFT /post-DFT insertion of PT-RS, blind detection, DM-RS)
  - Consider receiver complexity, PAPR, modulation order to be supported, …

Not treated.
R1-1700073 Further details for PT-RS design Huawei, HiSilicon
R1-1700138 Discussion on RS for phase tracking ZTE, ZTE Microelectronics
R1-1700232 Furhter discussion on Phase tracking for DL CATT
R1-1700233 Further discussion on Phase tracking for UL CATT
R1-1700355 Discussion on RS for Phase Tracking Intel Corporation
R1-1700394 DMRS Based Phase Noise Compensation for NR AT&T
R1-1700438 Phase-tracking reference signal design for high-frequency systems CMCC
R1-1700484 Discussion on Phase Tracking RS for DL LG Electronics
R1-1700485 Discussion on Phase Tracking RS for UL LG Electronics
R1-1700579 Discussion on phase tracking RS design ETRI
R1-1700607 Views on RS for phase tracking NTT DOCOMO, INC.
R1-1700646 On the need of PT-RS for DFTsOFDM Mitsubishi Electric RCE
R1-1700781 Discussion and Evaluation of Phase Tracking RS Design Beijing Xinwei Telecom Techn.
R1-1700808 Phase and frequency tracking reference signal considerations Qualcomm Incorporated
R1-1700854 Study of Time & Frequency Density of UE-Specific & Cell-Specific Phase Noise RS With Different CPE Estimation Techniques National Instruments Corp.
R1-1700857 PT-RS performance evaluation with different time domain densities InterDigital Communications
R1-1700932 Time/Frequency pattern for PTRS Samsung
R1-1701105 On PT-RS Design for NR Nokia, Alcatel-Lucent Shanghai Bell
R1-1701161 On DL and UL phase noise tracking RS (PTRS) Ericsson
R1-1701308 WF on PT-RS CATT

5.1.2.3.4 SRS

R1-1701307 WF on SRS CATT, National Instruments
The document was presented by Rakesh Tamrakar from CATT.

- NR SRS design should support any kind of antenna configuration at UE and should support dynamic port selection either by UE or by gNB
  - E.g., UE with 4 ports can be configured with 2 ports SRS by gNB
  - E.g., UE sends 2 ports SRS even though configured with 4 ports SRS by gNB
- The size of partial-band N is relatively a large value in terms of number of PRBs and consists multiple sub-bands which forms tree like structure.
- Frequency hopping within a partial-band is supported and numerology does not change within a hopping cycle.
- NR supports configuration of multiple numerologies for SRS transmission to an UE however simultaneous transmission with multiple numerologies by an UE is not supported.

Decision: The document is noted, modified as follows:

Agreements:

- NR SRS design should not assume a particular antenna configuration at UE and should support dynamic port/antenna/resource selection by gNB and UE
  - In the case of UE selection, it can be disabled/enabled by gNB (if the UE selection is not transparent). FFS whether or not the selection is transparent
    - E.g., UE with 4 ports can be configured with 2 ports SRS by gNB
    - E.g., UE sends 2 ports SRS even though configured with 4 ports SRS by gNB

R1-1701437 WF on SRS Transmission for NR Samsung, Nokia, ASB, InterDigital, NTT DOCOMO, KDDI, Huawei, HiSilicon, Sony
Decision: The document is noted.

Agreements:

- NR supports periodic and semi-persistent NR-SRS transmission.
  - Note aperiodic SRS transmission has been agreed
- Out of $K \geq 1$ configured NR-SRS resources:
  - For aperiodic transmission, the UE can be configured to transmit a subset of or all K NR-SRS resources with no precoding, the same or different precoding
  - For periodic and semi-persistent transmission, the UE can be configured to transmit K NR-SRS resources with no precoding, the same or different precoding
- FFS details related position & timing of SRS transmission (including configurable)
- NR supports SRS transmission including
  - Number of SRS ports are 1, 2, 4, FFS 3, 8 (possibly other values)
  - Comb levels are 2 and 4
  - Configurable frequency hopping (details FFS)

- Clarify the following agreed configurations are applicable to each NR-SRS resource from K configured NR-SRS resources:
  - NR-SRS bandwidth
  - Number of CP-OFDM/DFT-S-OFDM symbols
  - Number of SRS ports
  - Comb level

R1-1701315 Way Forward on SRS Sequence generation method Intel, ZTE

Agreements:
- To down-select one method for NR SRS sequence generation based on at least the following alternatives:
  - Alt-1: SRS sequence is a function of the sounding bandwidth and does not depend on the sounding bandwidth position or the PRB position.
    - Sequence design and other design details are FFS.
  - Alt-2: SRS sequence is a function of the sounding bandwidth position or the PRB position.
    - Sequence design and other design details are FFS.
  - Taking into account metrics such as PAPR, capacity/flexibility, etc.
  - Other parameters, if any, determining SRS sequence are FFS (e.g. SRS sequence ID)

R1-1700356 Further discussion on SRS for NR Intel Corporation

Not treated.
R1-1700074 UL SRS design for CSI acquisition and beam management Huawei, HiSilicon
R1-1700139 Discussion on SRS design for NR ZTE, ZTE Microelectronics
R1-1700234 Further discussion on SRS transmission CATT
R1-1700285 Discussion on SRS in NR Spreadtrum Communications
R1-1700318 CSI-RS Based Design of SRS for Sounding in NR AT&T
R1-1700486 Considerations on NR SRS design LG Electronics
R1-1700552 SRS design for NR Guangdong OPPO Mobile Telecom.
R1-1700673 Views on SRS design for NR Sony
R1-1700716 On SRS design for NR InterDigital Communications
R1-1700769 SRS Design Ericsson
R1-1700809 Discussion on SRS design Qualcomm Incorporated
R1-1700933 SRS design for NR Samsung
R1-1701106 UL SRS design considerations in NR Nokia, Alcatel-Lucent Shanghai Bell
R1-1701285 WF on NR-SRS Samsung, Nokia, ASB, InterDigital, NTT DOCOMO, KDDI

5.1.2.3.5 QCL

R1-1701284 Way Forward on QCL association between DL and UL antenna ports ZTE, ZTE Microelectronics, ASTRI, CMCC, Ericsson, Huawei, HiSilicon
R1-1701449 Way Forward on QCL on NR Huawei, HiSilicon, ZTE, ZTE Microelectronics
Also supported by AT&T

Thursday session
R1-1701476 WF on QCL assumption for NR Huawei, HiSilicon, ZTE, ZTE Microelectronics, vivo, Sony, AT&T

Agreements:
- Support DMRS ports grouping, and DMRS ports within one group are QCL-ed, and DMRS ports in different groups are non-QCLed.
  - FFS the grouping principle, e.g. grouping DMRS according to CWs, analog beams, etc.
  - FFS the signalling method of QCL indication, e.g., RRC, MAC CE, DCI, etc.
- Study RS for performing estimation of large scale properties of channel (E.g., Doppler shift/Doppler spread/delay spread)
- QCL supports following functionalities
  - Beam management functionality: at least including spatial parameters
  - Frequency/timing offset estimation functionality: at least including Doppler/delay parameters
  - RRM management functionality: at least including average gain
  - Others are not precluded

Not treated.
R1-1700072 Details of QCL assumptions and related RS design considerations Huawei, HiSilicon

R1-1700140 QCL/QCB design for DL MIMO ZTE, ZTE Microelectronics
R1-1700141 QCL/QCB design for UL MIMO ZTE, ZTE Microelectronics
R1-1700235 Further discussion on QCL for DL CATT
R1-1700317 View on QCL Type and Definition for NR-MIMO Framework AT&T
R1-1700357 On cross-carrier QCL Intel Corporation
R1-1700487 Discussion on QCL assumptions for NR LG Electronics
R1-1700771 On spatial QCL definition Ericsson
R1-1700810 Discussion on QCL Qualcomm Incorporated
R1-1700934 On QCL for NR Samsung
R1-1701107 On QCL Framework and Configurations in NR Nokia, Alcatel-Lucent Shanghai Bell

5.1.2.3.6 Other

R1-1701455 Way Forward on RS for time/frequency tracking Qualcomm, Samsung, MediaTek
Proposals:
- For fine time/frequency tracking, consider:
  - The required RE resource/patterns, periodicity, # of ports, bandwidth, and the corresponding configurations, if required
  - Tracking requirements

Continue discussion offline

Thursday session
R1-1701509 WF on RS for time/frequency tracking Samsung, Qualcomm, Ericsson, MediaTek, Intel, Xinwei, KT

Agreements:
- For fine time/frequency tracking, consider
  - The required RE resource/patterns
    - E.g. CSI-RS, RS for mobility (if adopted, may be CSI-RS or other RSs), DM-RS for broadcast/unicast/control (if introduced), PT-RS, a dedicated RS (if required), etc.
      - Other RSs are not precluded
  - The required periodicity and the corresponding configurations
  - Tracking performance

Not treated.
R1-1700276 RS design for beam management vivo
R1-1700416 Symmetric RS design for duplexing flexibility Huawei, HiSilicon
R1-1700811 Discussion on tracking RS and RLM Qualcomm Incorporated
R1-1700852 Introducing port coherency regions Ericsson Inc.

5.1.2.4 Other

Including MIMO calibration issues

Friday session
R1-1701513 WF on uplink power control Nokia, ASB, Huawei, Intel, KDDI, NTT DOCOMO, Samsung, SoftBank

Agreements:
- Pathloss measurement for UL power control to be based on at least one type of DL RS for beam measurement is supported.
  - Notes: beam measurement RS includes CSI-RS, RS defined for mobility purpose, FFS: SS & DMRS
  - FFS: on multiple type of RS
  - FFS: other DL RS
- FFS: Whether beam pair link and/or beam group and/or layer specific power control parameter set(s) includes $\alpha(j)$ and/or P_0.
- Separate power control process can be supported for transmission of different channel/RS (i.e., PUSCH, PUCCH, SRS).
  - Same gNB antenna port can be used for pathloss measurement for multiple process.
  - FFS: Different gNB antenna ports can be used for pathloss measurement for each process
- NR supports power control for UE side multiple panel transmission
  - FFS: specification impact to support multiple panel
- FFS: waveform independent/dependent parameters for power control

R1-1701516 WF on MIMO Calibration NTT DOCOMO, ZTE, ZTE Microelectronics, LG Electronics, Samsung, Xinwei, Spreadtrum, ETRI

Agreements:

- Set-up email discussions to collect phase1~3 results separately – Chuangxin (ZTE)
  - For updating phase-1 results: Until Feb. 6
    - Companies are encouraged to update results (particularly for the micro layer of dense urban scenario)
    - If further clarification of simulation assumptions is needed, it can also be discussed under this email thread
  - For phase-2 results: Until Mar. 31
  - For phase-3 results: Until Apr. 28
- Separate the excel sheet(s) for link level and system level.
- Email discussion moderator to summarize the above results and submit separate tdocs.
- Add in TR 38.802 A.1 link level evaluation assumptions/results for MIMO calibration
  - Summarize evaluation assumptions based on email discussion
  - Capture the reference tdoc # containing the link level evaluation assumption
  - Capture the reference tdoc # containing the excel sheet(s)
- Add in TR 38.802 A.2 system level evaluation assumptions/results for MIMO calibration
  - Summarize evaluation assumptions based on email discussion
  - Capture the reference tdoc # containing the system level evaluation assumption
  - Capture the reference tdoc # containing the excel sheet(s)
- FFS: how to capture the phase-2 and phase-3 results

R1-1701526 NR-MIMO Phase-1 and Phase-2 Calibration Results ZTE, ZTE Microelectronics
Decision: The document is agreed in principle. Subject to further updates from the email discussion.
R1-1701517 Summary of email discussion [87-30] on NR-MIMO calibration ZTE, ZTE Microelectronics
Decision: The document is agreed.

Not treated.

R1-1700063 General discussion of UL power control for NR Huawei, HiSilicon
R1-1700064 Detailed considerations on UL power control design for NR Huawei, HiSilicon
R1-1700085 Discussion on system-level calibration for NR-MIMO Huawei, HiSilicon
R1-1700086 Discussion on link-level calibration for NR-MIMO Huawei, HiSilicon
R1-1700142 Discussion on UL power control for NR ZTE, ZTE Microelectronics
R1-1700144 Further clarification on assumptions for Phase 1 NR MIMO calibration ZTE, ZTE Microelectronics
R1-1700236 NR MIMO calibration results CATT
R1-1700287 NR MIMO calibration results Spreadtrum Communications
R1-1700358 Discussion on UL Power Control Intel Corporation
R1-1700439 Phase 1 calibration results for NR MIMO CMCC
R1-1700488 Phase I SLS calibration results for NR MIMO LG Electronics
R1-1700490 Phase I LLS calibration results for NR MIMO LG Electronics
R1-1700491 Phase II LLS calibration results for NR MIMO LG Electronics
R1-1700492 Discussion on UL power control for NR LG Electronics
R1-1700553 Uplink power control for NR Guangdong OPPO Mobile Telecom.
R1-1700601 Uplink power control considering waveform switching NTT DOCOMO, INC.
R1-1700602 System-level calibration result for NR MIMO NTT DOCOMO, INC.
R1-1700603 Discussion on mobility model for MIMO phase-3 calibration NTT DOCOMO, INC.
R1-1700656 System Level Simulation Result for NR MIMO Calibration – Phase I Fujitsu
R1-1700772 On forming wide beams Ericsson
R1-1700773 NR MIMO Phase 1 SNR system level calibration results for above 6 GHz Ericsson
R1-1700774 NR MIMO Phase 1 SNR system level calibration results for below 6 GHz Ericsson
R1-1700775 Phase 1 NR MIMO LLS Calibration Results Ericsson
R1-1700782 NR MIMO Link Level Phase 2 Calibration Results Beijing Xinwei Telecom Techn.
R1-1700783 NR MIMO System Level Phase 2 Calibration Results Beijing Xinwei Telecom Techn.
R1-1700812 Phase 1 and Phase 2 calibration results for sub6GHz Qualcomm Incorporated
R1-1700848 Initial Calibration Results of NR MIMO CATR
R1-1700850 Simulation results on Phase 1 NR MIMO calibration ZTE, ZTE Microelectronics
R1-1700851 Simulation results on Phase 2 NR MIMO calibration ZTE, ZTE Microelectronics
R1-1700868 UL power control in multi-beam based approaches ASUSTEK COMPUTER (SHANGHAI)
R1-1700935 MIMO Phase-2 LLS calibration results on 4GHz frequency band Samsung
R1-1700936 MIMO Phase-1 SLS calibration results on 30GHz frequency band Samsung
R1-1700937 MIMO Phase-1 LLS calibration results on 30GHz frequency band Samsung

R1-1700938	MIMO Phase-2 SLS calibration results on 30GHz frequency band	Samsung
R1-1700939	MIMO Phase-2 LLS calibration results on 30GHz frequency band	Samsung
R1-1700940	UL power control aspects	Samsung
R1-1701108	Dynamic network coordination for URLLC in the 5G New Radio	Nokia, Alcatel-Lucent Shanghai Bell
R1-1701109	Power control for MIMO	Nokia, Alcatel-Lucent Shanghai Bell
R1-1701219	Phase II SLS calibration results for NR MIMO	LG Electronics

5.1.3 Scheduling/HARQ aspects

Friday

R1-1701533 Action plans for RAN1#88 NTT DOCOMO

The document was presented by Fred Takeda from NTT DOCOMO.

Discussion: NTT DOCOMO clarified that the plans were for information only – any feedback will be welcome.

Decision: The document is noted.

R1-1700011	Mechanisms of bandwidth adaptation	Huawei, HiSilicon

5.1.3.1 Physical downlink control channel

Mainly for eMBB.

R1-1701036 Summary of e-mail discussions on downlink control signaling Ericsson LM

The document was presented by Stefan Parkvall from Ericsson.

PDCCH structure

- Proposal: In one OFDM symbol, multiple PDCCHs cannot be transmitted on the same PRB except for spatial multiplexing to different UEs (MU-MIMO).

DM-RS for downlink control signaling

- Proposal: Focus on a 'hierarchical' structure where the channel estimate obtained for one RE is reusable across multiple blind decodings involving that RE but ensure that PDCCH blocking does not become a too large problem.

Duration of control resource set

- Adopt a semi-static duration of the control resource set, considering the possibility for data to dynamically reuse unused parts of the (OFDM symbols occupied by the) control resource set.
- The data DM-RS location does not vary dynamically from slot to slot.

DCI content

- Proposal: It is too early to fill in all details in the excel sheet, but keep it as a starting point for future discussions.

Two-stage DCI design

- Proposal: Further discussions are needed if a two-stage DCI design should be part of the first NR release in addition to the already agreed inclusion of a single-stage DCI design.

'PCFICH-like' channel

- Adopt a 'common PDCCH' for NR under the assumption that a missed 'common PDCCH' for a UE does not have a detrimental effect on reception of PDCCH/PDSCH for the same UE.
- Continue the discussion on the exact content of the 'common PDCCH'.

Decision: The document is noted.

Possible agreements:

- NR supports at least following functionalities
  - In one OFDM symbol, multiple PDCCHs cannot be transmitted on the same PRB except for spatial multiplexing to different UEs (MU-MIMO)
  - Focus on a 'hierarchical' structure where the channel estimate obtained for one RE is reusable across multiple blind decodings in one search space involving that RE but ensure that PDCCH blocking does not become a too large problem.
  - [Adopt non-dynamic non-per slot duration of the control resource set, considering the possibility for data to dynamically reuse parts of the OFDM symbols occupied by the control resource set.]
  - The front loaded data DM-RS location is fixed relative to the start of slot
  - [Adopt a 'common PDCCH' for NR under the assumption, it does not have a detrimental effect on reception of PDCCH/PDSCH. Common is not necessary to be common per cell]
  - Continue the discussion on the exact content of the 'common PDCCH'.

Continue offline discussion until Tuesday – Stefan (Ericsson)

R1-1700149 Transmission scheme of NR-PDCCH MediaTek Inc.

The document was presented by … from MediaTek.

- Observation 1: The gain of SFBC over random BF decreases significantly with the increase of delay spread.

- Observation 2: The gain of SFBC over random BF decreases significantly when RS overhead is taken into account.
- Observation 3: Random BF scheme has similar/better performance than SFBC scheme when the delay spread and RS overhead are both considered, e.g., RMS delay spread is 300ns in Case#2/3.
- Observation 4: RE mapping of CCE has large impact on the performance of SFBC.
- Proposal: Evaluate SFBC and random beamforming with practical factors taken into consideration, such as delay spread, RS overhead, RE mapping of CCE.

Decision: The document is noted.

R1-1700947 Performance Evaluation of DL Control Channels Samsung

The document was presented by Aris Papasakellariou from Samsung.

- The performance of PDCCH transmission diversity scheme may depend on the code rate, channel environment, DMRS design, channel estimation scheme, etc.
- SFBC is more sensitive than precoder cycling to channel estimation errors in low SNR region.

Decision: The document is noted.

R1-1700260 Issues related to UE/PDCCH-specific DMRS of NR-PDCCH ZTE, ZTE Microelectronics

The document was presented by Zhisong Zuo from ZTE.

- Observation1: The overhead of UE/NR-PDCCH-specific DMRS will be much higher than in LTE (where it is 5.56% for one port when 3 OS are used), if inefficient rules for CCE mapping are applied.
- Observation2: Mechanisms for DMRS overhead reduction should be studied for UE/NR-PDCCH-specific DMRS.
- Observation3: Further reduction of DRMS overhead should be considered when UE/PDCCH-specific DMRS is applied.
- Proposal 1: A PDCCH candidate is composed by a number of CCEs. The CCE is defined in number of PRBs spanning in 1 OFDM symbol.
- Proposal 2: Time-first CCE mapping of NR-PDCCH candidate should be supported. A CCE should not accommodate DMRS if its preceding CCE in same frequency for the same NR-PDCCH candidate contain DMRS.
- Proposal 3: The mapping scheme of the self-contained DMRS should be supported by NR when UE/PDCCH-specific DMRS is used.
- Proposal 4: NR supports dynamic indication of DMRS location in time domain in order to further reduce DMRS overhead.
- Proposal 5: To enable multiple beam operation, NR supports mapping search space in subset of control OFDM symbols of the whole control region of a slot.

Decision: The document is noted.

R1-1700562 Views on DL control channel for NR Guangdong OPPO Mobile Telecom.

The document was presented by Hua Xu from OPPO.

- A PRB with 12 RE in frequency and one symbol in time is the control resource unit size for control channel.
- Consider to include the time domain information as part of resource allocation in DCI for PDSCH and PUSCH scheduling.
- Common channel with information on slot structure and PDCCH symbols could be transmitted on different symbols with different beams

Decision: The document is noted.

R1-1700942 UE-Group Common Control Signaling Samsung

The document was presented by Aris Papasakellariou from Samsung.

- Proposal 1: UE-common control signaling informs of a current slot structure and of subsequent UL-only slots.
- Proposal 2: UE-common control signaling in a slot informs of a number of slot symbols for transmissions of DL control channels in the slot.
- Proposal 3: A network is not mandated to transmit UE-common control signaling in order to schedule UE-specific DL/UL transmissions in a slot.
- Observation 1: NR incurs significant losses in spectral efficiency relative to LTE if the number of symbols for transmissions of DL control channels in a slot is not configured per slot.

Decision: The document is noted.

R1-1700820 UE power evaluation for DRX with wake-up signaling Qualcomm Incorporated

The document was presented by … from Qualcomm.

- Observation 1: Reference signal processing is required for any coherent detection scheme and this is often the long pole for timeline and energy consumption reduction. Substantial energy consumption reduction could be feasible with non-coherent signal detection.
- Proposal 1: Wake-up signalling based on non-coherent signal detection should be considered for DRX for 5G NR. This should be compared against other candidates based on coherent detection including PDCCH and indicator channel in terms of energy saving, performance, and robustness.

- Observation 2: Substantial DoU power saving can be achieved with wake-up signaling, especially for use cases with high power consumption contributed by ON-duration-only DRX cycles.
- Proposal 2: DRX with wake-up signaling should be considered as one of the design options and studied for 5G NR

Decision: The document is noted.

Tuesday session

R1-1701334 Outcome of offline discussion on downlink control signalling Ericsson

The document was presented by Stefan Parkvall from Ericsson.

- In one OFDM symbol, multiple CCEs cannot be transmitted on the same PRB except for spatial multiplexing to different UEs (MU-MIMO)
- A PDCCH candidate consists of a set of CCEs. A CCE consists of a set of REGs. A REG is one RB during one OFDM symbol (minus the REs used for DM-RS).
- For one UE, the channel estimate obtained for one RE should be reusable across multiple blind decodings involving that RE in at least the same control resource set and type of search space (common or UE-specific).
- The DL data DM-RS location in time is not dynamically varying relative to the start of slot

- NR supports a 'group common PDCCH' carrying information of e.g. the slot structure.
  - If the UE does not receive the 'group common PDCCH' the UE should be able to receive at least PDCCH in a slot, at least if the gNB did not transmit the 'group common PDCCH'.
  - The network will inform through RRC signalling the UE whether to decode the 'group common PDCCH' or not
  - Common does not necessarily imply common per cell.
  - Continue the discussion on the detailed content of the 'group common PDCCH' including usage for TDD and FDD.
  - The term 'group common PDCCH' refers to a channel (either a PDCCH or a separately designed channel) that carries information intended for the group of UEs.

Decision: The document is noted, refined as follows:

Agreements

- NR supports at least following functionalities
  - At least for eMBB, in one OFDM symbol, multiple CCEs cannot be transmitted on the same PRB except for spatial multiplexing to different UEs (MU-MIMO)
  - A PDCCH candidate consists of a set of CCEs. A CCE consists of a set of REGs. A REG is one RB during one OFDM symbol.
  - For one UE, the channel estimate obtained for one RE should be reusable across multiple blind decodings involving that RE in at least the same control resource set and type of search space (common or UE-specific).
  - At least for DL data scheduled for a slot, the DL data DMRS location in time is not dynamically varying relative to the start of slot

Agreements:

- NR supports a 'group common PDCCH' carrying information of e.g. the slot structure.
  - If the UE does not receive the 'group common PDCCH' the UE should be able to receive at least PDCCH in a slot, at least if the gNB did not transmit the 'group common PDCCH'.
  - The network will inform through RRC signalling the UE whether to decode the 'group common PDCCH' or not
  - Common does not necessarily imply common per cell.
  - Continue the discussion on the detailed content of the 'group common PDCCH' including usage for TDD and FDD
  - The term 'group common PDCCH' refers to a channel (either a PDCCH or a separately designed channel) that carries information intended for the group of UEs.

R1-1701220 WF for NR DL control CCE ZTE, ZTE Microelectronics, Qualcomm, Huawei, HiSilicon, OPPO

The document was presented by Zhisong Zuo from ZTE.

- Each candidate of NR DL Control channel search space is composed by *K* NR-CCE(s) in unified size
  - A NR-CCE is defined in fixed number of PRBs
    - Each PRB is in 1 OFDM symbol duration
    - Different PRBs can be in different symbols depending on PRB to NR-CCE mapping
    - NR-CCE includes the REs of UE/PDCCH-specific DM-RS to demodulate that NR-CCE
  - FFS: PRB to NR-CCE mapping within a control resource set is frequency first, time first or gNB configurable
  - E.g. *K* can be 1, 2, 4, or 8, etc

Decision: The document is noted, modified and agreed as follows:

Agreements:

- Each candidate of NR DL Control channel search space is composed by *K* NR-CCE(s)

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- A NR-CCE is defined in fixed number of REGs
  - FFS: Different REGs can be in the same or different symbols depending on REG to NR-CCE mapping
  - FFS: NR-CCE includes the REs assumed for UE-specific DMRS to demodulate that NR-CCE
- FFS: REG to NR-CCE mapping within a control resource set is frequency first, time first or gNB configurable
- FFS: Down selection of REG to NR-CCE mapping
- E.g. *K* can be 1, 2, 4, or 8, etc

Continue offline discussion until Wednesday – (ZTE, NTT DOCOMO)

Wednesday session

R1-1701420 WF on Transmission Schemes for DL control channel LG Electronics, NTT DOCOMO, Samsung, Ericsson, Qualcomm, OPPO, MediaTek, Huawei, HiSilicon, CATT, Intel, ZTE, ZTE Microelectronics

Agreements:

- Transmit diversity scheme for DL control channel is supported.
  - FFS; SFBC or precoder-cycling, etc
    - Other schemes are not precluded
  - FFS number of antenna ports (1 or 2)
- A UE assumes fixed number of RS REs per REG for control channel rate matching when the REG contains RS REs
  - FFS; if the fixed number is configurable

R1-1701391 WF on the clarification of control resource set and control search space Qualcomm, Ericsson, LGE, ETRI,CATT, ZTE, VIVO, Intel, NTT DoCoMo, MediaTek, Panasonic, Samsung

Also supported by OPPO, Interdigital

Agreements:

- A control resource set is defined as a set of REGs under a given numerology
- Control search space includes at least the following properties
  - Aggregation level(s)
  - Number of decoding candidates for each aggregation level
  - The set of CCEs for each decoding candidate
- FFS: if any of the following properties belong to control resource set or control search space
  - Transmission/diversity scheme
  - CCE to REG mapping
  - RS structure
  - PRB bundling size
- FFS: if the control resource sets can overlap or not
- FFS: whether the mapping between control resource set and control search space is one-to-one or one-to-many

R1-1701421 WF on Study of wake up signal for NR Qualcomm, CATT, Sony, Ericsson

- Study the benefit and cost to introduce a Wake-up signal along with DRX, with waveform options such as:
  - FFS: details on wake-up signal waveform
  - FFS: The UE behavior after detecting the signal (wake up to receive PDCCH or skip the PDCCH reception)
- Consider low power circuit or passive circuit
- Notes: Example metrics for the evaluation of WUS can be
  - Miss-detection and false alarm probability
  - Power saving with WUS mechanism
- Performance in AWGN and fading channels (e.g., CDL-C, 100/300 ns delay spread with UE speed 3km/h) can be studied

Decision: The document is noted. Continue offline.

Thursday session

R1-1701498 Summary of offline discussion on group common PDCCH Ericsson

Agreements:

- The staring position of downlink data in a slot can be explicitly and dynamically indicated to the UE.
  - FFS: signaled in the UE-specific DCI and/or a ‘group-common PDCCH’
  - FFS: how and with what granularity the unused control resource set(s) can be used for data

Agreements:

- The UE will have the possibility to determine whether some blind decodings can be skipped based on information on a ‘group common PDCCH’ (if present).

- FFS: if the data starting position is signaled on the group common PDCCH, the UE may exploit this information to skip some blind decodings
- FFS: if the end of the control resource set is signaled on the 'group common PDCCH', the UE may exploit this information to skip some blind decodings
- FFS: how to handle the case when there is no 'group common PDCCH' in a slot
- When monitoring for a PDCCH, the UE should be able to process a detected PDCCH irrespective of whether the 'group common PDCCH' is received or not

R1-1701442 WF on the channel estimation for DL control channel LG Electronics, Samsung, Qualcomm, ETRI
Possible agreements:

- For a control channel candidate mapped to multiple OFDM symbols, UE can assume;
  - Channel estimation from the NR-REG (which is included in the candidate) having DMRS is reusable to NR-REGs without DMRS in a PRB (i.e. same frequency location)

Friday session
R1-1701478 WF on 2-Stage DCI for NR Qualcomm, Huawei, HiSilicon, National Instrument, Vivo, ZTE, Sony, MediaTek
Decision: Document is for email discussion until Feb. 7th – (Qualcomm)

R1-1701521 Summary of offline discussion on group common PDCCH – part 2 Ericsson

Agreements:

- 'Slot format related information'
  - Information from which the UE can derive at least which symbols in a slot that are 'DL', 'UL' (for Rel-15), and 'other', respectively
  - FFS: if 'other' can be subdivided into 'blank', 'sidelink', etc
- FFS: 'Control resource set duration'
  - FFS: Indicates the duration of the control resource set(s)
  - FFS: Can help the UE skip some of the semi-statically configured blind decodings. If not received, the UE performs all blind decodings.

Not treated.
R1-1700004 Numerology for DL control channel Huawei, HiSilicon
R1-1700007 DL control channels for CA and DC Huawei, HiSilicon
R1-1700012 Two-stage downlink control structure Huawei, HiSilicon
R1-1700013 Transmission schemes of DL control channel Huawei, HiSilicon
R1-1700014 Design of control resource set Huawei, HiSilicon
R1-1700015 Demodulation RS design for DL control channel Huawei, HiSilicon
R1-1700078 DCI monitoring occasions and blind detections Huawei, HiSilicon
R1-1700150 Design of NR-PDCCH resource allocation and search space MediaTek Inc.
R1-1700153 On Dynamic Switching between Single & Aggregated DCI MediaTek Inc.
R1-1700189 NR DL control channel structure CATT
R1-1700190 Construction and mapping of DCI formats CATT
R1-1700191 Common control signaling for NR CATT
R1-1700194 Indication of NR-PDSCH starting symbol CATT
R1-1700195 DM RS design for DL Control Channel CATT
R1-1700196 Configurable DL control channel monitoring for power saving and blank resource indication in NR CATT
R1-1700197 Wakeup signal for on-demand access for UE power saving in NR system design CATT
R1-1700257 DL control structure ZTE, ZTE Microelectronics
R1-1700258 DL common control ZTE, ZTE Microelectronics
R1-1700259 DL control procedure ZTE, ZTE Microelectronics
R1-1700277 NR-PDCCH Control Resource Set vivo
R1-1700278 Use case for two-step DCI reception vivo
R1-1700279 CCE Link-level performance evaluation for polar code vivo
R1-1700305 On DL control channel design Mitsubishi Electric Co.
R1-1700319 Details on The Design of Two Stage Downlink Control Channel for NR AT&T
R1-1700359 Physical Downlink Control Channel Design for NR Intel Corporation
R1-1700360 On common physical DL control channel Intel Corporation
R1-1700361 On multi-stage physical DL control Intel Corporation
R1-1700362 On the bandwidth adaptation for NR Intel Corporation
R1-1700397 Dynamic resource multiplexing of downlink control and data Huawei, HiSilicon
R1-1700398 Discussion on PCFICH-like control channel Huawei, HiSilicon

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R1-1700419 Discussion on PRB sharing between NR-PDCCH and eMBB data Huawei, HiSilicon
R1-1700440 Discussion on DCI in NR CMCC
R1-1700493 Discussion on control channel design LG Electronics
R1-1700494 Discussion on reference signal for DL control channel LG Electronics
R1-1700495 On DCI contents for NR LG Electronics
R1-1700496 Discussion on NR DCI design LG Electronics
R1-1700497 Further discussion on bandwidth adaptation LG Electronics
R1-1700498 Indication of blank resource LG Electronics
R1-1700499 Discussion on downlink design in multi-beam operation LG Electronics
R1-1700500 Discussion on common signal considering fallback operation LG Electronics
R1-1700501 Discussion on CSS and USS in NR LG Electronics
R1-1700539 PCFICH like signalling Panasonic Corporation
R1-1700540 DL control channel design Panasonic Corporation
R1-1700563 DL control channel design for multi-beam transmission above 6GHz Guangdong OPPO Mobile Telecom.
R1-1700564 RS design consideration for NR PDCCH Guangdong OPPO Mobile Telecom.
R1-1700565 On NR PDCCH search space configuration Guangdong OPPO Mobile Telecom.
R1-1700580 Discussion for slot type indication ETRI
R1-1700581 Discussion on control resource set and DMRS for DL control channel ETRI
R1-1700619 Discussion on the NR-PDCCH design NTT DOCOMO, INC.
R1-1700620 Monitoring of DL control channel for NR NTT DOCOMO, INC.
R1-1700639 Configuration of control resource set and UE bandwidth PANASONIC
R1-1700704 Downlink control channel framework INTERDIGITAL COMMUNICATIONS
R1-1700705 DL control channel common search space INTERDIGITAL COMMUNICATIONS
R1-1700717 On UE-Specific search space design for DL control channel InterDigital Communications
R1-1700732 Resource unit aggregation and control resource set duration for DL control channel in NRSharp
R1-1700733 DL Control Channel and data multiplexing in NR Sharp
R1-1700734 Reference signals for DL Control Channel in NR Sharp, MTI
R1-1700814 L1 broadcast control channel Qualcomm Incorporated
R1-1700815 2-Stage DCI Qualcomm Incorporated
R1-1700816 Common control resource set and UE-specific control resource set Qualcomm Incorporated
R1-1700817 UE power saving for PDCCH monitoring Qualcomm Incorporated
R1-1700818 Methodology for UE DOU analysis Qualcomm Incorporated
R1-1700819 Evaluation of frame structure design for UE power consumption Qualcomm Incorporated
R1-1700821 WF on evaluation for wake-up signal Qualcomm Incorporated
R1-1700860 Numerology indication for a mixed numerology carrier NEC
R1-1700882 Downlink Control Channel for NR Motorola Mobility
R1-1700941 Single Carrier Wide BW Operational Aspects Samsung
R1-1700943 Operation with Reduced Bandwidth for DL Control Channel Monitoring Samsung
R1-1700944 Transmission Schemes for DL Control Channels Samsung
R1-1700945 Bandwidth Adaptation for UE Power Savings Samsung
R1-1700946 Resource mapping aspects for NR-PDCCH Samsung
R1-1701010 On the DL control channel DM-RS design for NR Nokia, Alcatel-Lucent Shanghai Bell
R1-1701011 On the PDCCH search space structure for NR Nokia, Alcatel-Lucent Shanghai Bell
R1-1701012 Dynamic reuse of DL control resources for data in NR Nokia, Alcatel-Lucent Shanghai Bell
R1-1701013 On the usage of PDCCH DMRS as a complementary synchronization signal in DL Nokia, Alcatel-Lucent Shanghai Bell
R1-1701066 Discussion on Blind Decoding for NR-PDCCH WILUS Inc.
R1-1701117 On DL Control Signaling Structure Ericsson
R1-1701118 On Blind Detection of DL Control Channels Ericsson
R1-1701119 On DM-RS for DL Control Channels Ericsson
R1-1701120 On Two-Stage DCI Ericsson
R1-1701121 On PCFICH-like Channels Ericsson

5.1.3.2 *Physical uplink control channel*

Mainly for eMBB.

R1-1700618 Summary of [87-32]: UL L1/L2 control channel design for NR NTT DOCOMO, INC.

The document was presented by Fred Takeda from NTT DOCOMO. Following is proposed:

- For PUCCH in short-duration,
  - At least following is supported for PUCCH in 1-symbol duration:
    - UCI and RS are multiplexed in the given OFDM symbol in FDM manner if RS is multiplexed.
      - Same SCS between DL/UL data and PUCCH in short-duration in the same slot.
  - At least a PUCCH in short-duration spanning 2-symbol duration of a slot is supported.

        - FFS actual structure and waveform.
        - Same SCS between DL/UL data and PUCCH in short-duration in the same slot.
    - At least semi-static configuration for the following is supported.
        - Position of a PUCCH of a given UE within a slot.
            - I.e., short-PUCCHs of different UEs can be TDM'ed within the given duration in a slot.
        - FFS: Support of dynamic indication
    - PUCCH in short-duration can span until the end of a slot.
        - No explicit gap symbol is necessary after the PUCCH in short-duration.
    - For a slot having short UL-part (i.e., DL-centric slot):
        - 'Short UCI' and data can be FDMed by one UE if a data is scheduled on the short UL-part.
    - For a slot having long UL-part (i.e., UL-centric slot or UL-only slot), following are FFS:
        - Whether/how a UL data in the long UL-part can be extended until the end of the slots.
        - Whether/how a UL data can be scheduled on the short-duration.
- For PUCCH in long-duration,
    - Long UL-part of a slot can be used for transmission of PUCCH in long-duration.
        - I.e., PUCCH in long-duration is supported for both UL-only slot and a slot with the number of uplink symbols greater than X (X >= 2).
    - In addition to simultaneous PUCCH-PUSCH transmission, UCI on PUSCH is supported.
    - Intra-TTI frequency-hopping is supported.

Decision: The document is noted.

Agreements:

- ~~For PUCCH in short-duration,~~
    - ~~At least following is supported for PUCCH in 1-symbol duration:~~
        - ~~UCI and RS are multiplexed in the given OFDM symbol in FDM manner if RS is multiplexed.~~
            - ~~Same SCS between DL/UL data and PUCCH in short-duration in the same slot.~~
    - ~~At least a PUCCH in short-duration spanning 2-symbol duration of a slot is supported.~~
        - ~~FFS actual structure and waveform.~~
        - ~~Same SCS between DL/UL data and PUCCH in short-duration in the same slot.~~
    - ~~At least semi-static configuration for the following is supported.~~
        - ~~Position of a PUCCH of a given UE within a slot.~~
            - ~~i.e., short-PUCCHs of different UEs can be TDM'ed within the given duration in a slot.~~
        - ~~FFS: Support of dynamic indication~~
    - ~~PUCCH in short-duration can span until the end of a slot from UE perspective~~
        - ~~No explicit gap symbol is necessary after the PUCCH in short-duration.~~
    - ~~For a slot having short UL-part (i.e., DL-centric slot):~~
        - ~~'Short UCI' and data can be FDMed by one UE if a data is scheduled on the short UL-part.~~
    - ~~For a slot having long UL-part (i.e., UL-centric slot or UL-only slot), following are FFS:~~
        - ~~Whether/how a UL data in the long UL-part can be extended until the end of the slots.~~
        - ~~Whether/how a UL data can be scheduled on the short-duration.~~

Continue offline discussion about PUCCH structure including split symbol and sequence based - (Qualcomm, DOCOMO) and PAPR issue - (Huawei)

Friday: Above agreement is modified as follows:

Agreements:

- For PUCCH in short-duration,
    - At least following is supported for PUCCH in 1-symbol duration:
        - UCI and RS are multiplexed in the given OFDM symbol in FDM manner if RS is multiplexed.
            - Same SCS between DL/UL data and PUCCH in short-duration in the same slot.
    - At least a PUCCH in short-duration spanning 2-symbol duration of a slot is supported.
        - FFS actual structure and waveform.
        - Same SCS between DL/UL data and PUCCH in short-duration in the same slot.
    - At least semi-static configuration for the following is supported.
        - A PUCCH resource of a given UE within a slot.
            - i.e., short-PUCCHs of different UEs can be TDM'ed within the given duration in a slot.
    - The PUCCH resource includes time, frequency and, when applicable, code domains.
        - FFS details e.g., if the time in the PUCCH resource includes both slot and symbol, or only symbol in a slot
    - PUCCH in short-duration can span until the end of a slot from UE perspective
        - No explicit gap symbol is necessary after the PUCCH in short-duration.
    - For a slot having short UL-part (i.e., DL-centric slot):
        - Short UCI' and data can be FDMed by one UE if a data is scheduled on the short UL-part.
    - For a slot having long UL-part (i.e., UL-centric slot or UL-only slot), following are FFS:

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- Whether/how a UL data in the long UL-part can be extended until the end of the slots.
- Whether/how a UL data can be scheduled on the short-duration.

Agreements:

- For PUCCH in long-duration,
  - Long UL-part of a slot can be used for transmission of PUCCH in long-duration.
    - i.e., PUCCH in long-duration is supported for both UL-only slot and a slot with the number of uplink symbols greater than X (X >= 2).
      - FFS exact value of X
  - In addition to simultaneous PUCCH-PUSCH transmission, UCI on PUSCH is supported.
  - Intra-slot frequency-hopping is supported

R1-1700622 UL control channel structure in short duration NTT DOCOMO, INC.

The document was presented by Liu Liu from NTT DOCOMO.

Proposal 1:

- Two structures of short PUCCH for NR should be supported:
  - Format A: One-symbol with normal subcarrier spacing (i.e. f_0=15 KHz for below 6GHz, f_0=[60] KHz for above 6GHz).
  - Format B: Split-symbol with scaled value of normal subcarrier spacing, i.e. $2^n f_0$ (n = [1, 2, 3]) kHz, etc., according to different usage scenarios.
- Discuss whether configurability is necessary for the choice of these 2 formats and the DMRS density.

Proposal 2:

- PUCCH and PUSCH could dynamically share the resource in FDMed and/or TDMed manner by eNB indication or implicit manner.
- The scheduling of PUSCH in the short-duration could be done by mini-slot scheduling.

Proposal 3:

- RAN1 needs to investigate potential impact from transient period onto PUCCH or PUSCH performance.

Observation 1:

- Optimal number of DMRS REs per RB is different depending on coding rate for both Format A and B.
- 4-split and 8-split symbol perform better than one-symbol structures at 4GHz with SCS 15 KHz.

Observation 2:

- NR PUCCH in short duration with PF1-like structure (2-bit UCI payload) could support a cell coverage range from 200~300m at 4GHz and 200~350m at 28GHz.
- NR PUCCH in short duration with PF5-like structure (16-bit UCI payload) could support a cell coverage range from 100~150m at 4GHz and 100~200m at 28GHz.
- Higher number of PRBs does not provide benefit in expanding cell coverage, especially in low payload size.

Observation 3:

- PUCCH having 1-symbol duration with above I~V cases can be used for a small cell of up to less than 70~140m at 4GHz and 70~170m at 28GHz.
- Dynamic TDD using PUCCH in short-duration works well in small cell scenarios

Decision: The document is noted.

R1-1700367 Link level evaluation and comparison of sequence vs. DMRS based structure for short UL control channel Intel Corporation

The document was presented by Joonyoung Cho from Intel.

Observations:

- For short UL control channel carrying 1-bit payload
  - DM-RS based structure with perfect channel estimation offers better performance than sequence based structure.
  - With real channel estimation (MMSE), these two structures may deliver similar link level performance.
  - For larger delay spread, DM-RS based structure (with or without channel estimation error) always outperforms sequence based structure.
- For short UL control channel carrying 2-bit payload
  - DM-RS based structure with perfect channel estimation offers ~1 dB better performance than sequence based structure.
  - With real channel estimation (MMSE), DM-RS based structure may fall short of sequence based structure in detection performance by ~2 dB. This gap, however, may reduce with better channel estimate.
  - For larger delay spread, the relative merit of DM-RS based structure (without channel estimation error) over sequence based structure scales with SNR.

Proposal: For UL control channel with short duration and 1~2 bit payload, DM-RS based structure should be preferred over sequence based structure for NR.
Decision: The document is noted.
Wednesday possible working assumption:

- For UL control channel with short duration and 1~2 bit payload, DM-RS based structure is supported
  - Supported by Intel, Samsung, Nokia, LG (also support sequence based)
  - Objected by Huawei, HiSilicon, MediaTek, Motorola Mobility

R1-1700262 UL control time position ZTE, ZTE Microelectronics
The document was presented by Thorsten Schier from ZTE.

- Observation 1: Not all UEs are required to have self-contained capabilities.
- Observation 2: It cannot bring significant benefits if the UL control is placed at the last symbol(s) of the uplink slot.
- Observation 3: With UC at the end of the UL slot, a DL data transmission that occours in slot n cannot be retransmitted in slot n+2.
- Observation 4: Compared to UC placement at the end of the uplink slot, it can be obtained with more timely HARQ ACK feedback and sufficient retransmission time if the UC is placed in front of the UL data.
- Observation 5: In unlicensed spectrum, UC placed before the uplink data will become more necessary to minimize the number of GAPs to avoid source waste.
- Proposal: NR should also support UC is placed in the starting symbol(s) of uplink transmission part in uplink slot, in addition to being placed in the ending symbol(s) in the slot.

Decision: The document is noted.

Wednesday session
R1-1701418 WF on PUCCH NTT DOCOMO, INC., Mitsubishi, Panasonic, Qualcomm, Huawei, HiSilicon, Ericsson, Intel, OPPO, InterDigital, CATT, MediaTek, Samsung, LG Electronics, Motorola Mobility

Agreements:

- For further discussion of PUCCH in short-duration, UCI payload of 1 - at least a few tens of bits (or SR) is assumed.
- For further discussion of PUCCH in long-duration, UCI payload of 1 - at least a few hundreds of bits (or SR) is assumed.
- For PUCCH in long-duration, DFT-s-OFDM waveform is supported.
- For PUCCH in long-duration, transmit antenna diversity is supported.
  - FFS: PUCCH in short-duration

R1-1701439 WF on resource mapping for one-symbol NR-PUCCH LG Electronics, Panasonic
R1-1701340 WF on long duration NR-PUCCH LG Electronics, Intel, Panasonic

- Inter-slot hopping is supported for multi-slot NR-PUCCH.
  - Intra/inter-slot hopping is configurable by higher layer signaling for multi-slot NR-PUCCH.
- At least following parameters can be configured for long duration NR-PUCCH.
  - For inter/intra-slot hopping,
    - Hopping bandwidth
      - Hopping bandwidth can be configured, e.g., smaller than UE bandwidth.
    - Hopping period (i.e., switching point(s) to perform hopping)
      - Minimum hopping period may need to be defined considering the impact of power transient period, channel estimation, etc.
  - For time-domain resource allocation,
    - Allocated number/location of symbols in a slot (or in each slot for multi-slot NR-PUCCH)
    - FFS: Allocated number/location of slots for multi-slot NR-PUCCH

Decision: The document is noted. Continue offline.

R1-1701434 Outcome of offline discussion on Wednesday NTT DOCOMO

R1-1700822 Channel multiplexing for long PUCCH Qualcomm Incorporated
R1-1701123 Short PUCCH Transmission - Impact on Short PUSCH Ericsson

Thursday session
R1-1701485 WF on short-duration PUCCH LG Electronics, NTT DOCOMO, Qualcomm
Possible agreements:

- For a given UE, at least the position of short PUCCH within the configured symbols for short-duration PUCCH is indicated by L1 signaling

- Short PUCCH format resource that can be dynamically indicated includes at least the the position of short PUCCH within the configured symbols for short-duration PUCCH

Friday session

R1-1701523 WF on PUCCH resource indication for NR LG Electronics, Qualcomm, NTT DOCOMO, Samsung, Ericsson, Panasonic
Also supported by Huawei, HiSilicon

Agreements (updating RAN1 #87 agreements):

- A combination of semi-static configuration and (at least for some types of UCI information) dynamic signaling is used to determine the PUCCH resource both for the 'long and short PUCCH formats'
  - The PUCCH resource includes time, frequency and, when applicable, code domains.
    - FFS details e.g., if the time in the PUCCH resource includes both slot and symbol, or only symbol in a slot

R1-1701542 WF on PUCCH in one symbol short duration low PAPR design IITH, CEWiT, IITM, Tejas Networks, Huawei, Qualcomm, Interdigital
Also supported by INL

Not treated.

R1-1700008	UL control channels for CA and DC	Huawei, HiSilicon
R1-1700016	Short duration UL control channel design	Huawei, HiSilicon
R1-1700017	Long duration UL control channel design	Huawei, HiSilicon
R1-1700018	Resource allocation of UL control channel	Huawei, HiSilicon
R1-1700019	Multiplexing of UL control channel and SRS in NR	Huawei, HiSilicon
R1-1700173	Discussion on UL control channel structures with short duration	MediaTek Inc.
R1-1700174	Discussion on multiplexing of short PUCCH and UL data	MediaTek Inc.
R1-1700198	Long PUCCH structure	CATT
R1-1700199	Short PUCCH structure	CATT
R1-1700200	On waveform configuration for PUCCH	CATT
R1-1700261	UL control structure	ZTE, ZTE Microelectronics
R1-1700263	UL control resource design	ZTE, ZTE Microelectronics
R1-1700363	Short UL control channel early in a slot	Intel Corporation
R1-1700364	UL control channel design with short duration	Intel Corporation
R1-1700365	CM evaluation for short UL control channel	Intel Corporation
R1-1700366	Link level evaluation and comparison of DMRS structures for short UL control channel	Intel Corporation
R1-1700368	UL control channel design with long duration	Intel Corporation
R1-1700369	Resource allocation for NR uplink control channel	Intel Corporation
R1-1700370	Scheduling request design for NR	Intel Corporation
R1-1700399	On UCI transmission over PUCCH and PUSCH	Huawei, HiSilicon
R1-1700441	Discussion on long duration UL control channel design	CMCC
R1-1700502	Overall structure of NR-PUCCH formats	LG Electronics
R1-1700503	Design of one-symbol NR-PUCCH format	LG Electronics
R1-1700504	Design of short duration NR-PUCCH format	LG Electronics
R1-1700505	Design of long duration NR-PUCCH format	LG Electronics
R1-1700506	Multiplexing of UL channels and signals in NR	LG Electronics
R1-1700507	Initial evaluation results on NR-PUCCH structures	LG Electronics
R1-1700543	Discussion on uplink control channel for NR	Panasonic Corporation
R1-1700566	Discussion on uplink control channel in short duration	Guangdong OPPO Mobile Telecom.
R1-1700567	Discussion on uplink control channel in long duration	Guangdong OPPO Mobile Telecom.
R1-1700568	Multiplexing of UCI and UL data	Guangdong OPPO Mobile Telecom.
R1-1700569	Resource indication UL control channel	Guangdong OPPO Mobile Telecom.
R1-1700582	Design considerations for UL control channel	ETRI
R1-1700621	UCI transmission procedure with and without uplink data	NTT DOCOMO, INC.
R1-1700623	UL control channel structure in long duration	NTT DOCOMO, INC.
R1-1700657	Design of efficient CQI reports for high reliability transmission	Fujitsu
R1-1700675	MU-MIMO impact on frame structure for NR	Sony
R1-1700729	UCI reporting on PUCCH and PUSCH	Sharp
R1-1700730	5G NR short PUCCH considerations	Sharp
R1-1700731	5G NR long PUCCH considerations	Sharp
R1-1700823	Channelization of short PUCCH	Qualcomm Incorporated
R1-1700824	Location of short PUCCH	Qualcomm Incorporated

R1-1700825 UL transmit diversity for PUCCH Qualcomm Incorporated
R1-1700864 Considerations on the design of uplink control channel NEC
R1-1700881 Design for short duration uplink control channel Motorola Mobility
R1-1700948 On UCI Multiplexing in PUSCH Samsung
R1-1700949 On UCI Multiplexing with Multi-Layer UL Data Transmissions Samsung
R1-1700950 UCI and data multiplexing for slot aggregation Samsung
R1-1700951 UL Control Channel Design: Long Format Samsung
R1-1700952 UL Control Channel Design: Short Format Samsung
R1-1700953 UCI and Data Multiplexing Samsung
R1-1700954 Scaled Numerology for UL Control Channels Samsung
R1-1700955 Performance Evaluation of UL Control Channels Samsung
R1-1701014 On the design of long PUCCH for NR Nokia, Alcatel-Lucent Shanghai Bell
R1-1701015 On the design of short PUCCH for NR Nokia, Alcatel-Lucent Shanghai Bell
R1-1701016 UCI multiplexing in the presence of UL data Nokia, Alcatel-Lucent Shanghai Bell
R1-1701017 DFT-S-OFDM impacts in the NR UL design Nokia, Alcatel-Lucent Shanghai Bell
R1-1701018 On HARQ feedback determination Nokia, Alcatel-Lucent Shanghai Bell
R1-1701122 Short PUCCH Transmission - Impact on PUSCH Performance Ericsson
R1-1701124 On Long PUCCH Ericsson
R1-1701181 On long PUCCH with simultaneous data transmission Ericsson LM
R1-1701183 On Long PUCCH for Medium to Large Payload Sizes Ericsson LM
R1-1701353 WF on split symbol design for ULSB Qualcomm, NTT DOCOMO
R1-1701382 On short (1-symbol) PUCCH design Ericsson

5.1.3.3 DL/UL data scheduling and HARQ procedure

Mainly for eMBB.

R1-1700625 Data scheduling and HARQ-ACK feedback procedures for NR NTT DOCOMO, INC.

The document was presented by Lihui Wang from NTT DOCOMO.

Proposal 1: A scheduling unit having 7 symbols or more is realized by aggregating one or more of a slot.

- Each slot having 7 symbols contains all DL, all UL, or {one DL part and one UL part}.

Proposal 2:

- For DL data scheduling:
  - Minimum timing between DL assignment and the scheduled DL data is zero for all UEs.
- For UL data scheduling:
  - Minimum timing between a UL grant and the scheduled UL data can be different among UEs.
- For DL HARQ-ACK:
  - Minimum timing between a DL data and its HARQ-ACK feedback can be different among UEs.

Proposal 3: Use a combination of indication by higher layers and dynamic L1 signaling (e.g., DCI) to achieve above flexible timings.

Proposal 4:

- Default timing value(s) is necessary for RRC reconfiguration the timing values or before RRC configuration is obtained and/or for signalling transmitted in common channels.
  - The default timing for DL assignment and the scheduled DL data is zero.
  - The default timing for UL data scheduling and DL HARQ-ACK should be 4 for SCS = 15KHz and 1 slot = 14 symbols.
    - FFS the default value for other SCS and/or other number of symbols per slot.
- Default timing value(s)can be applied with or without timing indication field.

Proposal 5: For UL HARQ-ACK,

- Re-transmission or new data transmission is scheduled by a UL grant.

Proposal 6: For HARQ-ACK bundling/multiplexing,

- Both dynamic and semi-static HARQ-ACK codebook size adaptation is supported with reasonable increases in control signaling overhead and scheduler complexity.
  - FFS: code-block or code-block-group based HARQ-ACK feedback

Decision: The document is noted.

R1-1700696 On the number of HARQ processes Ericsson

The document was presented by Daniel Larsson from Ericsson.

- Determine the number of HARQ processes in NR considering
  - Supported cell sizes
  - Fronthaul delay
  - UE processing time
  - eNB processing time
  - Different numerologies
  - Soft buffer memory strategy in the UE

- Number of HARQ processes stored

Decision: The document is noted.

R1-1700026 Scheduling scheme for slot aggregation Huawei, HiSilicon

The document was presented by David Mazzarese from Huawei.

- Proposal 1: Single DCI can schedule one or multiple slots, where the number of scheduled slots is dynamically indicated.
- Proposal 2: One and multiple TBs can be mapped on multiple slots which are scheduled by single DCI.
- Following options can be considered.
  - Option 1: Single DCI schedules 1 TB and N slots, where the TB is mapped across multiple slots.
  - Option 2: Single DCI schedules N TBs and N slots, where each TB is mapped on one slot.
  - Option 3: Single DCI schedules M TBs and N slots. The details for data mapping can be further studied.

Decision: The document is noted.

R1-1700958 TB/CB handling for eMBB Samsung

The document was presented by … from Samsung.

- Observation 1: Single slot scheduling with CBG-level HARQ-ACK and multi-slot scheduling for multiple TBs with TB-level HARQ-ACK supports efficient partial retransmission for eMBB.
- Observation 2: Single mini-slot scheduling for eMBB is not proper.
- Observation 3: If multiple mini-slots scheduling is supported, both TB-level and CBG-level could be considered to support partial retransmission for eMBB.
- Proposal: Support the flexible configuration of proper TB/CB mechanism, including,
  - Switching between single slot scheduling with CBG-level HARQ-ACK and multi-slot scheduling for multiple TBs with TB-level HARQ-ACK.
  - Configuring variable number of CBGs for CBG-level HARQ-ACK feedback/retransmission.

Decision: The document is noted.

Tuesday session

R1-1701330 Multiple HARQ ACK bits per TB Samsung, NTT DOCOMO, Fraunhofer HHI, Lenovo, Nokia, Alcatel-Lucent Shanghai Bell, MediaTek, ZTE, ZTE Microelectronics

- HARQ-ACK feedback with one bit per TB is supported.
- HARQ-ACK feedback with more than one bit per TB is supported.

Discussion: Also supported by HTC
Decision: The document is noted.

Agreement:

- HARQ-ACK feedback with one bit per TB is supported.

Possible agreement:

- HARQ-ACK feedback with more than one bit per TB is supported.

Agreements (Thursday):

- RAN1 will down select between the following options to utilize HARQ-ACK feedback with more than one bit per TB until the next meeting
  - Option 1: CB-group based re-transmission (Samsung)
  - Option 2: Decoder state information feedback (Nokia)
  - Option 3: CB-level outer erasure code (Qualcomm)
  - Option 4: Any combination of Option 1-3
  - Other options are not precluded
- Note that if RAN1 cannot reach consensus in the next meeting, no support of utilization HARQ-ACK feedback with more than one bit per TB in Rel-15.

Wednesday session

R1-1701354 WF on scheduling and HARQ-ACK feedback timing NTT DOCOMO, INC., Nokia, Alcatel-Lucent Shanghai Bell, Panasonic, LG Electronics, Ericsson, Huawei, HiSilicon

Agreements:

- Timing between DL assignment and corresponding DL data transmission is indicated by a field in the DCI from a set of values
  - The set of values is configured by higher layer
- Timing between UL assignment and corresponding UL data transmission is indicated by a field in the DCI from a set of values

    - The set of values is configured by higher layer
- Timing between DL data reception and corresponding acknowledgement is indicated by a field in the DCI from a set of values
    - The set of values is configured by higher layer
- Timing(s) is (are) defined at least for the case where the timing(s) is (are) unknown to the UE
    - FFS the value for the timing

R1-1701443 WF on HARQ process number Huawei, HiSilicon, Nokia
- The number of HARQ processes is configurable to UE at least in a semi-static way

Discussion: Also supported by CATT.
Decision: The document is noted. Continue offline.

R1-1701440 WF on HARQ timing for NR LG Electronics, NTT DOCOMO, Huawei

Agreements:
- NR UE supports a set of minimum HARQ processing time
    - FFS: set size
- NR supports different minimum HARQ processing time at least for across UEs
    - The HARQ processing time at least includes:
        - Delay between DL data reception timing to the corresponding HARQ-ACK transmission timing
        - Delay between UL grant reception timing to the corresponding UL data transmission timing
    - NR UE is required to indicate its capability of minimum HARQ processing time to gNB
        - FFS how the capability is indicated by UE
            - e.g. reported processing time granularity
            - e.g. dependency of DMRS pattern configuration
    - FFS definition of minimum HARQ processing time

R1-1701444 WF on scheduling for slot and slot aggregation Huawei, HiSilicon
- For slot aggregation, the number of aggregated slots for a given UE can be dynamically indicated in DCI
    - NR supports single DCI schedules one TB mapped across multiple slots
    - FFS: Single DCI schedules one or multiple TBs mapped on one slot.

Decision: The document is noted.
Possible agreement:
- If slot aggregation is configured, the number of aggregated slots for a given UE can be dynamically indicated in DCI
    - NR supports single DCI schedules one TB mapped across multiple slots
    - FFS: Single DCI schedules one or multiple TBs mapped on one slot.

Thursday session
R1-1701491 WF on Resource Allocation Huawei, HiSilicon, OPPO, Nokia, Panasonic, NTT DoCoMo, InterDigital, Fujitsu
For FDM/TDM of numerologies, NR supports partitioning of carrier BW into sub-bands
- Each sub-band is associated with one numerology for a transmission.
- PRBs can be indexed over a sub-band or multiple sub-bands of a given carrier BW
- The sub-band configuration and/or the associated numerology is signaled to UEs (FFS: semi-statically and/or dynamically)
    - FFS sub-band signaling is UE specific and/or cell specific
- Note: sub-band refers to a confined frequency partition, where each partition has a BW less or equal to the carrier BW.

Decision: The document is noted. Continue offline.

Not treated.
R1-1700009 Power control for CA and DC Huawei, HiSilicon
R1-1700020 Discussion on timing relations and signaling of HARQ timing for NR Huawei, HiSilicon
R1-1700028 Dynamic resource allocation of different numerologies Huawei, HiSilicon
R1-1700029 Discussion on resource allocation and indication for data channel Huawei, HiSilicon
R1-1700030 Consideration of PRB misalignment between NR and LTE in the coexistence case Huawei, HiSilicon
R1-1700165 DL/UL data scheduling and HARQ procedure MediaTek Inc.
R1-1700202 NR Scheduling and HARQ operation CATT
R1-1700371 Scheduling and bandwidth configuration in wide channel bandwidth Intel Corporation
R1-1700372 Time Domain Aspects of NR Data Scheduling Intel Corporation
R1-1700373 Frequency Domain Aspects of NR Data Scheduling Intel Corporation

R1-1700400 Number of HARQ processes Huawei, HiSilicon
R1-1700402 Consideration of NR signals and channels mapping around LTE CRS Huawei, HiSilicon
R1-1700508 Discussion on HARQ timing and resource for NR LG Electronics
R1-1700509 Discussion on scheduling in time domain for NR LG Electronics
R1-1700510 Discussion on potential HARQ operation for NR LG Electronics
R1-1700511 Discussion on control signaling for HARQ in NR LG Electronics
R1-1700541 HARQ timing design in Panasonic Corporation
R1-1700544 Discussion on flexible bandwidth operation in NR Panasonic Corporation
R1-1700555 On data scheduling of eMBB and URLLC Lenovo
R1-1700556 Enhanced HARQ feedback for downlink transmission Lenovo
R1-1700570 DL resource allocation and indication for NR Guangdong OPPO Mobile Telecom.
R1-1700588 Enhanced HARQ for NR HTC Corporation
R1-1700624 Processing time and HARQ process number for NR NTT DOCOMO, INC.
R1-1700676 Discussion on DL/UL data scheduling and HARQ procedure Sony
R1-1700695 On timing of uplink hybrid-ARQ acknowledgement Ericsson
R1-1700706 Multi-bit HARQ feedback INTERDIGITAL COMMUNICATIONS
R1-1700707 HARQ feedback for downlink INTERDIGITAL COMMUNICATIONS
R1-1700728 DL HARQ and UL scheduling timing in NR Sharp
R1-1700826 Number of HARQ processes Qualcomm Incorporated
R1-1700869 NR HARQ Procedures in Different UL/DL Slot Length KT Corp.
R1-1700872 On Indicating HARQ timing and PUCCH resource ZTE Corporation, ZTE Microelectronics
R1-1700956 HARQ-ACK feedback for CA with Different Numerologies Samsung
R1-1700957 HARQ-ACK Feedback with Flexible Timing Samsung
R1-1700959 Discussion on partial retransmission for eMBB Samsung
R1-1700960 Evaluation results of partial retransmission for eMBB Samsung
R1-1700961 DCI Formats and Contents for NR Samsung
R1-1700962 Slot aggregation in DL Samsung
R1-1701019 On HARQ/scheduling timing and self-contained operation Nokia, Alcatel-Lucent Shanghai Bell
R1-1701020 Enriched feedback for adaptive HARQ Nokia, Alcatel-Lucent Shanghai Bell
R1-1701021 HARQ operation for large transport block sizes Nokia, Alcatel-Lucent Shanghai Bell
R1-1701022 On the Number of HARQ Processes Nokia, Alcatel-Lucent Shanghai Bell
R1-1701043 Resource allocation for data channel in NR ASUSTEK COMPUTER (SHANGHAI)

5.1.3.4 URLLC specific aspects

Including multiplexing of eMBB/URLLC.

R1-1700972 Summary of e-mail discussion on multiplexing eMBB and URLLC in DL Samsung
The document highlighted the following proposals:

- Support indication of time and/or frequency region of preempted/impacted eMBB resources to respective eMBB UE(s)
  - FFS: Details of granularity of indication for preempted/impacted region
    - Granularity could be symbol (group)/mini-slot (group)/CB (group)/TB.
  - The indication can be during and/or after current eMBB TTI.
- For URLLC, support PRB or multiple PRBs level granularity for frequency-domain scheduling unit as a baseline.

Decision: The document is noted.

Possible agreements:

- Support indication of time and/or frequency region of impacted eMBB resources to respective eMBB UE(s)
  - FFS: Details of granularity of indication for impacted region
    - Granularity could be symbol (group)/mini-slot (group)/CB (group)/TB
  - The indication can be during and/or after current eMBB TTI

Continue offline discussion until Wednesday – Yeohun (Samsung)
Wednesday
R1-1701456 Summary of offline discussion on multiplexing of eMBB and URLLC in DL Samsung, ZTE, Qualcomm, NTT Docomo, Sony, Oppo, Sequans, Sharp
Also supported LG

Agreements:

- For DL, support indication of time and/or frequency region of impacted eMBB resources to respective eMBB UE(s)
  - FFS: Details of the granularity for impacted region used in the indication
    - e.g., PRB (group)/symbol (group)/mini-slot (group)/CB (group)/TB/Slot
  - The indication is transmitted at one of the following (will be down selected later)
    - during current eMBB TTI
    - after current eMBB TTI

        - during and after current eMBB TTI
    - The indication is one of the following (will be down selected later)
        - explicit
        - implicit
        - explicit and implicit

R1-1701318 WF on resource configuration for UL grant-free transmission Huawei, HiSilicon, CATR, CATT, Ericsson, Fujitsu, Spreadtrum

- For an UL transmission scheme without grant
    - at least semi-static resource (re-)configuration is supported
        - The resource includes at least physical resource(s) in time and frequency domain and RS parameters,
        - The resource is configured at least via higher layer signaling, e.g. like in LTE semi-persistent scheduling mechanism
            - FFS additional complementary signaling,
        - FFS MCS
    - RS is transmitted together with data
        - channel structure of grant-based data transmission can be starting point
        - DMRS design as in UL MU-MIMO can be starting point

Decision: The document is noted, modified and agreed as follows:

Agreements:

- For an UL transmission scheme without grant
    - at least semi-static resource (re-)configuration is supported
        - FFS: The resource configuration includes at least physical resource in time and frequency domain and RS parameters
        - Higher-layer signaling could be similar to Rel-8 LTE SPS
        - FFS: MCS
    - RS is transmitted together with data
        - channel structure of grant-based data transmission can be starting point

R1-1701319 WF on consecutive transmission for URLLC Huawei, HiSilicon, Ericsson, NTT Docomo, Spreadtrum, Intel

- For an UL transmission scheme without grant
    - K transmissions (K>=1) for the same transport block with semi-static configured resources are supported,
        - FFS the way K is determined, e.g.,
            - Option 1: the number of transmissions until ACK is received, or
            - Option 2: a pre-configured or fixed number
    - FFS: hopping mechanisms over the transmissions

Decision: The document is noted, modified and agreed as follows:

Agreements:

- For an UL transmission scheme with/without grant
    - K repetitions including initial transmission (with the same or different RV and FFS with different MCS) (K>=1) for the same transport block are supported
        - FFS the way K is determined
        - FFS: hopping mechanisms over the transmissions

R1-1701310 WF on retransmission for UL URLLC ZTE, ZTE Microelectronics, NTT Docomo

- Dynamic switching from grant free transmission to grant based retransmission is supported
    - If UL grant containing UE identification and scheduling information is received, UE switches to grant based re-transmission.
    - Otherwise, UE can continue grant free transmission.
    - FFS details on identifying UE from grant free transmission

Decision: The document is noted. Continue offline discussion until Wednesday – Shupeng (ZTE)

Wednesday

R1-1701459 WF on retransmission for UL URLLC ZTE, ZTE Microelectronics, NTT Docomo, Sony, CATT, Qualcomm, CEWiT, IITH, IITM, Tejas Networks

Also supported by Idaho National Laboratory, Nokia

Possible agreements:

- gNB can schedule grant based transmission after receiving grant free transmission for the same UE

- UL grant overrides any UL grant free transmission in the same slot or mini-slot
- Switching from UL grant free transmission to grant based re-transmission is supported
  - FFS some UE can be configured not to receive UL grant

Continue offline discussion until Thursday – Shupeng (ZTE)

Friday

R1-1701505 WF on retransmission for UL URLLC ZTE, ZTE Microelectronics, NTT Docomo,Huawei, Hisilicon,Intel,CATT , Nokia,ASB, Sony, CEWiT, IITH, IITM, Tejas Networks,Interdigital

R1-1701543 WF on retransmission for UL URLLC ZTE

Wednesday session

R1-1701404 WF on scheduling-based approach for DL dynamic resource sharing between URLLC and eMBB Huawei, HiSilicon, NTT DOCOMO, CATT, CATR, Ericsson, vivo, MediaTek, Panasonic, InterDigital , LGE, Nokia,AT&T, China Unicom, Sequans, OPPO

Agreements:

- DL dynamic resources sharing between eMBB and URLLC is supported without pre-emption by scheduling the eMBB and URLLC services on non-overlapping time/frequency resources.
  - No specific specification work is expected
- The above should be captured into TR 38.802

R1-1701214 WF on URLLC & eMBB with Indication Sony, Sequans, MediaTek

Possible agreements:

- For DL, dynamic resource sharing between URLLC and eMBB, a post-indicator is transmitted to the eMBB UE after the URLLC pre-emption
  - post-indicator indicates the eMBB resources that are pre-empted (punctured/superposed) by URLLC transmission
  - The post-indicator can optionally schedules a retransmission of the portion of eMBB transmissions that is pre-empted by URLLC
  - FFS whether the post-indicator is within the same eMBB TTI or in the next eMBB scheduling interval

R1-1701436 WF on DL transmission for URLLC LG Electronics, Ericsson, Huawei, HiSilicon, Samsung, OPPO

Possible agreements:

- For an DL transmission scheme
  - N repetitions including initial transmission (with the same or different RV and FFS with different MCS) (N>=1) for the same transport block are supported,
    - FFS the way N is determined

R1-1701405 WF on NR-PDCCH design for URLLC Huawei, HiSilicon, CATR, Sony, Samsung, Ericsson, Qualcomm, ZTE, ZTE Microelectronics

Also supported by Nokia, CATT

Agreements:

- To ensure the reliability requirement of NR-PDCCH for URLLC, at least the following aspects should be supported
  - Defining a compact DCI format targeting low BLER operation
  - The highest aggregation level should target a BLER of Y for this compact DCI format
    - FFS Y, Y<1%
    - FFS highest aggregation levels, e.g., 16,32
  - FFS other enhancements

Friday session

R1-1701508 WF on NR-PDCCH Blocking Probability for URLLC InterDigital, NTT DOCOMO, Intel

Agreement: Blocking probability of DL control channel should be taken into account in NR-PDCCH design

R1-1701494 SR-triggered UL transmission for URLLC LG Electronics, Intel, OPPO, Lenovo

Revised in **R1-1701548 SR-triggered UL transmission for URLLC LG Electronics, Intel, OPPO, Lenovo, Ericsson, NTT Docomo, CATT, Nokia, ASB, Qualcomm**

Agreement: Time interval between SR resources configured for a UE can be smaller than a slot

R1-1701524 WF on Scheduling Request for URLLC UL transmissions Idaho National Laboratory, Qualcomm
R1-1700268 Zero-wait-time Scheduling Request Underlay Channel Idaho National Laboratory

Not treated.
R1-1700021 Control channel design for URLLC Huawei, HiSilicon
R1-1700022 On DL multiplexing of URLLC and eMBB transmissions Huawei, HiSilicon
R1-1700023 Discussion on mini-slot for URLLC Huawei, HiSilicon
R1-1700024 Support of URLLC in UL Huawei, HiSilicon
R1-1700025 On UL multiplexing of URLLC and eMBB transmissions Huawei, HiSilicon
R1-1700154 On dynamic multiplexing between eMBB & URLLC for DL MediaTek Inc.
R1-1700176 URLLC and eMBB DL Multiplexing using CRC masking and multi-bit NACK feedback MediaTek Inc.
R1-1700204 NR frame structure for multiplexing of URLLC and eMBB traffic CATT
R1-1700205 URLLC HARQ operation CATT
R1-1700206 UL grant-free transmission for URLLC CATT
R1-1700207 DL control channel monitoring for URLLC based on mini-slot scheduling CATT
R1-1700253 Basic grant-free transmission for URLLC ZTE, ZTE Microelectronics
R1-1700254 Advanced grant-free transmission for URLLC ZTE, ZTE Microelectronics
R1-1700264 About URLLC/eMBB multiplexing ZTE, ZTE Microelectronics
R1-1700265 Analysis of URLLC reliability in DL HARQ ZTE, ZTE Microelectronics
R1-1700281 Discussion on URLLC and eMBB multiplexing vivo
R1-1700374 Downlink multiplexing of eMBB and URLLC transmissions Intel Corporation
R1-1700376 Uplink URLLC transmission based on scheduling request and grant Intel Corporation
R1-1700377 Uplink multiplexing of eMBB and URLLC transmissions Intel Corporation
R1-1700378 URLLC link adaptation aspects Intel Corporation
R1-1700401 Support of URLLC in DL Huawei, HiSilicon
R1-1700442 Discussion on eMBB/URLLC multiplexing CMCC
R1-1700448 Multiplexing of eMBB and URLLC in DL NEC
R1-1700452 Consideration on URLLC HARQ design Beijing Xiaomi Mobile Software
R1-1700454 Discussion on resource configuration for UL URLLC Potevio
R1-1700455 Discussion on URLLC transmission aspects Potevio
R1-1700512 Discussion on multiplexing of eMBB and URLLC LG Electronics
R1-1700513 Discussion on URLLC UL transmission LG Electronics
R1-1700514 Discussion on URLLC HARQ operation and reliability enhancement schemes LG Electronics
R1-1700515 SLS results on coexistence between eMBB and URLLC LG Electronics
R1-1700554 Overview on URLLC design and the coexistance with eMBB Lenovo
R1-1700557 HARQ design for UL grant-free URLLC transmission Lenovo
R1-1700558 UL eMBB transmission multiplexing with UL URLLC Lenovo
R1-1700571 Uplink grant-less transmission for URLLC Guangdong OPPO Mobile Telecom.
R1-1700572 On multiplexing eMBB and URLLC in DL Guangdong OPPO Mobile Telecom.
R1-1700583 Multiplexing eMBB and URLLC UL control channels ETRI
R1-1700586 Discussion on eMBB and URLLC multiplexing in UL III
R1-1700626 On multiplexing of eMBB and URLLC in downlink NTT DOCOMO, INC.
R1-1700627 On UL grant free for URLLC NTT DOCOMO, INC.
R1-1700640 Considerations of grant-free transmission of UL URLLC Sequans Communications
R1-1700642 On dynamic resource sharing between URLLC and eMBB in DL Sequans Communications
R1-1700647 Aggressive early Hybrid ARQ for NR Fraunhofer HHI
R1-1700658 DL Scheduling and UL control information for URLLC Fujitsu
R1-1700659 Preemption based multiplexing eMBB and URLLC Fujitsu
R1-1700660 Discussions on grant-free for UL URLLC Fujitsu
R1-1700677 Considerations on Dynamic Resource Sharing for eMBB/URLLC in DL Sony
R1-1700678 Discussion on Grant-free based transmission Sony
R1-1700681 Feedback for URLLC transmissions Sony
R1-1700684 On URLLC characteristics Ericsson
R1-1700685 On URLLC design principles Ericsson
R1-1700686 On aspects of downlink control for high-reliability communication Ericsson
R1-1700687 On high-level considerations on URLLC design Ericsson
R1-1700688 Discussion on URLLC puncturing of data Ericsson
R1-1700689 Framework for grant-free acess for URLLC Ericsson
R1-1700690 Contention resolution for grant-free access Ericsson
R1-1700691 On Reference Signal Design for Grant-free Access Ericsson
R1-1700692 Synchronization aspects for grant-free access Ericsson
R1-1700693 Resource Configuration for Grant-free Access Ericsson
R1-1700718 Blocking probability of control channel for URLLC InterDigital Communications

R1-1700719 URLLC Scheduling and HARQ considerations InterDigital Communications
R1-1700720 High Reliable Transmission for URLLC by Network Coding InterDigital Communications
R1-1700721 Preemption/superposition-based multiplexing of eMBB and URLLC InterDigital Communications
R1-1700722 Scheduling-based URLLC and eMBB multiplexing InterDigital Communications
R1-1700737 A narrative on potential solutions for eMBB and URLLC multiplexing contextualized by 5G requirements Sharp
R1-1700738 Further results on Outer Codes for eMBB/URLLC coexistence Sharp
R1-1700827 URLLC/eMBB dynamic multiplexing schemes Qualcomm Incorporated
R1-1700828 Simultaneous scheduling request and data transmission for uplink URLLC Qualcomm Incorporated
R1-1700964 DMRS consideration for mutiplexing of eMBB and URLLC Samsung
R1-1700966 Preemption-based multiplexing between eMBB and URLLC for DL Samsung
R1-1700967 URLLC control channel Samsung
R1-1700968 Performance of eMBB receiver with blind detection for preempted eMBB resources Samsung
R1-1700969 Evaluation Results of Superposition for Multiplexing eMBB and URLLC Samsung
R1-1700970 Performance of eMBB with HARQ retransmission for multiplexing eMBB and URLLC Samsung
R1-1700971 Dynamic TDD for Latency Reduction Samsung
R1-1700973 User plane latency for URLLC Samsung
R1-1700974 Dynamic Resource Selection for UL URLLC Channels Samsung
R1-1701007 Discussions on the multiplexing for eMBB and URLLC CATR
R1-1701009 HARQ retransmission in grant-free NOMA HTC Corporation
R1-1701023 Punctured Scheduling for Low Latency Downlink Transmissions Nokia, Alcatel-Lucent Shanghai Bell
R1-1701024 Pause-Resume Scheduling for Low Latency Uplink Transmissions Nokia, Alcatel-Lucent Shanghai Bell
R1-1701025 Overview of UL data transmission schemes for URLLC Nokia, Alcatel-Lucent Shanghai Bell
R1-1701026 Contention-based grant-free transmission for URLLC Nokia, Alcatel-Lucent Shanghai Bell
R1-1701027 Flexible semi-persistent scheduling for UL URLLC Nokia, Alcatel-Lucent Shanghai Bell
R1-1701067 Discussion on Multiplexing between eMBB and URLLC in DL WILUS Inc.
R1-1701139 Discussion on eMBB and URLLC mixing Convida Wireless LLC
R1-1701179 UL Data Channel Transmission for URLLC Samsung Research America
R1-1701206 Uplink URLLC transmission without grant Intel Corporation
R1-1701335 SR-triggered UL transmission LG Electronics, Intel

5.1.3.5 Other

R1-1700266 Implicit DC indication ZTE, ZTE Microelectronics
R1-1700280 RNTI and CRC size for NR vivo
R1-1700428 Enhanced redundancy matching and HARQ transmission process in NR ITRI
R1-1700708 Impact of supporting different numerologies INTERDIGITAL COMMUNICATIONS
R1-1700963 UL Power Control for CA with Different Numerologies Samsung

5.1.4 Mini-slot design

Including mini-slot length(s)

R1-1700617 Summary of [87-36]: Mini-slot designs for NR NTT DOCOMO, INC.

The document was presented by Fred Takeda from NTT DOCOMO.

- Take into account following targets/use-cases to design mini-slots:
  - Support of very low latency including URLLC for certain slot lengths
    - Target slot lengths are at least 1ms, 0.5ms, ~~[0.25ms]~~.
  - Support of finer TDM granularity of scheduling for the same/different UEs within a slot
    - Especially if TRxP uses beam-sweeping (e.g., above 6GHz).
  - NR-LTE co-existence
    - Note that this use case also exists for slot-based scheduling
  - Forward compatibility towards unlicensed spectrum operation
    - FFS until phase II
- Take the following into account for designing slot-level channels/signals/procedures:
  - Possible occurrence of mini-slot/slot transmission(s) occupying resources scheduled for ongoing slot transmission(s) of a given carrier for the same/different UEs
  - At least one of DMRS format/structure/configuration for slot-level data channel is re-used for mini-slot-level data channel
  - At least one of DL control channel format/structure/configuration for slot-level data scheduling is designed to be applicable to mini-slot-level data scheduling
  - At least one of UL control channel format/structure/configuration for slot-level UCI feedback is designed to be applicable to mini-slot-level UCI feedback
- Take the following into account as starting point for designing mini-slot-level channels/signals/procedures:

- Possible occurrence of mini-slot/slot transmission(s) occupying resources scheduled for ongoing slot transmission(s) of a given carrier for the same/different UEs
- DMRS for mini-slot-level data channel is just a re-use of that for slot-level data channel
- DL control channel for mini-slot-level data scheduling is just a re-use of that for slot-level data scheduling
- UL control channel for mini-slot-level UCI feedback is just a re-use of that for slot-level UCI feedback
- Scheduling/HARQ timelines for a mini-slot can be based on scheduling/HARQ timelines for a slot
- Scheduling/HARQ timelines for a mini-slot can be based on scheduling/HARQ timelines shorter than those for a slot. FFS: exact timelines
- FFS: One mini-slot does not contain symbols for different link directions (i.e., DL-only or UL-only)

Decision: The document is noted. Summary is agreed including the above modifications.

R1-1700282 MBMS design in Mini-slot below 6 GHz vivo

The document was presented by Ding Yu from Vivo.

- Proposal 1: MBMS design in Mini-slot level multiplexing with unicast should be introduced at the first stage for NR.
- Proposal 2: At least one subcarrier spacing in numerology family with 15 kHz * 2^n (7.5 kHz or 3.75 kHz) should be supported for NR MBSFN Mini-slot below 6 GHz.

Decision: The document is noted.

R1-1700424 About mini-slot design ZTE, ZTE Microelectronics, Nokia, Ericsson

The document was presented by Thorsten Schier from ZTE.

Proposal 1: RAN1 should strive for a mini-slot design that is agnostic to the sub-carrier spacing (and carrier frequency), and would have maximal commonality with the slot design.

Proposal 2: The specific mini-slot configurations shall be derived from the same generic mini-slot frame-work

- Note: The 1-symbol mini-slot may require specific optimizations.

Proposal 3: Mini-slots should have the following properties

- Mini-slot of length 1 is supported in general (not just for above 6 GHz)
- Mini-slots can have a floating starting position, i.e. can start at any OFDM symbol
  - Mini-slot length and starting position can be defined independently from each other
- A contiguous mini-slot based transmission may cross slot boundaries.
  - Note: This is regardless whether the mini-slot based transmission is built up of one or several aggregated mini-slots.
- Mini-slot based transmissions can be aligned with 1 ms sub-frame boundaries by scheduler implementation.
  - Note: specification does not need to enforce this, just enable this
- At least at 2 and 4 OS mini-slot based transmission is supported
  - FFS if it shall be realized by one 4 OS mini-slot or an aggregation of 2 * 2OS mini-slots
  - Other lengths FFS
- Control monitoring is possible at every symbol
  - Note: This does not apply to all UEs
- For TDD, the mini-slot should be DL-only or UL-only, and not contain UL/DL switching gap, at least for shorter mini-slots lengths

Decision: The document is noted.

R1-1700381 Demodulation reference signals design aspects for URLLC mini-slots Intel Corporation

The document was presented by Alexey Khoryaev from Intel.

- Proposal 1
  - Further study reference signal structures considering the URLLC specific design implications.
  - Consider a wide range of channel conditions and different SINR regimes for evaluation of URLLC reference signals to achieve the very low target BLER requirements.
- Proposal 2
  - URLLC reference signal design should take into account potential interference variation during mini-slot transmission.
  - Consider “each-symbol” or “every two symbol” RS patterns in application to URLLC services.

Decision: The document is noted.

R1-1700628 Mini-slot for latency reduction NTT DOCOMO, INC.

The document was presented by Lihui Wang from NTT DOCOMO.

Proposal 1: Take into account slot-level design/operation for mini-slot design/operation.

- The length, position and alignment of mini-slot operation for latency reduction can be concluded after identifying slot-level designs further.

Proposal 2: Take into account LTE sTTI for the design of mini-slot for latency reduction.

- Control channels and DMRS for a data in a mini-slot should be contained in the given mini-slot to achieve fast decoding/scheduling/HARQ-ACK feedback.
- UE configured with mini-slot for latency reduction is assumed to be configured with slot-level operation.
  - Mini-slot configuration is provided by RRC signalling.
  - No stand-alone operation only by mini-slot is considered.

Decision: The document is noted.

R1-1700829 Mini-slot design for URLLC Qualcomm Incorporated

The document was presented by Jing Jiang from Qualcomm.

- Proposal 1: Mini-slots should be aligned with NCP-symbol boundaries of eMBB data numerology of the slot across different sub-carrier spacings.
- Proposal 2: Mini-slot aggregation should be supported in NR.
- Proposal 3: NR should support mini-slot length for URLLC only of 2 and 4 symbol duration.
- Proposal 4: Mini-slots control interval for URLLC is defined on a configurable grid, every mini-slot.
- Observation 1: 2-symbol and 4-symbol mini-slots with 60kHz SCS and NCP have substantial performance gain compared with 7-symbol mini-slot with 60kHz SCS and NCP.
- Observation 2: A 2-symbol mini-slot with 30kHz and NCP has substantial performance gain compared with 6-symbol mini-slot with 60kHz based on LTE ECP numerology.
- Observation 3: HARQ RTT should be carefully optimized to achieve high reliability with low latency for NR URLLC in addition to latency reduction based on numerology scaling and subframe shortening.

Decision: The document is noted.

R1-1701207 WF on mini-slots ZTE, ZTE Microelectronics, Ericsson, Nokia, Qualcomm, Convida Wireless

The document was presented by Thorsten Schier from ZTE.

Mini-slots shall have the following properties

- Length 1 is supported in general (not just for above 6 GHz)
- Can be configured to have a floating starting position, i.e. can start at any OFDM symbol
  - Mini-slot length and starting position can be defined independently from each other
- Mini-slot occurrence and monitoring interval can be configured on a fixed grid
- A contiguous mini-slot based transmission may cross slot boundaries.
- Mini-slot based transmissions can be aligned with 1 ms sub-frame boundaries by scheduler implementation.
  - Note: specification does not need to enforce this, just enable this
- At least at 2 and 4 OS mini-slot based transmission is supported
  - FFS if it shall be realized by one 4 OS mini-slot or an aggregation of 2 * 2OS mini-slots
  - Other length FFS
- Control monitoring can be configured to be possible at every symbol
  - Note: This does not apply to all UEs
- For TDD, the mini-slot should be DL-only or UL-only, and not contain UL/DL switching gap, at least for shorter mini-slots lengths (for example 2-symbol mini-slot)

Decision: The document is noted. Continue offline discussion until Tuesday evening – (ZTE)

Tuesday session

R1-1701343 Summary of off-line discussion Mini-slots ZTE, ZTE Microlectronics

The document was presented by Thorsten Schier from ZTE.

Discussion: Ericsson → all what RAN1 needs about mini-slots to complete the SI phase is there

Decision: The document is noted.

Thursday session

R1-1701336 WF on coexistence between slot and mini-slot LG Electronics, NTT DOCOMO, Panasonic

- For DL dynamic multiplexing of eMBB & URLLC where URLLC can puncture on-going eMBB transmission,
  - Avoiding URLLC transmission to be overlapped with at least following signals of eMBB transmission should be supported
    - Control channel
    - RS for control
    - RS for data
    - FFS on other signals
  - FFS on how to handle the above issue

Decision: The document is noted.

Not treated.

R1-1700027 Mini-slot usage for eMBB above 6GHz Huawei, HiSilicon

R1-1700208 Mini-slot and slot configuration CATT
R1-1700209 DL control channel design for mini-slot based scheduling CATT
R1-1700321 Mini Slot Design and Operations in NR AT&T
R1-1700322 Scheduling on Mini-Slot in NR AT&T
R1-1700379 Considerations on mini-slot for NR Intel Corporation
R1-1700380 Mini-slot length and start time for URLLC Intel Corporation
R1-1700420 Discussion on the usage of mini-slot in unlicensed band below 6GHz Huawei, HiSilicon
R1-1700516 Discussion on frame structure for Mini-slot LG Electronics
R1-1700517 Discussion on control/data and DM-RS design for Mini-slot LG Electronics
R1-1700573 Discussion on mini-slot for mmWave eMBBGuangdong OPPO Mobile Telecom.
R1-1700629 Mini-slot for analog beam-forming NTT DOCOMO, INC.
R1-1700661 Discussion on reference signal in mini-slot Fujitsu
R1-1700853 Design considerations for mini-slots InterDigital Communications
R1-1700858 Downlink scheduling using slots and mini-slots INTERDIGITAL COMMUNICATIONS
R1-1700861 DCI monitoring configuration for mini-slot NEC
R1-1700862 Time domain resource allocation for mini-slot NEC
R1-1700975 Design Aspects of Mini-slot Structure Samsung
R1-1701051 On the mini-slot scenarios in NR Nokia, Alcatel-Lucent Shanghai Bell
R1-1701052 On the mini-slot design in NR Nokia, Alcatel-Lucent Shanghai Bell
R1-1701140 Control Channel Design with Mini Slot Convida Wireless LLC
R1-1701144 On the number of symbols in a slot and TTI for mini-slot multiplexing Nokia, Alcatel-Lucent Shanghai Bell
R1-1701145 On the benefits of mini-slot for eMBB use cases Nokia, Alcatel-Lucent Shanghai Bell
Decision: The document is noted.

5.1.5 Channel coding

R1-1701384 Chairman's notes of AI 5.1.5 on channel coding Ad-Hoc chair (Nokia)
The document was presented by Matthew Baker from Nokia.
Decision: The document is endorsed, content incorporated below.

5.1.5.1 LDPC code design

Agree details of protomatrix design

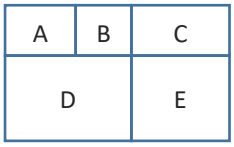
R1-1700092 LDPC design for eMBB data Huawei, HiSilicon
R1-1700094 Performance evaluation of LDPC codes Huawei, HiSilicon
R1-1700237 LDPC codes design for eMBB CATT
R1-1700108 LDPC Code Design Ericsson
R1-1700110 On LDPC Code Parameters for NR Ericsson
R1-1700383 LDPC prototype matrix design Intel Corporation
R1-1700831 LDPC design considerations Qualcomm Incorporated
R1-1701210 High performance LDPC design features MediaTek Inc. (Revision of R1-1700166)
Further revised in R1-1701470
R1-1700976 Discussion on LDPC Code DesignSamsung
R1-1701028 LDPC design for eMBB data Nokia, Alcatel-Lucent Shanghai Bell

Implementation Aspects
R1-1700093 Implementation aspects of LDPC codes Huawei, HiSilicon
R1-1700111 Implementation and Performance of LDPC Decoder Ericsson
R1-1701211 High efficiency LDPC design features MediaTek Inc. (Revision of R1-1700167)
R1-1700245 Consideration on flexibility of LDPC codes for eMBB ZTE, ZTE Microelectronics
R1-1701030 CRC attachment for eMBB data Nokia, Alcatel-Lucent Shanghai Bell

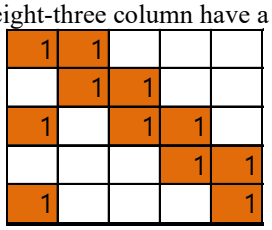
R1-1700109 Investigation of LDPC codes with CRC attachment Ericsson

R1-1701289 WF on Parity Check Matrix Structure Samsung
Also supported by Intel, Ericsson, LG, Qualcomm.

Working Assumption:
- For at least one base graph,
  - the parity check matrix consists of five sub-matrices (A, B, C, D, E)



  - A may contain systematic and parity bits
  - B:
    - B is not necessarily square
    - One of the columns has weight-three
    - The columns of B after the weight-three column have a dual diagonal structure, e.g.:



  - C is a zero matrix
  - E is an identity matrix for the above base graph
- Other structures can be considered for other base graph(s), if any
- Can be revisited if another structure is shown to be superior in performance and complexity

R1-1701454 **WF on LDPC** **Qualcomm**

R1-1701264 **WF on LDPC design for NR** **Samsung**

Agreement:
- Number of base graphs N_{BG} is FFS between 1, 2 and 3, considering the trade-offs
  - If N_{BG} >1,
    - Each base graph covers a different range of block sizes and/or code rates (not necessarily precluding partially overlapping ranges)
    - FFS whether one range can be fully covered by another range

R1-1701466 **WF on LDPC design parameters** **Ericsson, LG** (Revision of R1-1701256)

Agreement:
- The largest info block size supported by LDPC encoder Kmax and the largest shift size Zmax defined for a H matrix are selected from the following set of {Kmax, Zmax} pairs:
  - {8192, 256}, {8192, 512}, {8192, 1024},
  - {FFS near 8192, 320}, {FFS near 8192, 384}
- The exact {Kmax, Zmax} pair to be selected from the above 5 at RAN1#88

Agreement:
- Base graph for supporting K_{max} has minimum code rate $R_{min,kmax}$ = ~1/3
  - '~' means approximately
  - This does not preclude extending the same base graph to code rate lower than ~1/3 when supporting K<K_{max}, provided that the number of variable nodes (after lifting) of any parity check matrix, N_{max}, is not exceeded, where:
    - $N_{max} = K_{max} / R_{min,kmax} + N_{sys,punct}$
    - $N_{sys,punct}$ is the number of built-in punctured systematic bits
- Base graph for any info block sizes K has
  - $R_{min,k}$ >= ~1/5, provided that N_{max} is not exceeded

R1-1701463 **WF on LDPC Design for NR** **Samsung, Nokia, ASB**

Working Assumption:
- For the purpose of H matrix design, minimum Code Block Size (including CRC) in the range 40-100 bits should be considered

Conclusion:

- Evaluations at BLER of a single code block = 1e-2 (for performance comparison between codes) and 1e-4 (for the purpose of comparing the error floor performance of the codes)
  - (Note that this does not preclude other comparison criteria)

Email discussion until RAN1#88 on granularity of information block sizes to be evaluated. - Hongsil Jeong (Samsung)

Email discussion until RAN1#88 on details of other evaluation criteria - Hongsil Jeong (Samsung)

R1-1701230 WF on other criteria for LDPC design comparisonZTE, ZTE Microelectronics, Huawei, HiSilicon, CATT, MediaTek
R1-1701469 WF on LDPC comparisons MediaTek, Huawei HiSilicon, CATT, CATR, ZTE, ITRI

Conclusion:

- At least the following criteria are considered for LDPC design comparison in addition to BLER performance
  - Implementation complexity
  - Latency
    - discuss details in the email discussion.
- Companies are encouraged to provide at least the following for the base matrix for the considered code rates:
  - Zmax
  - Total number of edges
  - Maximum row weight
  - Maximum column weight
- FFS if/how to define and compare numbers of (quasi) layers

R1-1701269 WF on circulant weight for LDPC codes Qualcomm, Intel, Ericsson, LG

Agreement:

- For the QC-LDPC design, the non-zero sub-blocks have circulant weight = 1
  - Circulant weight is the number of superimposed circularly shifted Z×Z identity matrices

R1-1701464 WF on shortening of LDPC codesEricsson, Qualcomm, LG, Intel, Nokia, ASB, Samsung (Revision of R1-1701254)

Agreement:

- Shortening is applied before LDPC encoding when necessary
  - Working assumption: Filler bits F are attached at the end of info block B to form vector U = [B F]
    - Can be verified at RAN1#88
  - Vector U is the input to LDPC encoding
  - The filler bits F are not transmitted

R1-1701465 WF on rate matching of LDPC codes Ericsson, Qualcomm, Intel, LG, Samsung, ZTE, MediaTek, Nokia, ASB, InterDigital (Revision of R1-1701255)

Agreement:

- Built-in puncturing of systematic bits is supported for LDPC coding, that is:
  - At least for the initial transmission, the coded bits are taken after skipping the first $N_{sys,punct}$ systematic bits
- $N_{sys,punct}$ is selected from: 0, Z, and 2*Z
- The rate matching for LDPC code is circular buffer based (same concept as in LTE)
  - The circular buffer is filled with an ordered sequence of systematic bits and parity bits
    - FFS: Order of the bits in the circular buffer
  - For IR-HARQ, each Redundancy Version (RV), RV_i, is assigned a starting bit location S_i on the circular buffer
  - For IR retransmission of RV_i, the coded bits are read out sequentially from the circular buffer, starting with the bit location S_i
  - Limited buffer rate matching (LBRM) is supported

R1-1701467 WF on CRC attachment Ericsson, LG, Nokia, ASB (Revision of R1-1701257)

Agreement:

- Before code block segmentation, $L_{TB,CRC}$ bit TB-level CRC are attached to the end of the transport block

- $L_{TB,CRC}$ <=24 bits
- $L_{TB,CRC}$ value is determined to satisfy probability of misdetection of TB error <=10^{-6}
- Inherent error detection of LDPC codes is taken into account in determining the $L_{TB,CRC}$ value

Not treated.

R1-1700238 Optimization on the first offset row of QC-LDPC codes CATT
R1-1700239 Optimization on adjacent offset rows of QC-LDPC codes CATT
R1-1700240 IR-HARQ scheme for LDPC codes CATT
R1-1700244 Performance evaluation of LDPC code for eMBB ZTE, ZTE Microelectronics
R1-1700246 Complexity, throughput and latency analysis on LDPC codes for eMBB ZTE, ZTE Microelectronics
R1-1700248 Bit rearrangement of LDPC for high order modulation ZTE, ZTE Microelectronics
R1-1700382 Data channel encoding chain Intel Corporation
R1-1700384 LDPC HARQ design Intel Corporation
R1-1700518 LDPC code design for eMBB LG Electronics
R1-1700519 Performance results of LDPC code for eMBB LG Electronics
R1-1700520 Discussion on MET LDPC codes for eMBB data channel LG Electronics
R1-1700521 Discussion on maximum code block size for eMBB LG Electronics
R1-1700644 IR-HARQ scheme support with double QC-LDPC codes of degree-3 National Taiwan University
R1-1700645 Evaluation on double QC-LDPC codes with degree-3 for URLLC National Taiwan University
R1-1700830 LDPC rate compatible design Qualcomm Incorporated
R1-1700977 Discussion on Rate Matching for LDPC Codes Samsung
R1-1701008 Views on protomatrix selection for LDPC CATR
R1-1701029 Code segmentation for eMBB data Nokia, Alcatel-Lucent Shanghai Bell
R1-1701031 Padding for LDPC codes Nokia, Alcatel-Lucent Shanghai Bell
R1-1701256 WF on LDPC Design Parameters Ericsson
R1-1701273 Evaluation of LDPC codes for eMBB data channels NTT DOCOMO, INC.
R1-1701288 WF on LDPC base matrix ZTE, ZTE Microelectronics
R1-1701460 WF on LDPC lift size ZTE, ZTE Microelectronics, Qualcomm
R1-1701470 High performance LDPC design features MediaTek Inc.
R1-1701473 Compact LDPC design for eMBB ZTE, ZTE Microelectronics

5.1.5.2 Control channel coding

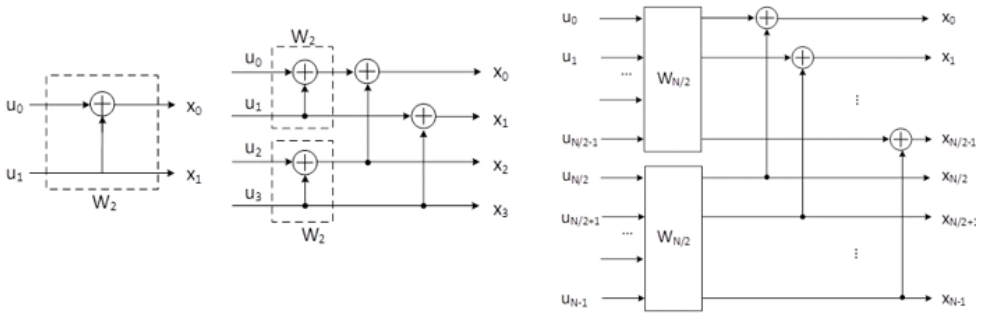
5.1.5.2.1 Polar code design

R1-1700088 Summary of polar code design for control channels Huawei, HiSilicon
R1-1700089 Performance of polar codes for control channels Huawei, HiSilicon
R1-1700979 Discussion on CA-Polar and PC-Polar Codes Samsung
R1-1700523 Discussion on polar code for control channel LG Electronics
R1-1700832 Design of Polar codes for control channel Qualcomm Incorporated
R1-1701186 Comparison of Polar codes for control channel Qualcomm Incorporated (Revision of R1-1700833)
R1-1700385 Considerations in Polar code design Intel Corporation
R1-1700386 Polar code design Intel Corporation
R1-1701212 Polar code design features for control channels MediaTek Inc. (Revision of R1-1700168)
R1-1701032 Polar code design for DL control Nokia, Alcatel-Lucent Shanghai Bell
R1-1700241 Discussion on polar codes for eMBB control channel CATT
R1-1700250 Construction of polar codes for eMBB ZTE, ZTE Microelectronics
R1-1700324 Design of Polar Codes for Control Channel in NR AT&T

R1-1701258 WF on Description of Polar Code for NR Ericsson, AT&T, LG, Intel, Qualcomm, Nokia, ASB, ZTE, Samsung

Agreed Description Method:

- In NR Polar Code discussion, polar codes will be described without bit reversal in the encoder, i.e.:
  - The output of the polar encoder is: $x_0^{N-1} = u_0^{N-1} G_N$
  - G_N is the generator matrix of size N
    - $G_2 = \begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix}$.
    - $G_N = F^{\otimes n}$ for any $N = 2^n, n \geq 1$, where
      - $F = \begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix}$, and $F^{\otimes n}$ is the n-th Kronecker power of matrix F



Note that this does not affect any aspect of the Polar code design.

R1-1701347 WF on Max Code Size for Polar Codes Ericsson, Intel, AT&T, Qualcomm, Samsung, Nokia, ASB, LG

Agreement:

- Maximum mother code size of Polar code, $N=2^n$, is:
  - $256 <= N_{max,DCI} <= 1024$ for downlink control information
  - $1024 <= N_{max,UCI} <= 2048$ for uplink control information
  - Exact values to be revisited with the aim of agreeing at RAN1#88

R1-1701474 WF on evaluation methodology of Polar Code for NR LG, Samsung, Ericsson

Agreement:

- To compare CRC-related aspects of polar code design,
  - The same FAR performance (the same as LTE) should be considered for a fair comparison
  - List size L_{max} 8 is the baseline (evaluations of other values are not precluded)
- Performance metrics (may be based on analytic derivation)
  - BLER
  - FAR (with AWGN as input to the decoder)
- Polar codes for control channels support one of the following alternatives:
  - Alt. 1: CRC + "basic polar" (i.e. as per above agreed description) codes
    - 1a: Longer CRC
      - e.g. ($J + J'$) bits CRC + basic polar
    - 1b: J bit CRC
      - The J bits can be distributed
    - The CRC can be used for both error detection and error correction
  - Alt. 2: J bits CRC + concatenated polar codes
    - e.g. J bits CRC + J' bits CRC + basic polar;
      - J bits CRC + J' bits distributed CRC + basic polar;
      - J bits CRC + PC bits + basic polar; (i.e. PC-Polar)
      - J bits CRC + Hash sequence + basic polar;
      - …
    - J bits CRC is only used for error detection

R1-1701331 WF on Polar Code Design NTT DOCOMO, Ericsson, Qualcomm, Nokia, ASB, Intel

R1-1701468 WF on SCL List Size for Polar Codes Ericsson, Nokia, ASB, LG , Samsung

Not treated.

R1-1700090 On latency, power consumption and implementation complexity for polar codes Huawei, HiSilicon
R1-1700112 Polar Code Design for Control Channel of NR Ericsson
R1-1700113 Practical Issues of Polar Code for NR Ericsson
R1-1700114 Investigation of Segmented Polar Codes Ericsson
R1-1700242 Polar codes design for eMMB control channel CATT
R1-1700249 Rate matching of polar codes for eMBB ZTE, ZTE Microelectronics
R1-1700325 Control Channel FEC for Small Block Size in NR AT&T
R1-1700425 Scalable processing for accelerated DCI blind detection Coherent Logix
R1-1700522 Principles of Polar code design LG Electronics
R1-1700724 Preliminary performance evaluation of polar codes puncturing InterDigital Communications

R1-1700867 Discussion on Polar codes design NTT DOCOMO, INC.
R1-1700978 Discussion on Polar Code Design Samsung
R1-1701033 Polar codes design for UL control Nokia, Alcatel-Lucent Shanghai Bell
R1-1701187 Polar code information bit allocation and nested extension construction Qualcomm Incorporated
R1-1701259 WF on Max Code Size and Rate Matching for Polar Codes Ericsson, Intel, AT&T, Qualcomm, MediaTek, Nokia, ASB, LG, InterDigital, Samsung
R1-1701301 WF on Channel Coding Design Huawei, HiSilicon, CATT, CATR, Coherentlogix, Mediatek, ZTE, ZTE Microelectronics
R1-1701349 WF on information and frozen bit Selection on NR Polar Codes LG Electronics, Samsung, AT&T
R1-1701488 WF on frozen set selection of Polar Codes NTT DOCOMO, InterDigital, MediaTek, Qualcomm, ZTE, ZTE Microelectronics

5.1.5.2.2 Other

R1-1701302 WF on Channel Coding for Very Small Control Information Blocks Huawei, HiSilicon, ZTE, ZTE Microelectronics, Mediatek, CATT, CATR, Coherentlogix

Not treated.
R1-1700091 Channel coding for very small control block lengths Huawei, HiSilicon
R1-1700834 Block codes for very small block length Qualcomm Incorporated
R1-1701034 Coding for Short Blocks in Control Channel Nokia, Alcatel-Lucent Shanghai Bell
R1-1701348 Control channel coding scheme for small block length LG Electronics
R1-1701471 WF on coding scheme for small block length LG Electronics, AT&T, Ericsson, Nokia, ASB

5.1.5.3 Other

Agreement:
- The channel coding working assumptions from RAN1#87 are agreed, with clarification that the mentioned DL control information means DCI (i.e. does not include PBCH, SIBs or PCFICH (if it exists for NR))

Not treated.
R1-1700075 Channel coding for URLLC scenario Huawei, HiSilicon
R1-1700115 Channel Coding Techniques for URLLC Ericsson
R1-1700116 On Channel Coding of PBCH Ericsson
R1-1700169 PBCH enhancement with Polar code MediaTek Inc.
R1-1700243 Performance comparison of LDPC and polar codes for URLLC CATT
R1-1700251 Consideration on outer code for NRZTE, ZTE Microelectronics
R1-1700406 HARQ for polar codes Huawei, HiSilicon
R1-1700725 Performance evaluation of URLLC channel codes InterDigital Communications
R1-1700835 Energy efficiency of channel coding Qualcomm Incorporated
R1-1700837 PBCH channel coding Qualcomm Incorporated
R1-1700980 Discussion on Channel Coding for eMBB Data Channel Samsung
R1-1700981 Discussion on Channel Coding for URLLC Channel Samsung
R1-1700982 Channel Coding for Short-Length Information Samsung
R1-1701035 LDPC design for URLLC codes Nokia, Alcatel-Lucent Shanghai Bell

5.1.6 Modulation

R1-1701482 WF on pi/2 BPSK Modulation with frequency domain shaping IITH, CEWiT, IITM, Tejas Networks, ATT, NTT DoCoMo, KDDI, Qualcomm, Deutsche Telekom, Samsung, INL, Panasonic, MediaTek, Straightpathcommunications, NI, IAESI, Interdigital, Sony, Kyocera, Intel
The document was presented by Kiran Kuchi from IITH.
- NR supports 0.5*pi BPSK modulation for DFT-s-OFDM
  - While using DFT-s-OFDM, 0.5*pi-BPSK modulation using DFT-S-OFDM with frequency domain spectrum shaping can be further considered at least for eMBB uplink data for up to 40GHz
  - FFS
    - The details of frequency domain spectrum shaping
    - This does not preclude the case where no spectrum shaping is needed

Discussion: Also supported by CMCC
Ericsson → RAN4 has already discussed the issue long time ago, worse sending an LS to RAN4 and check whether there are no concern from RAN4 point of view, why could RAN1 agree now something that RAN4 didn't
Nokia: concern under which conditions this proposal can be explored - coverage gain to be confirmed
IITH: Performance simulation results have been provided, both to RAN1 and RAN4.
INL noted that additional results have been submitted – contribution is available (R1-1700845)

Chair would prefer asking RAN4 of the feasibitlty via an LS
Decision: The document is noted.

Agreement: NR supports 0.5*pi BPSK modulation for DFT-s-OFDM

Agreement:

- Prepare draft LS to RAN4 to inform current RAN1 modulation agreement and WA (from RAN1#87), including the following RAN1 assumptions
  - Frequency band
  - Bandwidth allocation
- RAN1 also ask feasibility of it in the draft LS
- Note that additional performance results to address concerns from RAN4 have been submitted in RAN1

R1-1701040 Draft LS to RAN4 on rotated modulations for DFT-S-OFDM uplink Nokia, Alcatel-Lucent Shanghai Bell
Discussion: Nokia No need to present – can be used as basis for further updates
Decision: The document is noted.
R1-1701545 DRAFT LS on pi/2 BPSK with spectrum shaping for DFT-S-OFDM uplink IITH, Nokia
Decision: The document is noted and final LS is approved in R1-1701547.

Friday afternoon
R1-1701522 WF for NR Modulation MediaTek, IITH, CEWiT, IITM, Tejas Networks, NTU, Samsung, AT&T, Xiaomi

- NR Support QPSK based low PAPR modulation for DFT-s-OFDM
  - QPSK based low PAPR modulation includes, but not limited to:
    - For example: Interpolated-QPSK, Rotated-QPSK, Trellis Coded MPSK
  - While using DFT-s-OFDM, QPSK based low PAPR modulation using DFT-s-OFDM with frequency domain spectrum shaping (FDSS) can be further considered at least for eMBB uplink data for up to 40GHz.
  - FFS
    - The details of frequency domain spectrum shaping
    - This does not preclude the case where no spectrum shaping is needed

Decision: The document is noted.

R1-1701534 WF on Enhanced Modulation Schemes Sony, Samsung, InterDigital
The document was presented by Martin Beale from Sony and suggests capturing in TR the enhanced modulation schemes proposed for NR.
Discussion: Nokia unclear what to really capture in the TR.
Decision: The document is noted. Further revised in:
R1-1701549 WF on Enhanced Modulation Schemes Sony, Samsung, InterDigital
Discussion: Nokia still would like to see a concrete TP and agree what goes to the TR.
Decision: The document is noted.

Not treated.
R1-1700076 Signal shaping for QAM constellations Huawei, HiSillicon
R1-1700164 Low PAPR Modulation Design MediaTek Inc.
R1-1700252 Discussion on modulation schemes for NR ZTE, ZTE Microelectronics
R1-1700679 Non-uniform constellations for NR Sony
R1-1700726 Evaluation of Spatial Modulation with Spatial Correlation and Imperfect Channel Estimation InterDigital Communications
R1-1700845 PAPR and ACLR performance for SC-CPS waveforms including pi/2-BPSK Idaho National Laboratory
R1-1700983 Discussion on moduation schemes for high spectral efficiency Samsung
R1-1701039 Rotated modulations for DFT-S-OFDM uplink Nokia, Alcatel-Lucent Shanghai Bell
R1-1701162 Signal Space Diversity Use in NR Sony
R1-1701180 Comparison of pi/2 BPSK with and without frequency domain pulse shaping: Results with PA model TSDSI

5.1.7 Duplex and interference management

Note that PHY layer design on flexible duplex of paired spectrum other than a common PHY layer design between paired and unpaired spectrum is already listed as scope reduction item (see RP-162574)

R1-1701385 Chairman's notes of AI 5.1.7 on duplex and interference management Ad-Hoc chair (Qualcomm)
The document was presented by Wanshi Chen from Qualcomm.

Decision: The document is endorsed, content incorporated below.

R1-1700269 Overview of Duplexing and Cross-link Interference MitigationZTE, ZTE Microelectronics

5.1.7.1 Performance evaluation

R1-1700082 Evaluation of duplexing flexibility in indoor hotspot scenario Huawei, HiSilicon
R1-1700283 Proposal on the slot basis dynamic TDD vivo
R1-1700155 System performance evaluation with dynamic TDD MediaTek Inc.
R1-1700387 Evaluation results of dynamic TDD at 4 GHz Intel Corporation
R1-1700525 Evaluation results of duplexing flexibility in dense urban scenario LG Electronics
R1-1700634 Performance evaluation of dynamic TDD in dense urban scenario NTT DOCOMO, INC.
R1-1700838 Dynamic TDD performance evaluation Qualcomm Incorporated
R1-1700984 Performance evaluation of dynamic TDD Samsung
R1-1701126 Performance of Dynamic TDD in a Dense Urban Environment Ericsson

Conclusion:
- Discuss further offline on how to capture performance evaluation results – Zukang (Huawei). Revisit later this week.
- Companies are encouraged to further update the evaluation results

R1-1701329 WF on flexible duplexing evaluation NTT DOCOMO, Huawei, HiSilicon, ZTE, ZTE Microelectronics, Ericsson, Intel, CATT, LG Electronics, Qualcomm

Conclusion:
- The WF in R1-1701329 is agreed
- Companies are encouraged to perform evaluations under various RU percentage values
  - Note: the RU for a link direction (DL or UL) herein is defined as the amount of occupied resources for the given link direction divided by the total number of resources (irrespective of link directions)
- Companies should also report assumptions regarding backhaul
- In performing evaluations for flexible duplexing operation, companies should take into account additional overhead for the operation.

R1-1700087 Further clarification of channel model implementation for cross link in flexible duplex evaluation Huawei, HiSilicon

Conclusion:
- The proposal of adding a note as in R1-1700087 is agreed

Not treated.
R1-1700083 Evaluation of duplexing flexibility in urban macro scenario Huawei, HiSilicon
R1-1700084 Evaluation of duplexing flexibility in dense urban scenario Huawei, HiSilicon
R1-1700633 Performance evaluation of dynamic TDD in Indoor hotspot scenario NTT DOCOMO, INC.
R1-1701127 Performance of Dynamic TDD in an Indoor Hotspot Environment at 4 GHz Ericsson
R1-1701128 Performance of Dynamic TDD in an Indoor Hotspot Environment at 30 GHz Ericsson

5.1.7.2 Interference management

R1-1700095 On cross-link interference cancellation/suppression for duplexing flexibility Huawei, HiSilicon
R1-1700156 Interference management techniques for dynamic TDD MediaTek Inc.
R1-1700212 Interference management for dynamic TDD and flexible duplex CATT
R1-1700271 Discussion on Measurement and RS design for Cross-link Interference Mitigation ZTE, ZTE Microelectronics
R1-1701202 Desing of Interference Measurement and Feedback in NR AT&T (Revision of R1-1700326)
R1-1700444 Considerations on flexible duplex in NR CMCC
R1-1700527 Discussion on cross-link interference cancellation for duplexing flexibility LG Electronics
R1-1700635 Mechanism of data channel for dynamic TDD NTT DOCOMO, INC.
R1-1700663 Cross-link interference mitigation for duplexing in NR Fujitsu
R1-1700839 Dynamic TDD interference management considerations Qualcomm Incorporated
R1-1700985 Cross-link interference management based on UE measurements Samsung
R1-1701129 Cross-Link Interference Mitigation for Dynamic TDD in Dense Urban Environments Ericsson
R1-1701147 Dynamic TDD Interference Mitigation Concepts in NR Nokia, Alcatel-Lucent Shanghai Bell

R1-1701369 Offline summary on cross-link interference mitigation for duplexing flexibility Huawei, HiSilicon
Conclusion:

- Companies shall provide the following information in RAN1#88 for analyzing interference mitigation schemes for TRP-to-TRP and/or UE-to-UE cross-link interference
  - Gains provided by the considered interference mitigation scheme
  - Potential specification impacts (not limited to RAN1) of the considered interference mitigation scheme

R1-1701215 Way Forward on SRS for duplexing flexibility Huawei, HiSilicon, CATT, DoCoMo, CATR, Deutsche Telekom, LG Electronics
R1-1701370 WF on Study of CLI Measurements AT&T, MediaTek, Ericsson
R1-1701217 WF on inter-TRP signaling for duplexing flexibility LG Electronics, ZTE, ZTE Microelectronics, MediaTek, CATT
R1-1701218 WF on Cross-link Interference Measurement for Duplexing Flexibility LG Electronics, ZTE, ZTE Microelectronics

Not treated.

R1-1700096	On cross-link interference coordination for duplexing flexibility	Huawei, HiSilicon
R1-1700157	Considerations on receiver based techniques for interference management	MediaTek Inc.
R1-1700211	Dynamic TDD slot structure	CATT
R1-1700270	Discussion on dynamic TDD and Cross-link Interference Mitigation Schemes	ZTE, ZTE Microelectronics
R1-1700388	Considerations on reference signal for interference measurement	Intel Corporation
R1-1700443	Discussion on semi-static TDD configurations	CMCC
R1-1700526	Discussion on power control and sensing for duplexing flexibility	LG Electronics
R1-1700542	Discussion on NR duplexing	Panasonic Corporation
R1-1700636	Control channels/signals for dynamic TDD	NTT DOCOMO, INC.
R1-1700662	Implementation framework for duplexing in NR	Fujitsu
R1-1700986	Cross-link interference management based on coordinated beamforming	Samsung
R1-1701130	Cross-Link Interference Mitigation for Dynamic TDD in Indoor Hotspot Environments	Ericsson
R1-1701146	Dynamic TDD Interference Mitigation Concepts in NR	Nokia, Alcatel-Lucent Shanghai Bell
R1-1701213	WF on control signaling for transmission direction change	LG Electronics, ZTE, ZTE Microelectronics

5.1.7.3 Other

R1-1700079	On control signaling for duplexing flexibility	Huawei, HiSilicon
R1-1700080	Discussion on TDD operation on an unpaired spectrum	Huawei, HiSilicon
R1-1700081	On unified design for duplexing flexibility	Huawei, HiSilicon
R1-1700272	Sensing based Schemes for Cross-link Interference Mitigation in NR	ZTE, ZTE Microelectronics
R1-1700528	Cross-link interference management for coexistence between NR and LTE	LG Electronics
R1-1700683	Way Forward on TP for Duplexing Flexibility in TR 38.802 v1.0.0	ZTE, ZTE Microelectronics

5.1.8 Wider bandwidth operations

Including mechanisms to achieve wider bandwidth operation via carrier aggregation and dual-connectivity

R1-1700006 On the maximum carrier bandwidth and multiple carriers operation Huawei, HiSilicon
The document was presented by … from Huawei.

- Observation 1: To support 1 GHz contiguous spectrum, multiple sets of SCH may be required for the single carrier operation; one set of SCH exists in one carrier for the multi-carrier operation.
- Observation 2: RAN1 should assume a single RF chain and PA for one carrier operation. The feasibility of wideband RF chain and PA are needed to be studied in RAN4.
- Observation 3: No extra specification work is needed when CA is used to support 1GHz contiguous spectrum. While for the single wideband carrier operation, extra specification work is required.
- Proposal 1: The largest component carrier bandwidth should be separately defined for different bands, for example,
  - 40MHz for licensed bands below 6 GHz; 80MHz for licensed bands above 6 GHz but below 52.6 GHz;
  - FFS for licensed bands above 52.6 GHz and unlicensed bands.
- Proposal 2: Striving for a common physical layer design between different aggregations of carrier on MAC layer or PDCP layer should be considered in NR.
- Proposal 3: The maximum number of NR carriers for CA and DC should be 32.
- Proposal 4: A carrier without certain channels, e.g. PBCH, control channel, should be considered in NR CA and DC.
- Proposal 5: NR should support aggregating multiple carriers with same and different numerologies.

Discussion: Ericsson→ most of these proposals are RAN4 type of discussion/decision – ack by Spring, CATT as well
Decision: The document is noted.

R1-1700389 Wide bandwidth operation and UE capability Intel Corporation

The document was presented by Joonyoung Cho from Intel.

- Proposal 1: Bandwidth per carrier
  - Minimum bandwidth per component carrier is assumed as 20 MHz in RAN1 NR standardization.
  - Maximum bandwidth per component carrier is assumed as 100 MHz or larger (TBD) in Phase I.
- Proposal 2: UE specific bandwidth/CA configuration
  - Whether for a UE to operate in a single wideband carrier or CA/DC modes is configured in a UE specific manner.
  - UEs in the different modes and different bandwidth per carrier can co-exist within an NR carrier.

Decision: The document is noted.

R1-1700840 Views on wideband NR operation Qualcomm Incorporated

The document was presented by Peter Gaal from Qualcomm.

- Observation 1: In the future, NR is likely to operate on at least 1.6 – 2 GHz aggregated BW, therefore the NR design should be scalable beyond 1 GHz.
- Proposal 1: RAN1 should define either one of the following but exclude allowing both
  - Large maximum TB BW together with small number of maximum simultaneous TBs the UE is required to process (preferred)
  - Small maximum TB BW together with larger number of maximum simultaneous TBs the UE is required to process (not preferred)
- Proposal 2: NR should limit the total number of simultaneous TBs to no more than 8, even in future > 1 GHz aggregated BW cases, and the maximum TB BW should be selected at least 400 MHz, at least for > 6GHz.
- Proposal 3: NR should define a maximum CB BW to be the lesser of the Device RF BW and an appropriately chosen maximum (e.g. 100 MHz).
- Proposal 4: In order to make HW implementation more efficient, NR should define "CB subbands" either by configuration or by specification, and each CB is confined within one CB subband.
- Observation 2: It should be studied what the maximum useful BW of the DFT-S-OFDM waveform is for > 6GHz.
- Proposal 5: For below 6 GHz, the maximum RF Channel BW should be defined as 100 MHz.
- Proposal 6: For above 6 GHz, the maximum RF Channel BW should be defined as at least 100 MHz.
- Proposal 7: Larger than 100 MHz RF Channel BW should be only defined if Device RF BW of 100 MHz will be fully supported in RF Channel BW larger than 100 MHz. Device RF BW of 100 MHz must be a valid UE implementation in any NR deployment.
- Proposal 8: If larger than 100 MHz RF Channel BW is defined for above 6 GHz, consider whether it should be limited to above a certain nominal subcarrier spacing.

Decision: The document is noted.

Possible agreements:

- NR defines followings
  - "RF Channel BW", which is the BW over which waveforms are defined
    - Note that the RF channel BW of a CC may be greater than the implemented Device RF BW of the devices receiving its signal but in general it should not be greater than the implemented Device RF BW of the devices transmitting the signal
  - "CB subbands" either by configuration or by specification, and each CB is confined within one CB subband

Continue offline discussion until Wednesday morning – Peter (Qualcomm)

Possible agreements:

- From RAN1 specification perspective, maximum bandwidth per one NR carrier is [400, 800] MHz in Rel-15
  - RAN1 recommends RAN4 to consider at least 100 MHz maximum RF channel bandwidth per one NR carrier in Rel-15 considering the carrier frequency bands
    - RAN1 asks the feasibility of at least followings
      - For sub-6 GHz, 100 MHz is considered and for above-6 GHz, wider than 100 MHz is considered
      - Other cases can be considered by RAN4, e.g., 40 MHz, 200 MHz
  - Note that RAN1 will specify all details for bandwidth at least up to 100 MHz per one NR carrier in Rel-15
  - Also note that RAN1 will try to achieve one scalable design up to maximum bandwidth
- The maximum number of NR carriers for CA and DC is 8 in Rel-15
- Configurable UE bandwidth that can be equal or narrower than channel bandwidth is defined
  - FFS: Details on configurable UE bandwidth
- FFT size is not larger than [8192, 4096]

Agreements

- From RAN1 specification perspective, maximum channel bandwidth per NR carrier is [400, 800, 1000] MHz in Rel-15

    - RAN1 recommends RAN4 to consider at least 100 MHz maximum channel bandwidth per NR carrier in Rel-15 considering carrier frequency bands
        - RAN1 asks the feasibility of at least followings
            - For sub-6 GHz, 100 MHz is considered and for above-6 GHz, wider than 100 MHz is considered
            - Other cases can be considered by RAN4, e.g., 40 MHz, 200 MHz
    - Note that RAN1 will specify all details for channel bandwidth at least up to 100 MHz per NR carrier in Rel-15
    - Also note that RAN1 will consider scalable design(s) for up to maximum channel bandwidth per NR carrier
- From RAN1 specification perspective, the maximum number of NR carriers for CA and DC is [8, 16, 32]
- The maximum FFT size is not larger than [8192, 4096, 2048]
- Prepare draft LS to RAN4 within today including the above agreements and past UE supporting bandwidth related agreement from the last RAN1 meeting.

Continue offline discussions about above square brackets until Wednesday morning – Kazuaki (DOCOMO)
Thursday: no changes – values in square brackets stay as they are

R1-1701222 [Draft] LS on wider bandwidth operation for NR NTT DOCOMO
Decision: The document is noted and final LS is approved in R1-1701223.

Thursday session
R1-1701360 Way forward on Limiting Wideband Options Qualcomm Incorporated
The document was presented by Peter Gaal from Qualcomm.
- If it is decided that one of [400, 800, 1000]MHz CC BW is supported in >6GHz
    - The maximum number of CCs in any aggregation is 8
- If it is decided that the maximum BW over which a TB can be mapped is <=100MHz
    - The maximum number of CCs in any aggregation could be either 16 or 32
    - (The intent of the proposal is to avoid enabling both 16x100MHz and 4x400MHz in the specification, for example)
- Note: The subject of the proposal is not avoiding 32 x 800MHz, for example, since this is assumed obvious

Discussion: Fujitsu/NTT DOCOMO: ok with the intention, maybe premature deciding on such detailed proposal – involve RAN4 in the decision.
Samsung supports the proposal assuming maximum number of CCs is left FFS – same view for MediaTek
Ericsson would like to wait feedback from RAN4
Qualcomm: ok that the figures are questionable, ok to have them in brackets but proposed WF is agreeable whatever RAN4 decides
Decision: The document is noted.

Agreements:
- If it is decided that maximum CC BW is greater than or equal to 400 MHz and smaller than or equal to 1000MHz
    - The maximum number of CCs in any aggregation is [either 8 or 16]
- If it is decided that the maximum CC BW is <=100MHz
    - The maximum number of CCs in any aggregation could be [either 16 or 32]
- If it is decided that the maximum CC BW is greater than 100 MHz and smaller than 400MHz
    - The maximum number of CCs is FFS

R1-1701359 Way forward on Code Block subbands Qualcomm Incorporated
The document was presented by Peter Gaal from Qualcomm.
- If RF channel BW larger than 100MHz is defined
    - In order to make HW implementation more efficient, NR should define “CB subbands” either by configuration or by specification
        - The gNB and UE must have the same assumption on the subband boundaries in order to perform the same codeblock to RE mapping
    - Each CB is confined within one CB subband

Decision: The document is noted.

Friday
R1-1701528 Way forward on Wideband Carrier Support Qualcomm Incorporated
The document was presented by Peter Gaal from Qualcomm.
- At least for the case where the maximum CC BW is greater than 100 MHz, a UE operating in a wideband carrier with using multiple Rx / Tx chains (Case 3 in Figure) should be supported
- Determine whether the discontinuities due to the UE Rx / Tx chain arrangement need any handling in the eNB requiring physical layer support

Discussion: Qualcomm – no need to agree now, but would be great that companies look at it for the next meeting.
Decision: The document is noted.

Not treated.

R1-1700158	UE-specific RF bandwidth adaptation for single component carrier	MediaTek Inc.
R1-1700213	NR wider bandwidth operation up to 1GHz	CATT
R1-1700449	Number of component carriers in NR	NEC
R1-1700529	Discussion on wider bandwidth including CA/DC	LG Electronics
R1-1700637	Views on wider bandwidth operations for NR	NTT DOCOMO, INC.
R1-1700643	On support of joint UCI feedback in NR CA	Sequans Communications
R1-1700697	On wider bandwidth operations	Ericsson
R1-1700709	Bandwidth adaptation in NR	INTERDIGITAL COMMUNICATIONS
R1-1700987	Wider Bandwidth Operation: CA/DC vs. Single Carrier	Samsung
R1-1701148	Solutions for wider bandwidth options	Nokia, Alcatel-Lucent Shanghai Bell

5.1.9 NR-LTE co-existence

R1-1701540 Chairman's notes of AI 5.1.9 on NR-LTE coexistence Ad-Hoc chair (Qualcomm) (R1-1701386)
The document was presented by Wanshi Chen from Qualcomm.
Decision: The document is endorsed, content incorporated below.

R1-1700031	**Coexistence of NR DL and LTE**	**Huawei, HiSillicon**
R1-1700214	**Adjacent channel co-existence of NR and LTE in unpaired spectrum**	**CATT**
R1-1700327	**Further Details and Techniques on LTE and NR Co-Existence**	**AT&T**
R1-1700390	**Further Considerations on NR/LTE Coexistence**	**Intel Corporation**
R1-1700530	**Discussion on NR-LTE coexistence for DL transmission**	**LG Electronics**
R1-1700631	**LTE-NR co-existence for uplink**	**NTT DOCOMO, INC.**
R1-1700682	**Considerations on initial LTE-NR coexistence**	**Sony**
R1-1700841	**NR-LTE coexistence**	**Qualcomm Incorporated**
R1-1700989	**LTE-NR Coexistence for UL**	**Samsung**
R1-1701055	**On LTE and NR coexistence in the same frequency**	**Nokia, Alcatel-Lucent Shanghai Bell**
R1-1701131	**On Coexistence Between LTE and NR**	**Ericsson**
R1-1701198	**Uplink operation for LTE+NR Dual Connectivity**	**VODAFONE Group Plc** (Revision of R1-1701177)

R1-1701361 WF on LTE-NR Coexistence Scenarios with UL Sharing Huawei, HiSilicon, Vodafone, China Unicom, China Telecom, CATR, Orange

Agreements:

- LTE-NR co-existence should support the following UL sharing scenarios:
  - Collocated LTE and NR base stations with network operating UL on frequency F1 where LTE UL and NR UL share UL subframes of LTE
    - Detailed sharing on the UL is FFS
      - Note: this is not intended to have impact on legacy LTE UEs
    - LTE DL on a paired frequency F3
    - NR DL transmission on frequency F2 (different than LTE DL frequency)
    - NR UE operates in either of the following cases based on a common NR design:
      - Standalone NR: UE accesses standalone NR carrier on F2. The UE may not be connected to an LTE carrier (some UE may not even support LTE).
        - FFS whether NR UL frequency F1 is signaled in NR broadcast system information or derived from MIB/PBCH, or implicitly from NR DL frequency F2
      - Dual connectivity of LTE and NR: UE accesses LTE PCell (with LTE UL on F1), then is configured by dual connectivity to also operate NR on F1 (UL) and F2 (DL).
        - NR DL and UL frequencies (and/or NR band number) are signaled by RRC
  - Non-collocated LTE and NR base stations is FFS

R1-1701362 WF on LTE-NR FDM Coexistence Scenarios Huawei, HiSilicon, Vodafone, China Unicom, Telefonica, Orange
Proposals:

- LTE-NR co-existence should study how to support adjacent LTE and NR carriers when the NR carrier bandwidth is smaller than the NR PSS/SSS bandwidth

  - In particular, NR design should support a SCell bandwidth smaller than the NR PSS/SSS bandwidth without transmission of NR SS/PBCH where LTE carrier is adjacent
    - When LTE and NR base stations are collocated, a NR UE obtains downlink synchronization from the LTE carrier in the case where UE is operating with LTE/NR dual connectivity
      - Ask RAN4 to confirm the feasibility
    - FFS support of this scenario without LTE/NR dual connectivity

R1-1701363 WF on LTE-NR DL TDM Coexistence Huawei, HiSilicon, China Unicom, AT&T, CATR, Orange

Conclusion:
- NR should study the case of having DL transmissions in MBSFN and non-MBSFN subframes of LTE
  - Including details on transmissions of NR slots/mini-slots, resource reservations, potential unified mechanisms for forward compatibility, handling LTE control region/CRS symbols, RSSI/CSI measurements, sync requirements, etc.

R1-1701389 WF on coexistence between NR and LTE LG Electronics, Intel

Agreements:
- NR supports the case when an NR UE is not expected to understand or detect LTE signals/channels in the frequency band shared by NR and LTE.
  - Detailed conditions are FFS
- Initial access procedure design for NR should be used as a baseline for the case of NR-LTE coexisting
  - FFS whether or not additional impact

R1-1701392 WF on LTE-NR coexistence Samsung, KDDI
R1-1701390 WF on NR-LTE co-existence CMCC, Softbank, CATT, Nokia, ASB

Friday
R1-1701512 WF on LTE-NR Coexistence in UL Samsung, KDDI, AT&T, DT, Softbank, Verizon, Nokia, ASB, Ericsson, LGE (R1-1701392)
Also supported by Intel

Conclusion:
- For LTE-NR coexistence in UL, at least for collocated LTE and NR base stations, study further resource allocation aspects for NR-PUSCH to facilitate handling FDM'ed NR and LTE transmissions

R1-1701423 WF on NR-LTE co-existence CMCC, Softbank, CATT, Nokia, ASB (R1-1701390)

Agreements:
- NR supports efficient adjacent channel co-existence with LTE-TDD using UL-DL configurations 0,1,2,3,4,5 in unpaired spectrum
  - FFS detailed mechanism
- NR supports efficient adjacent channel co-existence with LTE-TDD using all the special subframe configurations in unpaired spectrum
- Notes:
  - The above bullets does not necessarily imply that two or more frame structures are to be defined for NR
  - The wording "efficient" in the above two bullets does not imply exact alignment of configurations
  - RAN1 has agreed the following
    - Design at least one semi-statically assigned DL/UL transmission direction configuration for NR that avoids DL/UL interference with at least one LTE TDD DL/UL configuration and special subframe configuration

R1-1701527 WF on LTE-NR DL TDM Coexistence Mechanisms Huawei, HiSilicon, AT&T, LG Electronics

Agreements:
- Supporting NR DL in MBSFN subframes of LTE
  - FFS details

Not treated.

R1-1700032 Considerations of NR UL operation on the uplink band of LTE Huawei, HiSillicon
R1-1700531 Discussion on NR-LTE coexistence for UL transmission LG Electronics
R1-1700630 LTE-NR co-existence for downlink NTT DOCOMO, INC.
R1-1700988 LTE-NR Coexistence for DL Samsung

5.1.10 Channel model

R1-1701387 Chairman's notes of AI 5.1.10 on channel model Ad-Hoc chair (Nokia)
The document was presented by Matthew Baker from Nokia.
Decision: The document is endorsed, content incorporated below.

5.1.10.1 Consistent channel modelling for < 6 GHz and > 6 GHz

R1-1700418 Discussion on multi-band channel model Huawei, HiSilicon

R1-1700445 New measurements on RMA 3D model CMCC
R1-1700417 Discussion on Rural channel model for below 6GHz Huawei, HiSilicon
R1-1700421 Draft CR to TR36.873 on rural channel model Huawei, HiSilicon

R1-1700446 3d extension for InH Scenario CMCC
R1-1700447 LoS Probability for InH Scenario CMCC

R1-1701170 On channel model harmonization Ericsson
R1-1701195 Correction for low and high frequency model harmonization Ericsson, Samsung, NTT DOCOMO, Nokia, Intel, Telstra (Revision of R1-1701168)

Agreement:
- Two alternatives are provided for single-band and multi-band simulations above and below 6 GHz:
  - A single model documented in 38.900 covering the range 0.5-100 GHz, as proposed in R1-1701195
  - 36.873 / M.2135 models below 6 GHz, updated according to R1-1700421/R1-1700446/R1-1700447, and 38.900 model above 6 GHz
- Companies are free to select which alternative they use, or the alternative to be used may be agreed on a case-by-case basis
- R1-1701195 is agreed in principle, subject to updating to remove the "applicability" sentence in section 8 – revised in **R1-1701225** → agreed in R1-1701406 as CR0066 of 38.900 (Rel-14).
- RAN Plenary / ETSI MCC to be requested to update the title of the TR accordingly.
- R1-1700421 is agreed in principle → agreed in R1-1701407 as CR0012 of 36.873 (Rel-12)
- CMCC to prepare a CR covering R1-1700446 and R1-1700447 which is agreed in principle - **R1-1701224** "CR to TR36.873 on indoor hotspot channel model" – revisit on Thursday.
  - CR remains agreed in principle; prepare a revision as follows (revisit on Friday) in R1-1701233:
    - Need to correct RMa->InH in Table 7.3-9
    - Discuss how to include values for scaling factor for K value compensation (if not time to reach agreement on this aspect by Friday, the corrected CR can be agreed anyway and an update agreed at RAN1#88).
- Huawei to prepare a CR covering R1-1700445 - ~~R1-1701228 36.873CRxxxx~~ – revisit at RAN1#88.

Friday
R1-1701510 WF on evaluation methodology & channel models Telecom Italia, Deutsche Telekom, Orange, Ericsson, Nokia
The document was presented by Enrico Buracchini from Telecom Italia.
- For comparisons between technologies or technical solutions it is recommended to use the same channel model for all alternatives
  - e.g. comparisons between LTE and NR or between low and high frequency bands

Discussion: Also supported by Vodafone.
Huawei's alternative proposal:
- For future work in 3GPP, if any comparison between technologies (e.g. within the same band) is required, it is recommended to use the same channel model for the comparison.

Telecom Italia: gave up after offline attempt to reach a consensus – Note that Telecom Italia intention was not to revert the agreement but to help clarifying the comparison between technologies
Decision: The document is noted.

R1-1701233 TR36.873_CR_Adding_3D-InH_Scenario CMCC (revision of R1-1701224)
Decision: The draft CR is agreed in **R1-1701535** as CR0021 of 36.873 (Rel-12).

Not treated.
R1-1701184 Phase 3 channel model calibration results Ericsson
R1-1701296 Way Forward on channel model for NR evaluation Huawei, HiSilicon, CATR, CATT

5.1.10.2 Other essential corrections

TR38.900

Section 7.2
R1-1701163 Correction for scenario description Ericsson, Fraunhofer HHI
Decision: Agreed in R1-1701410 as CR0067 of 38.900 (Rel-14).

Section 7.5
R1-1701169 Correction for fast fading model Ericsson
Decision: Agreed in R1-1701411 as CR0068 of 38.900 (Rel-14).
R1-1701158 TR38.900_draftCR_Ground_Reflection_Model Fraunhofer HHI
Decision: Agreed in R1-1701412 as CR0069 of 38.900 (Rel-14).

R1-1701159 TR38.900_draftCR_Initial_PhaseFraunhofer HHI
R1-1701167 Correction for initial phase Ericsson
Decision: No longer needed following agreement of R1-1701412.

R1-1701160 TR38.900_draftCR_Normalize_Cluster_Powers Fraunhofer HHI, Ericsson
Decision: Agreed in R1-1701413 as CR0070 of 38.900 (Rel-14).

Section 7.6.3
R1-1701164 Correction for spatial consistencyEricsson
Decision: Agreed in R1-1701414 as CR0071 of 38.900 (Rel-14).

R1-1701171 Correction for spatially-consistent UT mobility modelling Ericsson, Nokia
Revised in R1-1701415 CR0072
Decision: Revisit at RAN1#88.

R1-1700604 Clarification for spatial consistency procedure NTT DOCOMO, INC.
Decision: Revisit at RAN1#88.

Section 7.6.4
R1-1701166 Clarifications on blockage model B Ericsson
R1-1701221 Correction for blockage model B and its calibration assumptions Ericsson
Revision of R1-1701165
Decision: Agreed in R1-1701416 as CR0073 of 38.900 (Rel-14).

Section 7.6.5
R1-1701172 Correction for correlation modeling for multi-frequency simulations Ericsson, Fraunhofer HHI
Decision: Agreed in R1-1701417 as CR0074 of 38.900 (Rel-14).

R1-1701267 Correction for channel generation for multi-frequency simulations Ericsson (Revision of R1-1701176)
Revised in **R1-1701475** (CR0076 of 38.900)
Check on Friday – if not agreeable, then revisit at RAN1#88.
Friday
R1-1701507 Correction for channel generation for multi-frequency simulations Ericsson, Fraunhofer HHI
Decision: Email approval until 26th January – (Ericsson)

Section 7.8.3
R1-1700605 Correction for calibration assumptions for spatial consistency NTT DOCOMO, INC.
Clarify that the first non-d.c. sub-carrier is intended - **R1-1701226** – agreed in R1-1701231 as CR0077 of 38.900 (Rel-14).

R1-1700990 e-mail discussion summary [87-35] on updating calibration results on additional features Samsung
R1-1700991 Draft CR for TR38.900 to update calibration results on additional features Samsung
Decision: Agreed in R1-1701425 as CR0075 of 38.900 (Rel-14).

R1-1700560 Calibration results of additional features for channel model above 6GHZ Lenovo

TR36.873

Section 6
R1-1701152 **TR36.873_draftCR_Scenarios Fraunhofer HHI, Ericsson**
Decision: Agreed in R1-1701426 as CR0013 of 36.873 (Rel-12)

Section 7.1
R1-1701143 **TR36.873_draftCR_Section_7.1 Fraunhofer HHI, Ericsson**
Decision: Agreed in R1-1701427 as CR0014 of 36.873 (Rel-12)

Section 7.2
R1-1701157 **TR36.873_draftCR_Section_7.2 Fraunhofer HHI**
Decision: Agreed in R1-1701428 as CR0015 of 36.873 (Rel-12)

Section 7.3
R1-1701141 **TR36.873_draftCR_Incorrect_Reference Fraunhofer HHI, Ericsson**
Decision: Agreed in R1-1701429 as CR0016 of 36.873 (Rel-12)
R1-1701142 **TR36.873_draftCR_Align_LSP_Notation Fraunhofer HHI, Ericsson**
Decision: Agreed in R1-1701430 as CR0017 of 36.873 (Rel-12)
R1-1701153 **TR36.873_draftCR_Notation_of_Cluster_Angular_Spreads Fraunhofer HHI, Ericsson**
Decision: Agreed in R1-1701431 as CR0018 of 36.873 (Rel-12)
R1-1701155 **TR36.873_draftCR_Normalize_Cluster_Powers Fraunhofer HHI, Ericsson**
Decision: Agreed in R1-1701432 as CR0019 of 36.873 (Rel-12)
R1-1701156 **TR36.873_draftCR_Incorrect_Reference_to_LSP_Table Fraunhofer HHI, Ericsson**
Decision: Agreed in R1-1701433 as CR0020 of 36.873 (Rel-12)

TR36.814
R1-1701112 **TR36.814_draftCR_Align_LSP_Notation Fraunhofer HHI, Ericsson**
Decision: Agreed in R1-1701446 as CR0004 of 36.814 (Rel-9)
R1-1701113 **TR36.814_draftCR_Correction_of_B-22 Fraunhofer HHI**
Decision: Revised and agreed in **R1-1701452** as CR0008 of 36.814 (Rel-9)

R1-1701114 **TR36.814_draftCR_Incorrect_Reference_to_LSP_Table Fraunhofer HHI, Ericsson**
Decision: Agreed in R1-1701447 as CR0005 of 36.814 (Rel-9)
R1-1701115 **TR36.814_draftCR_Normalize_Cluster_Powers Fraunhofer HHI, Ericsson**
Decision: Agreed in R1-1701448 as CR0006 of 36.814 (Rel-9)
R1-1701116 **TR36.814_draftCR_Notation_of_Cluster_Angular_Spreads Fraunhofer HHI**
Decision: Agreed in R1-1701227 as CR0007 of 36.814 (Rel-9) with corrected affected clause on cover sheet.

TR25.996
R1-1701110 **TR25.996_draftCR_Correction_of_Channel_Coefficient_Indexes Fraunhofer HHI**
Decision: Revised and agreed in **R1-1701451 as** CR0005 of 25.996 (Rel-13)

R1-1701111 **TR25.996_draftCR_Correction_of_Circular_Angle_Spread Fraunhofer HHI, Ericsson**
Decision: Agreed in R1-1701450 as CR0004 of 25.996 (Rel-13)

5.1.11 Extended CP study for 60 kHz sabcarrier spacing

R1-1701388 **Chairman's notes of AI 5.1.11 on extended CP study for 60 kHz sabcarrier spacing Ad-Hoc chair (Qualcomm)**
The document was presented by Wanshi Chen from Qualcomm.
Decision: The document is noted.

R1-1700003 **Discussion on evaluation on ECP Huawei, HiSilicon**
R1-1700267 **ECP at 60 kHz SCS ZTE, ZTE Microelectronics**
R1-1700391 **Extended CP numerology Intel Corporation**
R1-1700532 **Discussion on extended CP LG Electronics**
R1-1700680 **Discussion on CP lengths for 60 kHz SCS Sony**
R1-1700843 **Considerations on ECP use cases with 60kHz SCS Qualcomm Incorporated**
R1-1700992 **Extended CP Aspects Samsung**
R1-1701046 **NR extended cyclic prefix Ericsson**
R1-1701149 **On extended CP for 60 kHz SCS Nokia, Alcatel-Lucent Shanghai Bell**

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Further discussion offline on ECP details (duration, how to configure, whether or not to extend to other SCS, etc.) – revisit later this week

R1-1701357 WF on extended CP Huawei, HiSilicon, Nokia, ASB, CATT, Sony, Ericsson, LGE, Vodafone, Deutsche Telekom, Samsung, Intel, OPPO
Proposals:
- The length of NR extended CP is scaled from LTE extended CP according to the scaling of NR SCSs.
- From RAN1 specification perspective, the same scalable ECP design supports ECP for all SCSs
- How ECP is indicated is FFS

Friday
R1-1701544 WF on extended CP Huawei, HiSilicon, Nokia, ASB, NTT DOCOMO, Ericsson, LGE, Vodafone, Deutsche Telekom, Samsung, Intel, OPPO, AT&T, China Unicom, CATT, Sony, vivo, InterDigital, Mediatek, Verizon
- The length of NR extended CP is scaled from LTE extended CP according to the scaling of NR subcarrier spacing relative 15KHz.
- From RAN1 specification perspective, the same scalable extended CP design supports ECP for all NR subcarrier spacings.
  - Symbol level alignment across all subcarrier spacings shall be maintained in case of using extended CP
  - How ECP is indicated is FFS
  - Which SCSs support extended CP may depend on UE type/capability
- Other ECP design for new scenarios is not precluded

Discussion: Qualcomm cannot agree, even cannot take it as a working assumption – would like to agree having the decision postponed to the WI phase.
ZTE there is no need for rush regarding ECP.
Decision: The document is noted.

5.1.12 Other

Including remaining issues on waveform and multiple access
Also including forward compatibility not covered by above agenda items

R1-1701054 Forward compatibility: NR performance via Aerial platforms Thales, Fraunhofer IIS, Dish Network
The document was presented by Nicolas Chuberre from Thales and provides preliminary link budget analysis for NR radio interface performance evaluation via satellite/HAPS (for mMTC service). The main purpose is to study the forward compatibility of the proposed NR waveform with satellite links as part of the Rel-16/NR Phase 2.
Discussion: Thales will welcome any feedback from RAN1.
Decision: The document is noted.

R1-1700700 Satellite Aspects- Forward Compatibility Consideration for Random Access Preamble Format DISH Network, Thales, Fraunhofer IIS, SES S.A.
The document was presented by Medhi Alasti from Dish and studies the satellite considerations of the PRACH preamble format for the NR access technology to ensure forward compatibility for support via satellite in Phase II.

- Proposal 1: Flexible preamble formats allowing different length are needed in order to support the forward compatibility of NR with satellite systems.

Decision: The document is noted.

R1-1700545 Remaining issues on NR frame structure focusing on frequency domain Panasonic Corporation
The document was presented by Tetsuya Yamamoto from Panasonic.
- Proposal 1: Common PRB boundary should be used regardless of the system bandwidth for the same numerology in the same carrier.
- Proposal 2: NW centre is located at the boundary of PRBs or edge subcarrier of PRBs.
- Proposal 3: Common PRB boundary should be used among UL, DL, and sidelink for the same numerology in the same carrier.
- Proposal 4: PRB grid is defined on absolute frequency position.
- Proposal 5: DC subcarrier is located at the boundary of PRBs or edge subcarrier of PRBs.
- Proposal 6: Subcarriers affected by DC is modulated but EVM is not specified and collision at least with RS should be avoided.
- Proposal 7: DC offset is specified at each band.

Decision: The document is noted.

Agreements:
- ~~Handling of transmitter DC subcarrier at the transmitter~~

~~- DL~~
~~- Transmitter DC subcarrier at the transmitter (gNB) side is modulated but EVM is not specified~~
~~- Note that gNB can suppress DC interference to the required level by implementation~~
~~- UL~~
~~- The transmitter DC subcarrier at the transmitter (UE) side should avoid collisions at least with DMRS~~
~~- The specification should define at least one particular subcarrier as the candidate position of DC subcarrier, e.g., DC subcarrier is located at the boundary of PRBs~~
~~- This should be considered in the RS design for NR~~
~~- Specify means for the receiver to determine DC subcarrier location~~
~~- This involves semi-static signalling from UE and also standard specified DC subcarrier location~~
~~- FFS how to determine and how to indicate DC subcarrier location in the case of bandwidth adaptation~~
~~- Note that above DC subcarrier can be interpreted as DC subcarrier candidate~~

Friday: Above agreement is modified as follows (further to the proposal in R1-1701525)

- Handling of transmitter DC subcarrier at the transmitter
  - DL
    - UE may assume transmit DC subcarrier at the transmitter (gNB) side is modulated i.e., data is neither rate-matched nor punctured.
      - Signal quality requirement (e.g., EVM) corresponding to DC subcarriers is up to RAN4.
  - UL
    - Transmit DC subcarrier at the transmitter (UE) side is modulated i.e., data is neither rate-matched nor punctured.
      - Signal quality requirement (e.g., EVM) corresponding to DC subcarriers is up to RAN4.
    - The transmitter DC subcarrier at the transmitter (UE) side should avoid collisions at least with DMRS if possible
    - The specification should define at least one particular subcarrier as the candidate position of DC subcarrier, e.g., DC subcarrier is located at the boundary of PRBs
    - This should be considered in the RS design for NR
    - Specify means for the receiver to determine DC subcarrier location
      - This involves semi-static signalling from UE and also standard specified DC subcarrier location
      - FFS how to determine and how to indicate DC subcarrier location in the case of bandwidth adaptation
- Note that above DC subcarrier can be interpreted as DC subcarrier candidate

Possible agreements

- Handling of receiver DC subcarrier at the transmitter
  - DL
    - Transmitter should be aware of the DC subcarrier position (or potential positions) used at receiver side in order to avoid collisions at least with RS
      - FFS: need to avoid collisions with other signals or channels, e.g., sync signals and broadcast channels
      - Note that this includes being aware of whether the receiver DC subcarrier is present within the transmitter bandwidth
      - This should be considered in the RS design for NR
  - UL
    - The receiver (gNB) DC subcarrier at the transmitter (UE) side is modulated but EVM is not specified
      - Note that gNB can supress DC interference to the required level by implementation

Continue discussion until Thursday – (Panasonic)

Friday

R1-1701525 **WF on DC handling** **Panasonic, Intel, Huawei, HiSilicon**

The document was presented by Tetsuya … from Panasonic.

Decision: The document is noted.

Agreement:

- RAN1 should consider the impact of the potential receiver DC subcarrier collision with RS used by that receiver, and whether NR design would offer the possibility of collision free operation

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- Note that this does not create the requirement for receiver on receiver DC subcarrier handling

Not treated.

R1-1700010 Handling of DC subcarrier in NR Huawei, HiSilicon
R1-1700077 Discussion on further PAPR reduction of uplink DFT-s-OFDMHuawei, HiSilicon
R1-1700255 Non-orthogonal data transmission for eMBBZTE, ZTE Microelectronics
R1-1700256 Remaining issues on system level simulation for multiple access ZTE, ZTE Microelectronics
R1-1700284 Discussion on numerology multiplexing vivo
R1-1700392 Transmitter side dc subcarrier handling in NR Intel Corporation
R1-1700427 Results of additional feature calibration ITRI
R1-1700574 Discussion on the waveform for the one Tx port UE Guangdong OPPO Mobile Telecom.
R1-1700584 Discussion on NR reserved resources ETRI
R1-1700585 Remaining issues on NR frequency domain frame structure ETRI
R1-1700632 Frequency-domain aspects of frame structure NTT DOCOMO, INC.
R1-1700641 Further waveform considerations for UL URLLC Sequans Communications
R1-1700649 UW DFTsOFDM performance evaluation above 40GHz Mitsubishi Electric RCE
R1-1700664 Further LLS results for UL non-orthogonal multiple access Fujitsu
R1-1700694 DM-RS design for multiple access Ericsson
R1-1700699 On scrambling Ericsson
R1-1700878 Performance evaluations of UW-DFT-s-OFDM in the 30GHz high speed train scenario Mitsubishi Electric Co.
R1-1700993 Basic channel structure for grant-free based multiple access Samsung
R1-1700994 Indication of Reserved Resources Samsung
R1-1700995 DC subcarrier handling Samsung
R1-1700996 Guard-band Considering Inter-numerology Interference Samsung
R1-1700997 Remaining Issues on RB Grid Samsung
R1-1700998 Design aspects of frequency domain spectral shaping for DFT-s-OFDM Samsung
R1-1700999 Modulation/waveform optimization for further PAPR reduction Samsung
R1-1701000 Performance evaluation results of DFT-s-OFDM with FDSS Samsung
R1-1701001 DFT-based IGMA Samsung
R1-1701002 PAPR evaluation results for DFT-based IGMA Samsung
R1-1701003 Grant-free Based Multiple Access Samsung
R1-1701004 Collision Analysis of Grant-Free Based Multiple Access Samsung
R1-1701005 Overview of NR Unlicensed and Shared Spectrums Samsung
R1-1701006 Discussion on vehicular communications for NR Samsung
R1-1701044 On mMTC, NB-IoT and eMTC battery life evaluation Ericsson LM
R1-1701045 On mMTC, NB-IoT and eMTC latency evaluation Ericsson LM
R1-1701047 On mMTC multiple access Ericsson LM
R1-1701048 On NB-IoT, eMTC and NR coexistence Ericsson LM
R1-1701050 On the evolution of mMTC Ericsson LM
R1-1701053 On the signalling support for forward compatibility Nokia, Alcatel-Lucent Shanghai Bell
R1-1701132 On NR Operation in the 60 GHz Unlicensed Band Ericsson
R1-1701133 On Channel Access Mechanisms for NR in Unlicensed Spectrum Ericsson
R1-1701134 Technology Components for Unlicensed Operation Ericsson
R1-1701135 On Autonomous UL Transmissions for NR in Unlicensed Spectrum Ericsson
R1-1701136 Discussion of Multi-Antenna and Highly Directional Beam-Forming for Operation in Unlicensed Spectrum Ericsson
R1-1701137 On Physical Layer Design Policies for Unlicensed Operation of NR Ericsson
R1-1701150 Intra-carrier sub-band for mixed numerologyNokia, Alcatel-Lucent Shanghai Bell
R1-1701151 Guard band arrangement supporting mixed numerology Nokia, Alcatel-Lucent Shanghai Bell

6 Closing of the meeting

As a conclusion, Mr Chair expressed his good feeling regarding the merit of having set-up such an ad-hoc meeting, hoping that the week had been helpful to all.
Mr Chair thanked all for the hard work performed during the week. Only one remaining meeting to complete the SI on NR, coming up soon in February 2017. Due to the short gap and taken into consideration that this gap will include the Chinese New Year, Mr Chair announced an extended deadline for the submission of contributions to the next meeting (Monday 6th Feb instead of Friday 3rd Feb).

Before closing the meeting, Mr Chair also told RAN1 about his decision to candidate to the upcoming RAN election, now officially annouced – see 3GPP web site. Whatever the result will be, he shall remain and chair RAN1 meetings until August 2017 – date of the next RAN1 election.
Meeting was closed at 17:10.
See you all in Athens.

Annex A: List of Tdocs at RAN1 #AH1_NR

Please see excel file attached to this report

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Annex B: List of CRs agreed at RAN1 #AH1_NR

TR	CR	Rev	Rel	Title	Cat	Vsn	@ Mtg	TD#	Source to WG	Work Item
25.996	4		Rel-13	TR25.996_CR_Correction_of_Circular_Angle_Spread	F	13.1.0	R1#AH1_NR	R1-1701450	Fraunhofer HHI, Ericsson	MIMO
25.996	5		Rel-13	TR25.996_CR_Correction_of_Channel_Coefficient_Indexes	F	13.1.0	R1#AH1_NR	R1-1701451	Fraunhofer HHI	MIMO
36.814	4		Rel-9	TR36.814_CR_Align_LSP_Notation	F	9.1.0	R1#AH1_NR	R1-1701446	Fraunhofer HHI, Ericsson	FS_RAN_LTEA
36.814	5		Rel-9	TR36.814_CR_Incorrect_Reference_to_LSP_Table	F	9.1.0	R1#AH1_NR	R1-1701447	Fraunhofer HHI, Ericsson	FS_RAN_LTEA
36.814	6		Rel-9	TR36.814_CR_Normalize_Cluster_Powers	F	9.1.0	R1#AH1_NR	R1-1701448	Fraunhofer HHI, Ericsson	FS_RAN_LTEA
36.814	7		Rel-9	TR36.814_CR_Notation_of_Cluster_Angular_Spreads	F	9.1.0	R1#AH1_NR	R1-1701227	Fraunhofer HHI	FS_RAN_LTEA
36.814	8		Rel-9	TR36.814_CR_Correction_of_B-22	F	9.1.0	R1#AH1_NR	R1-1701452	Fraunhofer HHI	FS_RAN_LTEA
36.873	13		Rel-12	TR36.873_CR_Scenarios	F	12.3.0	R1#AH1_NR	R1-1701426	Fraunhofer HHI, Ericsson	FS_LTE_3D_channel
36.873	14		Rel-12	TR36.873_CR_Section_7.1	F	12.3.0	R1#AH1_NR	R1-1701427	Fraunhofer HHI, Ericsson	FS_LTE_3D_channel
36.873	15		Rel-12	TR36.873_CR_Section_7.2	F	12.3.0	R1#AH1_NR	R1-1701428	Fraunhofer HHI	FS_LTE_3D_channel
36.873	16		Rel-12	TR36.873_CR_Incorrect_Reference	F	12.3.0	R1#AH1_NR	R1-1701429	Fraunhofer HHI, Ericsson	FS_LTE_3D_channel
36.873	17		Rel-12	TR36.873_CR_Align_LSP_Notation	F	12.3.0	R1#AH1_NR	R1-1701430	Fraunhofer HHI, Ericsson	FS_LTE_3D_channel
36.873	18		Rel-12	TR36.873_CR_Notation_of_Cluster_Angular_Spreads	F	12.3.0	R1#AH1_NR	R1-1701431	Fraunhofer HHI, Ericsson	FS_LTE_3D_channel
36.873	19		Rel-12	TR36.873_CR_Normalize_Cluster_Powers	F	12.3.0	R1#AH1_NR	R1-1701432	Fraunhofer HHI, Ericsson	FS_LTE_3D_channel
36.873	20		Rel-12	TR36.873_CR_Incorrect_Reference_to_LSP_Table	F	12.3.0	R1#AH1_NR	R1-1701433	Fraunhofer HHI, Ericsson	FS_LTE_3D_channel
38.900	67	-	Rel-14	Correction for scenario description	F	14.2.0	R1#AH1_NR	R1-1701410	Ericsson, Fraunhofer HHI	FS_6GHz_CH_model
38.900	68	-	Rel-14	Correction for fast fading model	F	14.2.0	R1#AH1_NR	R1-1701411	Ericsson, Fraunhofer HHI	FS_6GHz_CH_model
38.900	69		Rel-14	TR38.900_CR_Ground_Reflection_Model	B	14.2.0	R1#AH1_NR	R1-1701412	Fraunhofer HHI, ZTE, Ericsson	FS_6GHz_CH_model
38.900	70		Rel-14	TR38.900_CR_Normalize_Cluster_Powers	F	14.2.0	R1#AH1_NR	R1-1701413	Fraunhofer HHI, Ericsson	FS_6GHz_CH_model
38.900	71	-	Rel-14	Correction for spatial consistency	F	14.2.0	R1#AH1_NR	R1-1701414	Ericsson	FS_6GHz_CH_model
38.900	73	-	Rel-14	Correction for blockage model B and its calibration assumptions	F	14.2.0	R1#AH1_NR	R1-1701416	Ericsson, Fraunhofer HHI	FS_6GHz_CH_model

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38.900	74	-	Rel-14	Correction for correlation modelling for multi-frequency simulations	F	14.2.0	R1#AH1_NR	R1-1701417	Ericsson, Fraunhofer HHI	FS_6GHz_CH_model
38.900	75	-	Rel-14	CR to capture additional feature calibration results	F	14.2.0	R1#AH1_NR	R1-1701425	Samsung	FS_6GHz_CH_model
38.900	77	-	Rel-14	Correction for calibration assumptions for spatial consistency	F	14.2.0	R1#AH1_NR	R1-1701231	NTT DOCOMO	FS_6GHz_CH_model
36.873	12		Rel-12	Draft CR to TR36.873 on rural channel model	F	12.3.0	R1#AH1_NR	R1-1701407	Huawei, HiSilicon	FS_LTE_3D_channel
36.873	21		Rel-12	TR36.873_CR_Adding_3D-InH_Scenario	F	12.3.0	R1#AH1_NR	R1-1701535	CMCC	FS_LTE_3D_channel
38.900	66	-	Rel-14	Correction for low and high frequency model harmonization	F	14.2.0	R1#AH1_NR	R1-1701406	Ericsson, Samsung, NTT DOCOMO, Nokia, Intel, Telstra, Verizon Wireless, Deutsche Telekom, T-Mobile US	FS_6GHz_CH_model

Annex C-1: List of Outgoing LSs from RAN1 #AH1_NR

TDoc #	Title	Source	Release	Related WIs	Reply to	To	Cc	Original LS	Reply in
R1-1701223	LS on wider bandwidth operation for NR	RAN1, NTT DOCOMO, INC.	Rel-14	FS_NR_newRAT		RAN4	RAN2		
R1-1701487	Response LS on UE capability aspects for LTE/NR tight interworking	RAN1, Nokia	Rel-14	FS_NR_newRAT	R2-168961	RAN2	RAN4		
R1-1701495	LS on Paging Requirements	RAN1, Huawei	Rel-14	FS_NR_newRAT		RAN2			
R1-1701501	LS on NR Mobility	RAN1, Huawei, Intel	Rel-14	FS_NR_newRAT		RAN2			
R1-1701541	Reply LS on PRACH preambles for on demand SI requests	RAN1, Ericsson	Rel-14	FS_NR_newRAT	R2-1700653	RAN2			
R1-1701547	LS on pi/2 BPSK with spectrum shaping for DFT-S-OFDM uplink	RAN1, IITH, Nokia	Rel-14	FS_NR_newRAT		RAN4			

Annex C-2: List of Incoming LSs from RAN1 #AH1_NR

TDoc #	Title	Source	Release	Related WIs	Reply to	To	Cc	Original LS	Reply in
R1-1700290	LS on UE capability aspects for LTE/NR tight interworking	RAN2, Nokia	Rel-14	FS_NR_newRAT		RAN4, RAN1		R2-168961	
R1-1700291	Reply LS on NR RACH Procedure	RAN2, Huawei	Rel-14	FS_NR_newRAT		RAN1		R2-169141	
R1-1701518	LS on PRACH preambles for on demand SI requests	RAN2, BlackBerry	Rel-14	FS_NR_newRAT		RAN1		R2-1700653	
R1-1701519	Response LS on minimum system information	RAN2, LG Electronics	Rel-14	FS_NR_newRAT	R1-1613692	RAN1		R2-1700654	

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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 #AH1_NR

Tdoc Number	Title	Source	Conclusion/Decision
R1-1701422	TR 38.802 v1.1.0 Study on New Radio (NR) Access Technology - Physical Layer Aspects	NTT DOCOMO, INC.	Agreed as basis for further updates

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Annex F: List of actions

- **Outgoing LS**

None

- **CR approval**

[NRAH1-07] Henrik (Ericsson)
R1-1701507 Correction for channel generation for multi-frequency simulations Ericsson, Fraunhofer HHI
Email approval until 26th January
Done: No consensus – A revised CR based on the discussion in this email thread should be submitted to the upcoming meeting.

- **Text proposal for TS and TR**

None

- **Miscellaneous**

[NRAH1-01] Ruyue (ZTE)
R1-1701514 Way Forward on Evaluation for Beam Management ZTE, ZTE Microelectronics, Ericsson, Nokia, ASB
Email discussion until Feb. meeting
Done: Summary in R1-1701827 for further discussion at RAN1#88.

[NRAH1-02-Ph1] Chuangxin (ZTE)
NR MIMO calibration Phase 1 - updating phase-1 results until Feb. 6th based on
R1-1701526 NR-MIMO Phase-1 and Phase-2 Calibration Results ZTE, ZTE Microelectronics
Companies are encouraged to update results (particularly for the micro layer of dense urban scenario)
If further clarification of simulation assumptions is needed, it can also be discussed under this email thread
Done: Summaries for further discussion at RAN1#88 as follows:
R1-1701829 Calibration results for Phase 1 NR MIMO link level calibration
R1-1701830 Calibration results for Phase 1 NR MIMO system level calibration

[NRAH1-02-Ph2] Chuangxin (ZTE)
For phase-2 results until Mar. 31st
Done: Summaries for further discussion at RAN1#88 as follows:
R1-1701831 Calibration results for Phase 2 NR MIMO link level calibration
R1-1701832 Calibration results for Phase 2 NR MIMO system level calibration

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[NRAH1-02-Ph3] Chuangxin (ZTE)
For phase-3 results until Apr. 28th

[NRAH1-03] Jing (Qualcomm)
R1-1701478 WF on 2-Stage DCI for NR Qualcomm, Huawei, HiSilicon, National Instrument, Vivo, ZTE, Sony, MediaTek
Email discussion until 7th February
Done: Summary in R1-1702629 for further discussion at RAN1#88.

[NRAH1-04] Hongsil (Samsung)
Granularity of information block sizes to be evaluated for email discussion until the meeting
Done: Status to be checked at RAN1#88.

[NRAH1-05] Hongsil (Samsung)
Details of other evaluation criteria for information block sizes of LDPC for email discussion until the meeting
Done: Status to be checked at RAN1#88.

[NRAH1-06] Jan (ZTE)
Option 2/4 agreements of PRACH for email approval until 27th January
Done: According to Chair's email posted on Jan 28th, the following is agreed

- **Agreement (under 5.1.1.4.1) on PRACH design is modified as follows:**
  - **For single/multi-beam operation in the Option 2/4 case**
    - **The same/different RACH sequences with CP is used and GT is reserved at the end of the consecutive multiple/repeated RACH ~~sequences~~ preambles**

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Annex G: List of participants at RAN1 #AH1_NR

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#88	WG	13 – 17 Feb 2017	Athens	Greece
3GPPRAN1#88bis	WG	03 – 07 Apr 2017	Spokane	US
3GPPRAN1#89	WG	15 – 19 May 2017	Hangzhou (TBC)	China
3GPPRAN1-NR	AH	27 – 30 Jun 2017	TBD	China
3GPPRAN1#90	WG	21 – 25 Aug 2017	Prague	Rep Czech
3GPPRAN1-NR	AH	18 – 21 Sep 2017	Nagoya	Japan
3GPPRAN1#90bis	WG	09 – 13 Oct 2017	Prague	Rep Czech
3GPPRAN1#91	WG	27 Nov – 01 Dec 2017	TBD	US
3GPPRAN1#92	WG	26 Feb – 2 Mar 2018	Athens (TBC)	Greece
3GPPRAN1#92bis	WG	16 – 20 Apr 2018	TBD	TBD
3GPPRAN1#93	WG	21 – 25 May 2018	TBD	Korea
3GPPRAN1#94	WG	20 – 24 Aug 2018	Gothenburg (TBC)	Sweden
3GPPRAN1#94bis	WG	8 – 12 Oct 2018	TBD	TBD
3GPPRAN1#95	WG	12 – 16 Nov 2018	TBD	TBD

MEETING TYPES		
AH = Ad Hoc	ST = Startup Meeting	RG = Rapporteurs Group
JM = Joint	WG = Working Group	SG = Steering Group
PM = Preparatory Meeting	CM = Chairmen's meeting	TG = Task Group
RM = Resolution Meeting	OR = Ordinary	XO = Extraordinary

End of document

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Appendix E

TDoc #	Title	Source	TDoc Status	Reservation date	Uploaded
R1-1700001	Draft Agenda of RAN1 Ad-hoc meeting on New Radio	RAN1 Chair	approved	2016-12-20 22:23:29	2016-12-20 22:37:33
R1-1700002	Selected highlights from RAN#74 relevant to RAN1	RAN1 Chair	noted	2016-12-20 22:23:29	2017-01-10 09:03:32
R1-1700003	Discussion on evaluation on ECP	Huawei, HiSilicon	noted	2016-12-21 02:18:04	2017-01-09 21:09:25
R1-1700004	Numerology for DL control channel	Huawei, HiSilicon	available	2016-12-21 02:18:04	2017-01-09 21:09:25
R1-1700005	On numerology determination during initial access	Huawei, HiSilicon	available	2016-12-21 02:18:04	2017-01-09 21:09:25
R1-1700006	On the maximum carrier bandwidth and multiple carriers operation	Huawei, HiSilicon	noted	2016-12-21 02:18:04	2017-01-09 21:09:25
R1-1700007	DL control channels for CA and DC	Huawei, HiSilicon	available	2016-12-21 02:18:04	2017-01-09 21:09:25
R1-1700008	UL control channels for CA and DC	Huawei, HiSilicon	available	2016-12-21 02:18:04	2017-01-09 21:09:25
R1-1700009	Power control for CA and DC	Huawei, HiSilicon	available	2016-12-21 02:18:04	2017-01-09 21:09:25
R1-1700010	Handling of DC subcarrier in NR	Huawei, HiSilicon	available	2016-12-21 02:18:04	2017-01-09 21:09:25
R1-1700011	Mechanisms of bandwidth adaptation	Huawei, HiSilicon	available	2016-12-21 02:18:04	2017-01-09 21:09:25
R1-1700012	Two-stage downlink control structure	Huawei, HiSilicon	available	2016-12-21 02:18:04	2017-01-09 21:09:25
R1-1700013	Transmission schemes of DL control channel	Huawei, HiSilicon	available	2016-12-21 02:18:04	2017-01-09 21:09:25
R1-1700014	Design of control resource set	Huawei, HiSilicon	available	2016-12-21 02:18:04	2017-01-09 21:09:25
R1-1700015	Demodulation RS design for DL control channel	Huawei, HiSilicon	available	2016-12-21 02:18:04	2017-01-09 21:09:25
R1-1700016	Short duration UL control channel design	Huawei, HiSilicon	available	2016-12-21 02:18:04	2017-01-09 21:09:25
R1-1700017	Long duration UL control channel design	Huawei, HiSilicon	available	2016-12-21 02:18:04	2017-01-09 21:09:25
R1-1700018	Resource allocation of UL control channel	Huawei, HiSilicon	available	2016-12-21 02:18:04	2017-01-09 21:09:25
R1-1700019	Multiplexing of UL control channel and SRS in NR	Huawei, HiSilicon	available	2016-12-21 02:18:04	2017-01-09 21:09:25
R1-1700020	Discussion on timing relations and signaling of HARQ timing for NR	Huawei, HiSilicon	available	2016-12-21 02:18:04	2017-01-09 21:09:25
R1-1700021	Control channel design for URLLC	Huawei, HiSilicon	available	2016-12-21 02:18:04	2017-01-09 21:12:36
R1-1700022	On DL multiplexing of URLLC and eMBB transmissions	Huawei, HiSilicon	available	2016-12-21 02:18:04	2017-01-09 21:38:31
R1-1700023	Discussion on mini-slot for URLLC	Huawei, HiSilicon	available	2016-12-21 02:18:04	2017-01-09 21:38:31
R1-1700024	Support of URLLC in UL	Huawei, HiSilicon	available	2016-12-21 02:18:04	2017-01-09 21:38:31
R1-1700025	On UL multiplexing of URLLC and eMBB transmissions	Huawei, HiSilicon	available	2016-12-21 02:18:04	2017-01-09 21:12:36
R1-1700026	Scheduling scheme for slot aggregation	Huawei, HiSilicon	noted	2016-12-21 02:18:04	2017-01-09 21:09:25
R1-1700027	Mini-slot usage for eMBB above 6GHz	Huawei, HiSilicon	available	2016-12-21 02:18:04	2017-01-09 21:23:07
R1-1700028	Dynamic resource allocation of different numerologies	Huawei, HiSilicon	available	2016-12-21 02:18:04	2017-01-09 21:09:25
R1-1700029	Discussion on resource allocation and indication for data channel	Huawei, HiSilicon	available	2016-12-21 02:18:04	2017-01-09 21:23:08
R1-1700030	Consideration of PRB misalignment between NR and LTE in the coexistence case	Huawei, HiSilicon	available	2016-12-21 02:18:04	2017-01-09 21:12:36
R1-1700031	Coexistence of NR DL and LTE	Huawei, HiSillicon	noted	2016-12-21 02:18:04	2017-01-09 21:09:25
R1-1700032	Considerations of NR UL operation on the uplink band of LTE	Huawei, HiSillicon	available	2016-12-21 02:18:04	2017-01-09 21:09:25
R1-1700033	Discussion and evaluation on NR-SS multiplexing and bandwidth	Huawei, HiSilicon	noted	2016-12-21 02:18:04	2017-01-09 21:23:08
R1-1700034	RACH preamble design for NR	Huawei, HiSilicon	noted	2016-12-21 02:18:04	2017-01-09 21:12:36
R1-1700035	Further consideration on two-step RACH	Huawei, HiSilicon	available	2016-12-21 02:18:04	2017-01-09 21:09:25

R1-1700036	UL based RRM measurement for mobility	Huawei, HiSilicon	available	2016-12-21 02:18:04	2017-01-09 21:09:25
R1-1700037	Synchronization signals for NR	Huawei, HiSilicon	available	2016-12-21 02:18:04	2017-01-09 21:09:25
R1-1700038	Frequency location of the synchronization signals	Huawei, HiSilicon	available	2016-12-21 02:18:04	2017-01-09 21:09:25
R1-1700039	Discussion on downlink beam measurement and UE reporting procedure	Huawei, HiSilicon	available	2016-12-21 02:18:04	2017-01-09 21:12:36
R1-1700040	Beam diversity for data and control channels	Huawei, HiSilicon	available	2016-12-21 02:18:04	2017-01-09 21:12:36
R1-1700041	Discussion on link recovery procedure for beam blockage	Huawei, HiSilicon	available	2016-12-21 02:18:04	2017-01-09 21:12:36
R1-1700042	Enhanced CRI reporting for NR MIMO	Huawei, HiSilicon	available	2016-12-21 02:18:04	2017-01-09 21:12:36
R1-1700043	Discussion on beam management aspects for UL MIMO	Huawei, HiSilicon	available	2016-12-21 02:18:04	2017-01-09 21:12:36
R1-1700044	Beam management across multiple carriers	Huawei, HiSilicon	available	2016-12-21 02:18:04	2017-01-09 21:12:36
R1-1700045	DL beam management with reduced overhead	Huawei, HiSilicon	available	2016-12-21 02:18:04	2017-01-09 21:12:36
R1-1700046	Discussion and evaluation on NR-SS periodicity	Huawei, HiSilicon	available	2016-12-21 02:18:04	2017-01-09 21:12:36
R1-1700047	Discussion and evaluation on broadcast channel/signals transmission for beam based initial access	Huawei, HiSilicon	noted	2016-12-21 02:18:04	2017-01-09 21:12:36
R1-1700048	Multi-beam Paging for NR	Huawei, HiSilicon	available	2016-12-21 02:18:04	2017-01-09 21:12:36
R1-1700049	RACH procedures and resource configuration	Huawei, HiSilicon	available	2016-12-21 02:18:04	2017-01-09 21:12:36
R1-1700050	Discussion on DMRS-based open loop transmission scheme for DL data channel	Huawei, HiSilicon	available	2016-12-21 02:18:04	2017-01-09 21:23:08
R1-1700051	Discussion on transmission parameter sets	Huawei, HiSilicon	available	2016-12-21 02:18:04	2017-01-09 21:23:08
R1-1700052	Discussion on network coordination schemes with non-ideal backhaul links in NR	Huawei, HiSilicon	available	2016-12-21 02:18:04	2017-01-09 21:23:08
R1-1700053	Non-linear precoding for downlink multiuser MIMO	Huawei, HiSilicon	available	2016-12-21 02:18:04	2017-01-09 21:23:08
R1-1700054	CSI measurement and reporting for coordinated transmission schemes	Huawei, HiSilicon	available	2016-12-21 02:18:04	2017-01-09 21:23:07
R1-1700055	Consideration on interference measurement for downlink CSI acquisition	Huawei, HiSilicon	available	2016-12-21 02:18:04	2017-01-09 21:23:07
R1-1700056	Independent and joint control of CSI-RS transmission and CSI reporting for NR MIMO	Huawei, HiSilicon	available	2016-12-21 02:18:04	2017-01-09 21:23:07
R1-1700057	Considerations on two-level configuration of CSI acquisition settings	Huawei, HiSilicon	available	2016-12-21 02:18:04	2017-01-09 21:23:07
R1-1700058	Mechanism of shared CSI-RS transmission	Huawei, HiSilicon	available	2016-12-21 02:18:04	2017-01-09 21:23:07
R1-1700059	Discussion on reciprocity based DL CSI feedback	Huawei, HiSilicon	available	2016-12-21 02:18:04	2017-01-09 21:23:07
R1-1700060	Discussion on DL CSI feedback for SFBC	Huawei, HiSilicon	available	2016-12-21 02:18:04	2017-01-09 21:23:07
R1-1700061	Discussion on UL CSI acquisition	Huawei, HiSilicon	available	2016-12-21 02:18:04	2017-01-09 21:23:07
R1-1700062	UL codebook design in NR	Huawei, HiSilicon	available	2016-12-21 02:18:04	2017-01-09 21:23:07
R1-1700063	General discussion of UL power control for NR	Huawei, HiSilicon	available	2016-12-21 02:18:04	2017-01-09 21:23:07
R1-1700064	Detailed considerations on UL power control design for NR	Huawei, HiSilicon	available	2016-12-21 02:18:04	2017-01-09 21:23:07
R1-1700065	Considerations on multi-panel based uplink transmission	Huawei, HiSilicon	available	2016-12-21 02:18:04	2017-01-09 21:23:07
R1-1700066	DL Codebook design for multi-panel structured MIMO in NR	Huawei, HiSilicon	available	2016-12-21 02:18:04	2017-01-09 21:23:07
R1-1700067	Design of DL DMRS for data transmission	Huawei, HiSilicon	available	2016-12-21 02:18:04	2017-01-09 21:09:25
R1-1700068	Evaluation results of DMRS design for DL data channel	Huawei, HiSilicon	available	2016-12-21 02:18:04	2017-01-09 21:38:31
R1-1700069	CSI-RS design for beam management	Huawei, HiSilicon	available	2016-12-21 02:18:04	2017-01-09 21:09:25
R1-1700070	CSI-RS design for CSI acquisition	Huawei, HiSilicon	available	2016-12-21 02:18:04	2017-01-09 21:38:31
R1-1700071	UL DMRS design for data transmission	Huawei, HiSilicon	available	2016-12-21 02:18:04	2017-01-09 21:38:31

R1-1700072	Details of QCL assumptions and related RS design considerations	Huawei, HiSilicon	available	2016-12-21 02:18:04	2017-01-09 21:09:25
R1-1700073	Further details for PT-RS design	Huawei, HiSilicon	available	2016-12-21 02:18:04	2017-01-09 21:09:25
R1-1700074	UL SRS design for CSI acquisition and beam management	Huawei, HiSilicon	available	2016-12-21 02:18:04	2017-01-09 21:09:25
R1-1700075	Channel coding for URLLC scenario	Huawei, HiSilicon	available	2016-12-21 02:18:04	2017-01-10 03:51:55
R1-1700076	Signal shaping for QAM constellations	Huawei, HiSillicon	available	2016-12-21 02:18:04	2017-01-09 21:09:25
R1-1700077	Discussion on further PAPR reduction of uplink DFT-s-OFDM	Huawei, HiSilicon	available	2016-12-21 02:18:04	2017-01-09 21:38:31
R1-1700078	DCI monitoring occasions and blind detections	Huawei, HiSilicon	available	2016-12-21 02:18:04	2017-01-09 21:09:25
R1-1700079	On control signaling for duplexing flexibility	Huawei, HiSilicon	available	2016-12-21 02:18:04	2017-01-09 21:12:36
R1-1700080	Discussion on TDD operation on an unpaired spectrum	Huawei, HiSilicon	available	2016-12-21 02:18:04	2017-01-09 21:12:36
R1-1700081	On unified design for duplexing flexibility	Huawei, HiSilicon	available	2016-12-21 02:18:04	2017-01-09 21:12:36
R1-1700082	Evaluation of duplexing flexibility in indoor hotspot scenario	Huawei, HiSilicon	noted	2016-12-21 02:18:04	2017-01-09 21:12:36
R1-1700083	Evaluation of duplexing flexibility in urban macro scenario	Huawei, HiSilicon	available	2016-12-21 02:18:05	2017-01-09 21:12:36
R1-1700084	Evaluation of duplexing flexibility in dense urban scenario	Huawei, HiSilicon	available	2016-12-21 02:18:05	2017-01-09 21:12:36
R1-1700085	Discussion on system-level calibration for NR-MIMO	Huawei, HiSilicon	available	2016-12-21 02:18:05	2017-01-09 21:23:07
R1-1700086	Discussion on link-level calibration for NR-MIMO	Huawei, HiSilicon	available	2016-12-21 02:18:05	2017-01-09 21:23:07
R1-1700087	Further clarification of channel model implementation for cross link in flexible duplex evaluation	Huawei, HiSilicon	noted	2016-12-21 02:18:05	2017-01-09 21:23:07
R1-1700088	Summary of polar code design for control channels	Huawei, HiSilicon	noted	2016-12-21 02:18:05	2017-01-10 03:51:55
R1-1700089	Performance of polar codes for control channels	Huawei, HiSilicon	noted	2016-12-21 02:18:05	2017-01-10 03:51:55
R1-1700090	On latency, power consumption and implementation complexity for polar codes	Huawei, HiSilicon	available	2016-12-21 02:18:05	2017-01-10 03:51:55
R1-1700091	Channel coding for very small control block lengths	Huawei, HiSilicon	available	2016-12-21 02:18:05	2017-01-10 03:51:55
R1-1700092	LDPC design for eMBB data	Huawei, HiSilicon	noted	2016-12-21 02:18:05	2017-01-10 03:51:55
R1-1700093	Implementation aspects of LDPC codes	Huawei, HiSilicon	noted	2016-12-21 02:18:05	2017-01-10 03:51:55
R1-1700094	Performance evaluation of LDPC codes	Huawei, HiSilicon	noted	2016-12-21 02:18:05	2017-01-10 03:51:55
R1-1700095	On cross-link interference cancellation/suppression for duplexing flexibility	Huawei, HiSilicon	noted	2016-12-21 02:18:05	2017-01-09 21:12:36
R1-1700096	On cross-link interference coordination for duplexing flexibility	Huawei, HiSilicon	available	2016-12-21 02:18:05	2017-01-09 21:12:36
R1-1700097	NR-SS: Bandwidth, Multiplexing	ZTE, ZTE Microelectronics	available	2016-12-21 05:07:54	2017-01-10 03:43:03
R1-1700098	NR-SS: Frequency Raster	ZTE, ZTE Microelectronics	available	2016-12-21 05:07:54	2017-01-10 03:43:03
R1-1700099	NR-SS: Periodicity	ZTE, ZTE Microelectronics	available	2016-12-21 05:07:54	2017-01-10 03:43:03
R1-1700100	NR-SS: Sequence Design	ZTE, ZTE Microelectronics	available	2016-12-21 05:07:54	2017-01-10 03:43:04
R1-1700101	NR-PBCH and Delivery of Minimum SI	ZTE, ZTE Microelectronics	available	2016-12-21 05:07:54	2017-01-10 03:43:04
R1-1700102	Paging in NR	ZTE, ZTE Microelectronics	available	2016-12-21 05:07:54	2017-01-10 03:43:04
R1-1700103	PRACH Design Considerations	ZTE, ZTE Microelectronics	available	2016-12-21 05:07:54	2017-01-10 03:43:04

R1-1700104	4-step Random Access Procedure	ZTE, ZTE Microelectronics	available	2016-12-21 05:07:54	2017-01-10 03:43:04
R1-1700105	2-step Random Access Procedure	ZTE, ZTE Microelectronics	noted	2016-12-21 05:07:54	2017-01-10 03:43:04
R1-1700106	Idle mode RRM Measurements	ZTE, ZTE Microelectronics	available	2016-12-21 05:07:54	2017-01-10 03:43:04
R1-1700107	Connected mode RRM Measurements	ZTE, ZTE Microelectronics	available	2016-12-21 05:07:54	2017-01-10 03:43:04
R1-1700108	LDPC Code Design	Ericsson	noted	2016-12-26 05:32:41	2017-01-10 07:52:15
R1-1700109	Investigation of LDPC codes with CRC attachment	Ericsson	noted	2016-12-26 05:32:41	2017-01-10 07:52:15
R1-1700110	On LDPC Code Parameters for NR	Ericsson	noted	2016-12-26 05:32:41	2017-01-10 07:52:15
R1-1700111	Implementation and Performance of LDPC Decoder	Ericsson	noted	2016-12-26 05:32:41	2017-01-10 07:52:15
R1-1700112	Polar Code Design for Control Channel of NR	Ericsson	available	2016-12-26 05:32:41	2017-01-10 07:52:15
R1-1700113	Practical Issues of Polar Code for NR	Ericsson	available	2016-12-26 05:32:41	2017-01-10 08:55:40
R1-1700114	Investigation of Segmented Polar Codes	Ericsson	available	2016-12-26 05:32:41	2017-01-10 07:52:15
R1-1700115	Channel Coding Techniques for URLLC	Ericsson	available	2016-12-26 05:32:41	2017-01-10 07:52:15
R1-1700116	On Channel Coding of PBCH	Ericsson	available	2016-12-26 05:32:41	2017-01-10 07:52:15
R1-1700117	Aspects of DL MIMO Transmission	ZTE, ZTE Microelectronics	available	2016-12-28 02:15:35	2017-01-10 06:39:53
R1-1700118	Aspects of UL MIMO Transmission	ZTE, ZTE Microelectronics	available	2016-12-28 02:15:35	2017-01-10 06:39:53
R1-1700119	Multi-TRP Transmission considering advanced receiver	ZTE, ZTE Microelectronics	available	2016-12-28 02:15:35	2017-01-10 06:39:53
R1-1700120	Discussion on interference issues in NR	ZTE, ZTE Microelectronics	available	2016-12-28 02:15:35	2017-01-10 06:39:53
R1-1700121	High level views on beam management for NR MIMO	ZTE, ZTE Microelectronics	available	2016-12-28 02:15:35	2017-01-10 06:39:53
R1-1700122	Group based beam management	ZTE, ZTE Microelectronics	available	2016-12-28 02:15:35	2017-01-10 06:39:53
R1-1700123	Beam related indication for DL and UL beam management	ZTE, ZTE Microelectronics	available	2016-12-28 02:15:35	2017-01-10 06:39:53
R1-1700124	UE reporting for beam management	ZTE, ZTE Microelectronics	available	2016-12-28 02:15:35	2017-01-10 06:39:53
R1-1700125	Beam grouping evaluation for beam management	ZTE, ZTE Microelectronics	revised	2016-12-28 02:15:35	2017-01-10 08:41:33
R1-1700126	Beamforming procedure considering high frequency channel characteristics	ZTE, ZTE Microelectronics	available	2016-12-28 02:15:35	2017-01-10 06:39:53
R1-1700127	Discussion on evaluation assumptions for beam management	ZTE, ZTE Microelectronics	available	2016-12-28 02:15:35	2017-01-10 06:39:53
R1-1700128	On RS and CSI report settings	ZTE, ZTE Microelectronics	noted	2016-12-28 02:15:35	2017-01-10 06:39:53
R1-1700129	On Type I codebook design for NR MIMO	ZTE, ZTE Microelectronics	revised	2016-12-28 02:15:35	2017-01-10 06:39:53

R1-1700130	Linear combination based CSI feedback design for NR MIMO	ZTE, ZTE Microelectronics	available	2016-12-28 02:15:35	2017-01-10 06:39:53
R1-1700131	Beam management for DL control channel	ZTE, ZTE Microelectronics	available	2016-12-28 02:15:35	2017-01-10 06:39:53
R1-1700132	Discussion on beam recovery mechanism	ZTE, ZTE Microelectronics	available	2016-12-28 02:15:35	2017-01-10 07:36:48
R1-1700133	On CSI-RS for CSI acquisition	ZTE, ZTE Microelectronics	available	2016-12-28 02:15:35	2017-01-10 06:39:53
R1-1700134	On CSI-RS for beam management	ZTE, ZTE Microelectronics	available	2016-12-28 02:15:35	2017-01-10 06:39:53
R1-1700135	Discussion on downlink DMRS design	ZTE, ZTE Microelectronics	available	2016-12-28 02:15:35	2017-01-10 06:39:53
R1-1700136	Discussion on uplink DMRS design	ZTE, ZTE Microelectronics	available	2016-12-28 02:15:35	2017-01-10 06:39:53
R1-1700137	Simulation results for downlink DMRS	ZTE, ZTE Microelectronics	available	2016-12-28 02:15:35	2017-01-10 06:39:53
R1-1700138	Discussion on RS for phase tracking	ZTE, ZTE Microelectronics	available	2016-12-28 02:15:35	2017-01-10 06:39:53
R1-1700139	Discussion on SRS design for NR	ZTE, ZTE Microelectronics	available	2016-12-28 02:15:35	2017-01-10 07:49:12
R1-1700140	QCL/QCB design for DL MIMO	ZTE, ZTE Microelectronics	available	2016-12-28 02:15:35	2017-01-10 07:22:52
R1-1700141	QCL/QCB design for UL MIMO	ZTE, ZTE Microelectronics	available	2016-12-28 02:15:35	2017-01-10 07:22:53
R1-1700142	Discussion on UL power control for NR	ZTE, ZTE Microelectronics	available	2016-12-28 02:15:35	2017-01-10 08:00:56
R1-1700143	Channel Reciprocity Based Massive MIMO for FDD	ZTE, ZTE Microelectronics	available	2016-12-28 02:15:35	2017-01-10 06:47:10
R1-1700144	Further clarification on assumptions for Phase 1 NR MIMO calibration	ZTE, ZTE Microelectronics	available	2016-12-28 02:15:35	2017-01-10 08:08:49
R1-1700145	Linear combination codebook design for multiple panels	ZTE, ZTE Microelectronics	available	2016-12-28 02:15:35	2017-01-10 06:50:44
R1-1700146	Hybrid CSI feedback for NR MIMO	ZTE, ZTE Microelectronics	revised	2016-12-28 02:15:35	2017-01-10 06:53:16
R1-1700147	Beam selection and CSI acquisition for NR MIMO	ZTE, ZTE Microelectronics	available	2016-12-28 09:06:03	2017-01-10 06:56:32
R1-1700148	Mobility RS for DL RRM Measurement	MediaTek Inc.	available	2016-12-28 16:47:34	2017-01-10 06:44:52
R1-1700149	Transmission scheme of NR-PDCCH	MediaTek Inc.	noted	2016-12-28 16:47:34	2017-01-10 06:44:52
R1-1700150	Design of NR-PDCCH resource allocation and search space	MediaTek Inc.	available	2016-12-28 16:47:34	2017-01-10 06:44:52
R1-1700151	Broadcast channel design for system information acquisition	MediaTek Inc.	available	2016-12-28 16:47:34	2017-01-10 06:57:07
R1-1700152	Considerations on paging design	MediaTek Inc.	withdrawn	2016-12-28 16:47:34	
R1-1700153	On Dynamic Switching between Single & Aggregated DCI	MediaTek Inc.	available	2016-12-28 16:47:34	2017-01-10 06:44:52
R1-1700154	On dynamic multiplexing between eMBB & URLLC for DL	MediaTek Inc.	available	2016-12-28 16:47:34	2017-01-10 06:44:52
R1-1700155	System performance evaluation with dynamic TDD	MediaTek Inc.	noted	2016-12-28 16:47:34	2017-01-10 06:44:52

R1-1700156	Interference management techniques for dynamic TDD	MediaTek Inc.	noted	2016-12-28 16:47:34	2017-01-10 06:44:52
R1-1700157	Considerations on receiver based techniques for interference management	MediaTek Inc.	available	2016-12-28 16:47:34	2017-01-10 06:44:52
R1-1700158	UE-specific RF bandwidth adaptation for single component carrier	MediaTek Inc.	available	2016-12-28 16:47:34	2017-01-10 06:44:52
R1-1700159	TDM based unified SS block design for both above and below 6 GHz	MediaTek Inc.	available	2016-12-28 16:47:34	2017-01-10 06:44:52
R1-1700160	Low Density Power Boosted Synchronization Signal for flexible NR frequency raster	MediaTek Inc.	available	2016-12-28 16:47:34	2017-01-10 06:44:52
R1-1700161	SS Block set periodicity considering beam tracking and initial acquisition	MediaTek Inc.	available	2016-12-28 16:47:34	2017-01-10 06:44:52
R1-1700162	Candidate Sequences for NR PSS	MediaTek Inc.	available	2016-12-28 16:47:34	2017-01-10 06:44:52
R1-1700163	Considerations on beam correspondence	MediaTek Inc.	available	2016-12-28 16:47:34	2017-01-10 06:44:52
R1-1700164	Low PAPR Modulation Design	MediaTek Inc.	available	2016-12-28 16:47:34	2017-01-10 06:44:52
R1-1700165	Discussion on multiple HARQ-ACK/NACK bits per TB	MediaTek Inc.	available	2016-12-28 16:47:34	2017-01-10 06:44:52
R1-1700166	High performance LDPC design features	MediaTek Inc.	revised	2016-12-28 16:47:34	2017-01-10 06:44:52
R1-1700167	High efficiency LDPC design features	MediaTek Inc.	revised	2016-12-28 16:47:34	2017-01-10 06:44:52
R1-1700168	Polar code design features for control channels	MediaTek Inc.	revised	2016-12-28 16:47:34	2017-01-10 06:44:52
R1-1700169	PBCH enhancement with Polar code	MediaTek Inc.	available	2016-12-28 16:47:34	2017-01-10 06:44:52
R1-1700170	Preamble format comparison in NR	MediaTek Inc.	withdrawn	2016-12-28 16:47:34	
R1-1700171	Considerations on handover in multi-beam operation	MediaTek Inc.	withdrawn	2016-12-28 16:47:34	
R1-1700172	On 2-step random access procedure and physical channel in NR	MediaTek Inc.	noted	2016-12-28 16:47:34	2017-01-10 06:44:52
R1-1700173	Discussion on UL control channel structures with short duration	MediaTek Inc.	available	2016-12-28 16:47:34	2017-01-10 06:44:52
R1-1700174	Discussion on multiplexing of short PUCCH and UL data	MediaTek Inc.	available	2016-12-28 16:47:34	2017-01-10 06:44:52
R1-1700175	DMRS pattern analysis and evaluation	MediaTek Inc.	available	2016-12-28 16:47:34	2017-01-10 06:44:52
R1-1700176	URLLC and eMBB DL Multiplexing using CRC masking and multi-bit NACK feedback	MediaTek Inc.	available	2016-12-28 16:47:34	2017-01-10 06:44:52
R1-1700177	NR Initial Access Procedure with multi-stage synchronization signals	CATT	available	2016-12-30 01:54:52	2017-01-10 05:20:04
R1-1700178	NR-SS Bandwidth and multiplexing with NR-PBCH	CATT	available	2016-12-30 01:54:52	2017-01-10 05:20:04
R1-1700179	Consideration of NR Raster and UE behavior	CATT	available	2016-12-30 01:54:52	2017-01-10 05:20:04
R1-1700180	NR SS periodicity	CATT	noted	2016-12-30 01:54:52	2017-01-10 05:20:04
R1-1700181	Numerology agnostic NR PSS design and performance evaluation results	CATT	available	2016-12-30 01:54:52	2017-01-10 05:20:04
R1-1700182	NR PBCH and NR physical channel carried system information	CATT	available	2016-12-30 01:54:52	2017-01-10 05:20:04
R1-1700183	NR Paging Channel	CATT	available	2016-12-30 01:54:52	2017-01-10 05:20:04
R1-1700184	On NR RACH Preamble Design	CATT	available	2016-12-30 01:54:52	2017-01-10 06:47:18
R1-1700185	Discussion on NR 4-step RA Procedure	CATT	available	2016-12-30 01:54:52	2017-01-10 05:20:04
R1-1700186	Further considerations on a 2-step RA procedure	CATT	available	2016-12-30 01:54:52	2017-01-10 05:20:04
R1-1700187	NR measurements and mobility management in IDLE and CONNECTED modes	CATT	available	2016-12-30 01:54:52	2017-01-10 05:20:04

R1-1700188	Mobility management based on UL Signals	CATT	available	2016-12-30 01:54:52	2017-01-10 05:20:04
R1-1700189	NR DL control channel structure	CATT	available	2016-12-30 01:54:52	2017-01-10 06:37:44
R1-1700190	Construction and mapping of DCI formats	CATT	available	2016-12-30 01:54:52	2017-01-10 05:20:04
R1-1700191	Common control signaling for NR	CATT	available	2016-12-30 01:54:52	2017-01-10 05:20:04
R1-1700192	Beam management for control and data channel	CATT	available	2016-12-30 01:54:52	2017-01-10 05:20:04
R1-1700193	QCL between CSI-RS for beam management	CATT	available	2016-12-30 01:54:52	2017-01-10 05:20:04
R1-1700194	Indication of NR-PDSCH starting symbol	CATT	available	2016-12-30 01:54:52	2017-01-10 05:20:04
R1-1700195	DM RS design for DL Control Channel	CATT	available	2016-12-30 01:54:52	2017-01-10 06:37:44
R1-1700196	Configurable DL control channel monitoring for power saving and blank resource indication in NR	CATT	available	2016-12-30 01:54:52	2017-01-10 05:20:04
R1-1700197	Wakeup signal for on-demand access for UE power saving in NR system design	CATT	available	2016-12-30 01:54:52	2017-01-10 05:20:04
R1-1700198	Long PUCCH structure	CATT	available	2016-12-30 01:54:52	2017-01-10 05:20:04
R1-1700199	Short PUCCH structure	CATT	available	2016-12-30 01:54:52	2017-01-10 05:20:04
R1-1700200	On waveform configuration for PUCCH	CATT	available	2016-12-30 01:54:52	2017-01-10 05:20:04
R1-1700201	Discussion on beam reporting	CATT	available	2016-12-30 01:54:52	2017-01-10 05:20:04
R1-1700202	NR Scheduling and HARQ operation	CATT	available	2016-12-30 01:54:52	2017-01-10 05:20:04
R1-1700203	NR HARQ operation	CATT	withdrawn	2016-12-30 01:54:52	
R1-1700204	NR frame structure for multiplexing of URLLC and eMBB traffic	CATT	available	2016-12-30 01:54:52	2017-01-10 05:20:04
R1-1700205	URLLC HARQ operation	CATT	available	2016-12-30 01:54:52	2017-01-10 06:52:59
R1-1700206	UL grant-free transmission for URLLC	CATT	available	2016-12-30 01:54:52	2017-01-10 06:37:44
R1-1700207	DL control channel monitoring for URLLC based on mini-slot scheduling	CATT	available	2016-12-30 01:54:52	2017-01-10 05:20:04
R1-1700208	Mini-slot and slot configuration	CATT	available	2016-12-30 01:54:52	2017-01-10 05:20:04
R1-1700209	DL control channel design for mini-slot based scheduling	CATT	available	2016-12-30 01:54:52	2017-01-10 05:20:04
R1-1700210	NR UL control channel design for mini-slot scheduling	CATT	withdrawn	2016-12-30 01:54:52	
R1-1700211	Dynamic TDD slot structure	CATT	available	2016-12-30 01:54:52	2017-01-10 05:20:04
R1-1700212	Interference management for dynamic TDD and flexible duplex	CATT	noted	2016-12-30 01:54:52	2017-01-10 05:20:05
R1-1700213	NR wider bandwidth operation up to 1GHz	CATT	available	2016-12-30 01:54:52	2017-01-10 05:20:05
R1-1700214	Adjacent channel co-existence of NR and LTE in unpaired spectrum	CATT	noted	2016-12-30 01:54:52	2017-01-10 05:20:05
R1-1700215	On codeword-to-layer mapping	CATT	available	2016-12-30 01:54:52	2017-01-10 05:20:05
R1-1700216	On DL transmission schemes	CATT	available	2016-12-30 01:54:52	2017-01-10 05:20:05
R1-1700217	On non-coherent and coherent MIMO	CATT	available	2016-12-30 01:54:52	2017-01-10 05:20:05
R1-1700218	Dicussion on network coordination	CATT	available	2016-12-30 01:54:52	2017-01-10 05:20:05
R1-1700219	On precoding granularity	CATT	available	2016-12-30 01:54:52	2017-01-10 05:20:05
R1-1700220	On UL transmission schemes	CATT	available	2016-12-30 01:54:52	2017-01-10 05:20:05
R1-1700221	Discussion on UL frequency selective precoding	CATT	available	2016-12-30 01:54:52	2017-01-10 05:20:05
R1-1700222	On Type I feedback	CATT	revised	2016-12-30 01:54:52	2017-01-10 05:20:05
R1-1700223	On Type II feedback	CATT	available	2016-12-30 01:54:52	2017-01-10 05:20:05
R1-1700224	Discusison on CSI reporting	CATT	available	2016-12-30 01:54:52	2017-01-10 05:20:05
R1-1700225	Discussion on beam recovery	CATT	available	2016-12-30 01:54:52	2017-01-10 05:20:05

R1-1700226	Consideration on beam reciprocity	CATT	available	2016-12-30 01:54:52	2017-01-10 05:20:05
R1-1700227	Further discussion beam management	CATT	available	2016-12-30 01:54:52	2017-01-10 05:20:05
R1-1700228	Discussion on CSI-RS for CSI	CATT	available	2016-12-30 01:54:52	2017-01-10 05:20:05
R1-1700229	Discussion on CSI-RS for beam management	CATT	available	2016-12-30 01:54:52	2017-01-10 05:20:05
R1-1700230	Discussion on DMRS design for DL	CATT	available	2016-12-30 01:54:53	2017-01-10 05:20:05
R1-1700231	Discussion on DMRS design for UL	CATT	available	2016-12-30 01:54:53	2017-01-10 05:20:05
R1-1700232	Furhter discussion on Phase tracking for DL	CATT	available	2016-12-30 01:54:53	2017-01-10 05:20:05
R1-1700233	Further discussion on Phase tracking for UL	CATT	available	2016-12-30 01:54:53	2017-01-10 05:20:05
R1-1700234	Further discussion on SRS transmission	CATT	available	2016-12-30 01:54:53	2017-01-10 05:20:05
R1-1700235	Further discussion on QCL for DL	CATT	available	2016-12-30 01:54:53	2017-01-10 05:20:05
R1-1700236	NR MIMO calibration results	CATT	available	2016-12-30 01:54:53	2017-01-10 05:20:05
R1-1700237	LDPC codes design for eMBB	CATT	noted	2016-12-30 01:54:53	2017-01-10 05:20:05
R1-1700238	Optimization on the first offset row of QC-LDPC codes	CATT	available	2016-12-30 01:54:53	2017-01-10 05:20:05
R1-1700239	Optimization on adjacent offset rows of QC-LDPC codes	CATT	available	2016-12-30 01:54:53	2017-01-10 05:20:05
R1-1700240	IR-HARQ scheme for LDPC codes	CATT	available	2016-12-30 01:54:53	2017-01-10 05:20:05
R1-1700241	Discussion on polar codes for eMMB control channel	CATT	noted	2016-12-30 01:54:53	2017-01-10 05:20:05
R1-1700242	Polar codes design for eMMB control channel	CATT	available	2016-12-30 01:54:53	2017-01-10 05:20:05
R1-1700243	Performance comparison of LDPC and polar codes for URLLC	CATT	available	2016-12-30 01:54:53	2017-01-10 05:20:05
R1-1700244	Performance evaluation of LDPC code for eMBB	ZTE, ZTE Microelectronics	available	2016-12-30 06:04:23	2017-01-10 03:43:04
R1-1700245	Consideration on flexibility of LDPC codes for eMBB	ZTE, ZTE Microelectronics	noted	2016-12-30 06:04:23	2017-01-10 03:43:04
R1-1700246	Complexity, throughput and latency analysis on LDPC codes for eMBB	ZTE, ZTE Microelectronics	available	2016-12-30 06:04:23	2017-01-10 03:43:04
R1-1700247	Compact LDPC design for eMBB	ZTE, ZTE Microelectronics	revised	2016-12-30 06:04:23	2017-01-10 06:23:31
R1-1700248	Bit rearrangement of LDPC for high order modulation	ZTE, ZTE Microelectronics	available	2016-12-30 06:04:23	2017-01-10 03:43:04
R1-1700249	Rate matching of polar codes for eMBB	ZTE, ZTE Microelectronics	available	2016-12-30 06:04:23	2017-01-10 03:43:04
R1-1700250	Construction of polar codes for eMBB	ZTE, ZTE Microelectronics	noted	2016-12-30 06:04:23	2017-01-10 03:43:04
R1-1700251	Consideration on outer code for NR	ZTE, ZTE Microelectronics	available	2016-12-30 06:04:23	2017-01-10 03:43:04
R1-1700252	Discussion on modulation schemes for NR	ZTE, ZTE Microelectronics	available	2016-12-30 06:04:23	2017-01-10 06:23:31
R1-1700253	Basic grant-free transmission for URLLC	ZTE, ZTE Microelectronics	available	2016-12-30 06:07:43	2017-01-10 03:43:04
R1-1700254	Advanced grant-free transmission for URLLC	ZTE, ZTE Microelectronics	available	2016-12-30 06:07:43	2017-01-10 03:43:04
R1-1700255	Non-orthogonal data transmission for eMBB	ZTE, ZTE Microelectronics	available	2016-12-30 06:07:43	2017-01-10 03:43:04

R1-1700256	Remaining issues on system level simulation for multiple access	ZTE, ZTE Microelectronics	available	2016-12-30 06:07:43	2017-01-10 03:43:04
R1-1700257	DL control structure	ZTE, ZTE Microelectronics	available	2016-12-30 06:10:26	2017-01-10 03:43:04
R1-1700258	DL common control	ZTE, ZTE Microelectronics	available	2016-12-30 06:10:26	2017-01-10 03:43:04
R1-1700259	DL control procedure	ZTE, ZTE Microelectronics	available	2016-12-30 06:10:26	2017-01-10 03:43:04
R1-1700260	Issues related to UE/PDCCH-specific DMRS of NR-PDCCH	ZTE, ZTE Microelectronics	noted	2016-12-30 06:10:26	2017-01-10 03:43:04
R1-1700261	UL control structure	ZTE, ZTE Microelectronics	available	2016-12-30 06:10:26	2017-01-10 03:43:04
R1-1700262	UL control time position	ZTE, ZTE Microelectronics	noted	2016-12-30 06:10:26	2017-01-10 03:43:04
R1-1700263	UL control resource design	ZTE, ZTE Microelectronics	available	2016-12-30 06:10:26	2017-01-10 03:43:04
R1-1700264	About URLLC/eMBB multiplexing	ZTE, ZTE Microelectronics	available	2016-12-30 06:10:26	2017-01-10 03:43:04
R1-1700265	Analysis of URLLC reliability in DL HARQ	ZTE, ZTE Microelectronics	available	2016-12-30 06:10:26	2017-01-10 03:43:04
R1-1700266	Implicit DC indication	ZTE, ZTE Microelectronics	available	2016-12-30 06:10:26	2017-01-10 03:43:04
R1-1700267	ECP at 60 kHz SCS	ZTE, ZTE Microelectronics	noted	2016-12-30 06:10:26	2017-01-10 03:43:04
R1-1700268	Zero-wait-time Scheduling Request Underlay Channel	Idaho National Laboratory	noted	2017-01-03 18:24:59	2017-01-09 19:31:02
R1-1700269	Overview of Duplexing and Cross-link Interference Mitigation	ZTE, ZTE Microelectronics	available	2017-01-03 19:02:41	2017-01-09 21:33:12
R1-1700270	Discussion on dynamic TDD and Cross-link Interference Mitigation Schemes	ZTE, ZTE Microelectronics	available	2017-01-03 19:07:35	2017-01-09 21:33:12
R1-1700271	Discussion on Measurement and RS design for Cross-link Interference Mitigation	ZTE, ZTE Microelectronics	noted	2017-01-03 19:11:09	2017-01-09 21:33:12
R1-1700272	Sensing based Schemes for Cross-link Interference Mitigation in NR	ZTE, ZTE Microelectronics	available	2017-01-03 19:14:17	2017-01-09 21:33:12
R1-1700273	Support beam operation for NR mobility	vivo	available	2017-01-04 07:04:37	2017-01-09 02:35:12
R1-1700274	Discussion on beam management for NR MIMO	vivo	available	2017-01-04 07:04:37	2017-01-09 02:35:12
R1-1700275	Discussion on DMRS configurations	vivo	available	2017-01-04 07:04:37	2017-01-09 02:35:12
R1-1700276	RS design for beam management	vivo	available	2017-01-04 07:04:37	2017-01-09 02:35:12
R1-1700277	NR-PDCCH Control Resource Set	vivo	available	2017-01-04 07:04:37	2017-01-09 02:35:12
R1-1700278	Use case for two-step DCI reception	vivo	available	2017-01-04 07:04:37	2017-01-09 02:35:12
R1-1700279	CCE Link-level performance evaluation for polar code	vivo	available	2017-01-04 07:04:37	2017-01-09 02:35:12
R1-1700280	RNTI and CRC size for NR	vivo	available	2017-01-04 07:04:37	2017-01-09 02:35:12
R1-1700281	Discussion on URLLC and eMBB multiplexing	vivo	available	2017-01-04 07:04:37	2017-01-09 02:35:12
R1-1700282	MBMS design in Mini-slot below 6 GHz	vivo	noted	2017-01-04 07:04:37	2017-01-09 02:35:12

R1-1700283	Proposal on the slot basis dynamic TDD	vivo	noted	2017-01-04 07:04:37	2017-01-09 02:35:12
R1-1700284	Discussion on numerology multiplexing	vivo	available	2017-01-04 07:04:37	2017-01-09 02:35:12
R1-1700285	Discussion on SRS in NR	Spreadtrum Communications	available	2017-01-04 08:57:40	2017-01-09 13:40:14
R1-1700286	On the explicit feedback for NR	Spreadtrum Communications	available	2017-01-04 08:57:40	2017-01-09 13:40:14
R1-1700287	NR MIMO calibration results	Spreadtrum Communications	available	2017-01-04 08:57:40	2017-01-09 13:40:14
R1-1700288	Indication of the SS-block index in multi-beam cases	Spreadtrum Communications	available	2017-01-04 08:57:40	2017-01-09 13:40:15
R1-1700289	Discussion on the UL signal transmission in multi-beam cases	Spreadtrum Communications	available	2017-01-04 08:57:40	2017-01-09 13:40:15
R1-1700290	LS on UE capability aspects for LTE/NR tight interworking	RAN2, Nokia	treated	2017-01-04 13:43:09	2017-01-04 14:05:59
R1-1700291	Reply LS on NR RACH Procedure	RAN2, Huawei	treated	2017-01-04 13:43:09	2017-01-04 14:05:59
R1-1700292	NR SS bandwidth and multiplexing	Ericsson	noted	2017-01-04 15:26:34	2017-01-10 06:53:47
R1-1700293	NR SS frequency raster	Ericsson	available	2017-01-04 15:26:34	2017-01-10 06:53:47
R1-1700294	NR SS burst set periodicity	Ericsson	noted	2017-01-04 15:26:34	2017-01-10 06:53:47
R1-1700295	NR-PSS/SSS Sequence design	Ericsson	available	2017-01-04 15:26:34	2017-01-10 06:53:47
R1-1700296	NR Minimum system information delivery	Ericsson	available	2017-01-04 15:26:34	2017-01-10 06:53:47
R1-1700297	NR Paging design	Ericsson	available	2017-01-04 15:26:34	2017-01-10 06:53:47
R1-1700298	NR PRACH design	Ericsson	noted	2017-01-04 15:26:34	2017-01-10 06:53:47
R1-1700299	NR Four-step random access procedure	Ericsson	available	2017-01-04 15:26:34	2017-01-10 06:53:47
R1-1700300	NR Two-step random access procedure	Ericsson	available	2017-01-04 15:26:34	2017-01-10 06:53:47
R1-1700301	NR Synchronization signals for idle and connected mode mobility	Ericsson	available	2017-01-04 15:26:34	2017-01-10 06:53:47
R1-1700302	Synchronization signal options for active mode mobility RS	Ericsson	available	2017-01-04 15:26:34	2017-01-10 06:53:47
R1-1700303	RACH procedure in non-standalone operation	Mitsubishi Electric Co.	available	2017-01-05 02:33:17	2017-01-10 00:55:21
R1-1700304	On RACH retransmission	Mitsubishi Electric Co.	available	2017-01-05 02:34:45	2017-01-10 00:52:02
R1-1700305	On DL control channel design	Mitsubishi Electric Co.	available	2017-01-05 02:36:02	2017-01-10 00:52:19
R1-1700306	NR SS Design: Minimum Bandwidth and Multiplexing	AT&T	noted	2017-01-05 03:26:49	2017-01-10 02:54:45
R1-1700307	NR SS Design: Frequency Raster	AT&T	available	2017-01-05 03:28:17	2017-01-10 02:54:45
R1-1700308	Periodicty of NR SS	AT&T	available	2017-01-05 03:29:09	2017-01-10 02:54:45
R1-1700309	PRACH Design for NR	AT&T	noted	2017-01-05 03:29:51	2017-01-10 02:54:45
R1-1700310	4-Step RA Procedure for NR	AT&T	available	2017-01-05 03:30:28	2017-01-10 02:54:45
R1-1700311	2-Step RA Procedure for NR	AT&T	available	2017-01-05 03:31:03	2017-01-10 02:54:45
R1-1700312	RRM Measurement for IDLE mode and CONNECTED mode UE	AT&T	available	2017-01-05 03:31:45	2017-01-10 02:54:45
R1-1700313	Flexible Transport Block, Codeword and Layer Mapping Concepts fot NR	AT&T	available	2017-01-05 03:32:46	2017-01-10 02:54:45
R1-1700314	Further Evaluation of Component Based NR-MIMO Feedback	AT&T	available	2017-01-05 03:33:37	2017-01-10 02:54:45
R1-1700315	Design and Evaluation of CSI-RS for NR MIMO with Mixed Numerology Support	AT&T	available	2017-01-05 03:34:31	2017-01-10 05:01:55
R1-1700316	Design of DM-RS for NR MIMO	AT&T	available	2017-01-05 03:35:20	2017-01-10 05:01:55
R1-1700317	View on QCL Type and Definition for NR-MIMO Framework	AT&T	available	2017-01-05 03:36:17	2017-01-10 02:54:45

R1-1700318	CSI-RS Based Design of SRS for Sounding in NR	AT&T	available	2017-01-05 03:37:02	2017-01-10 02:54:45
R1-1700319	Details on The Design of Two Stage Downlink Control Channel for NR	AT&T	available	2017-01-05 03:37:47	2017-01-10 02:54:45
R1-1700320	UE Assisted UCI Format Selection for NR	AT&T	available	2017-01-05 03:38:37	2017-01-10 02:54:45
R1-1700321	Mini Slot Design and Operations in NR	AT&T	available	2017-01-05 03:39:20	2017-01-10 02:54:45
R1-1700322	Scheduling on Mini-Slot in NR	AT&T	available	2017-01-05 03:39:51	2017-01-10 02:54:45
R1-1700323	Design of Parity Check Matrix for LDPC	AT&T	withdrawn	2017-01-05 03:40:46	
R1-1700324	Design of Polar Codes for Control Channel in NR	AT&T	noted	2017-01-05 03:41:48	2017-01-10 05:01:55
R1-1700325	Control Channel FEC for Small Block Size in NR	AT&T	available	2017-01-05 03:42:51	2017-01-10 05:01:55
R1-1700326	Desing of Interference Measurement and Feedback in NR	AT&T	revised	2017-01-05 03:43:29	2017-01-10 02:54:45
R1-1700327	Further Details and Techniques on LTE and NR Co-Existence	AT&T	noted	2017-01-05 03:44:12	2017-01-10 02:54:45
R1-1700328	Synchronization signal structure	Intel Corporation	available	2017-01-05 05:16:45	2017-01-10 07:09:34
R1-1700329	Periodicity of syncrhonization signals	Intel Corporation	noted	2017-01-05 05:16:45	2017-01-10 07:09:34
R1-1700330	Considerations for synchronization signal sequence	Intel Corporation	available	2017-01-05 05:16:45	2017-01-10 07:09:34
R1-1700331	Considerations for NR physical broadcast channel	Intel Corporation	available	2017-01-05 05:16:45	2017-01-10 07:09:33
R1-1700332	PRACH preamble and resource allocation	Intel Corporation	available	2017-01-05 05:16:45	2017-01-10 07:09:33
R1-1700333	Considerations for random access procedure	Intel Corporation	available	2017-01-05 05:16:45	2017-01-10 07:09:33
R1-1700334	Considerations for NR mobility	Intel Corporation	available	2017-01-05 05:16:45	2017-01-10 07:09:33
R1-1700335	On DMRS based DL (open Loop and semi-open Loop) MIMO	Intel Corporation	available	2017-01-05 05:16:45	2017-01-10 07:09:33
R1-1700336	On UL Frequency Selective Precoding	Intel Corporation	available	2017-01-05 05:16:45	2017-01-10 07:09:33
R1-1700337	On Interference Measurement	Intel Corporation	available	2017-01-05 05:16:45	2017-01-10 07:09:33
R1-1700338	Study on the number of codewords for NR	Intel Corporation	noted	2017-01-05 05:16:45	2017-01-10 07:09:33
R1-1700339	On codeword to MIMO layer mapping	Intel Corporation	available	2017-01-05 05:16:45	2017-01-10 07:09:33
R1-1700340	On MIMO layer adaptation	Intel Corporation	available	2017-01-05 05:16:45	2017-01-10 07:09:33
R1-1700341	Further discussion on NR Type I codebook design	Intel Corporation	available	2017-01-05 05:16:45	2017-01-10 07:09:33
R1-1700342	CSI for Type II feedback	Intel Corporation	noted	2017-01-05 05:16:45	2017-01-10 07:09:33
R1-1700343	Discussion on codebook for multi-panel support	Intel Corporation	available	2017-01-05 05:16:45	2017-01-10 07:09:33
R1-1700344	On NR CSI acquisition signaling	Intel Corporation	available	2017-01-05 05:16:45	2017-01-10 07:09:33
R1-1700345	Further discussion on network initiated beam recovery in NR	Intel Corporation	available	2017-01-05 05:16:45	2017-01-10 07:09:33
R1-1700346	On Beam State Reporting	Intel Corporation	available	2017-01-05 05:16:45	2017-01-10 07:09:33
R1-1700347	Discussion on DL Beam Management	Intel Corporation	revised	2017-01-05 05:16:45	2017-01-10 07:09:33
R1-1700348	Reference Signal and Procedure for UL Beam Management	Intel Corporation	available	2017-01-05 05:16:45	2017-01-10 07:09:33
R1-1700349	On UE initiated beam recovery	Intel Corporation	available	2017-01-05 05:16:45	2017-01-10 07:09:33
R1-1700350	CSI-RS Structure for Beam Management	Intel Corporation	available	2017-01-05 05:16:45	2017-01-10 07:09:33
R1-1700351	Further discussion on CSI-RS for NR	Intel Corporation	available	2017-01-05 05:16:45	2017-01-10 07:09:33
R1-1700352	Downlink DM-RS design for NR	Intel Corporation	available	2017-01-05 05:16:45	2017-01-10 07:09:33
R1-1700353	Uplink DM-RS design for NR	Intel Corporation	available	2017-01-05 05:16:45	2017-01-10 07:09:33
R1-1700354	Evaluation results for DM-RS	Intel Corporation	revised	2017-01-05 05:16:45	2017-01-10 07:09:33
R1-1700355	Discussion on RS for Phase Tracking	Intel Corporation	available	2017-01-05 05:16:45	2017-01-10 07:09:33
R1-1700356	Further discussion on SRS for NR	Intel Corporation	noted	2017-01-05 05:16:45	2017-01-10 07:09:33
R1-1700357	On cross-carrier QCL	Intel Corporation	available	2017-01-05 05:16:45	2017-01-10 07:09:33
R1-1700358	Discussion on UL Power Control	Intel Corporation	available	2017-01-05 05:16:45	2017-01-10 07:09:33
R1-1700359	Physical Downlink Control Channel Design for NR	Intel Corporation	available	2017-01-05 05:16:45	2017-01-10 07:09:33
R1-1700360	On common physical DL control channel	Intel Corporation	available	2017-01-05 05:16:45	2017-01-10 07:09:33

R1-1700361	On multi-stage physical DL control	Intel Corporation	available	2017-01-05 05:16:45	2017-01-10 07:09:33
R1-1700362	On the bandwidth adaptation for NR	Intel Corporation	available	2017-01-05 05:16:45	2017-01-10 07:09:33
R1-1700363	Short UL control channel early in a slot	Intel Corporation	available	2017-01-05 05:16:45	2017-01-10 07:09:33
R1-1700364	UL control channel design with short duration	Intel Corporation	available	2017-01-05 05:16:45	2017-01-10 07:09:33
R1-1700365	CM evaluation for short UL control channel	Intel Corporation	available	2017-01-05 05:16:45	2017-01-10 07:09:33
R1-1700366	Link level evaluation and comparison of DMRS structures for short UL control channel	Intel Corporation	available	2017-01-05 05:16:45	2017-01-10 07:09:33
R1-1700367	Link level evaluation and comparison of sequence vs. DMRS based structure for short UL control channel	Intel Corporation	noted	2017-01-05 05:16:45	2017-01-10 07:09:33
R1-1700368	UL control channel design with long duration	Intel Corporation	available	2017-01-05 05:16:45	2017-01-10 07:09:33
R1-1700369	Resource allocation for NR uplink control channel	Intel Corporation	available	2017-01-05 05:16:45	2017-01-10 07:09:33
R1-1700370	Scheduling request design for NR	Intel Corporation	available	2017-01-05 05:16:45	2017-01-10 07:09:33
R1-1700371	Scheduling and bandwidth configuration in wide channel bandwidth	Intel Corporation	available	2017-01-05 05:16:45	2017-01-10 07:09:33
R1-1700372	Time Domain Aspects of NR Data Scheduling	Intel Corporation	available	2017-01-05 05:16:45	2017-01-10 07:09:33
R1-1700373	Frequency Domain Aspects of NR Data Scheduling	Intel Corporation	available	2017-01-05 05:16:46	2017-01-10 07:09:33
R1-1700374	Downlink multiplexing of eMBB and URLLC transmissions	Intel Corporation	available	2017-01-05 05:16:46	2017-01-10 07:09:33
R1-1700375	Uplink URLLC transmission without grant	Intel Corporation	revised	2017-01-05 05:16:46	2017-01-10 07:09:33
R1-1700376	Uplink URLLC transmission based on scheduling request and grant	Intel Corporation	available	2017-01-05 05:16:46	2017-01-10 07:09:33
R1-1700377	Uplink multiplexing of eMBB and URLLC transmissions	Intel Corporation	available	2017-01-05 05:16:46	2017-01-10 07:09:33
R1-1700378	URLLC link adaptation aspects	Intel Corporation	available	2017-01-05 05:16:46	2017-01-10 07:09:33
R1-1700379	Considerations on mini-slot for NR	Intel Corporation	available	2017-01-05 05:16:46	2017-01-10 07:09:33
R1-1700380	Mini-slot length and start time for URLLC	Intel Corporation	available	2017-01-05 05:16:46	2017-01-10 07:09:33
R1-1700381	Demodulation reference signals design aspects for URLLC mini-slots	Intel Corporation	noted	2017-01-05 05:16:46	2017-01-10 07:09:33
R1-1700382	Data channel encoding chain	Intel Corporation	available	2017-01-05 05:16:46	2017-01-10 07:09:33
R1-1700383	LDPC prototype matrix design	Intel Corporation	noted	2017-01-05 05:16:46	2017-01-10 07:09:33
R1-1700384	LDPC HARQ design	Intel Corporation	available	2017-01-05 05:16:46	2017-01-10 07:09:33
R1-1700385	Considerations in Polar code design	Intel Corporation	noted	2017-01-05 05:16:46	2017-01-10 07:09:34
R1-1700386	Polar code design	Intel Corporation	noted	2017-01-05 05:16:46	2017-01-10 07:09:34
R1-1700387	Evaluation results of dynamic TDD at 4 GHz	Intel Corporation	noted	2017-01-05 05:16:46	2017-01-10 07:09:34
R1-1700388	Considerations on reference signal for interference measurement	Intel Corporation	available	2017-01-05 05:16:46	2017-01-10 07:09:34
R1-1700389	Wide bandwidth operation and UE capability	Intel Corporation	noted	2017-01-05 05:16:46	2017-01-10 08:20:28
R1-1700390	Further Considerations on NR/LTE Coexistence	Intel Corporation	noted	2017-01-05 05:16:46	2017-01-10 07:09:34
R1-1700391	Extended CP numerology	Intel Corporation	noted	2017-01-05 05:16:46	2017-01-10 07:09:34
R1-1700392	Transmitter side dc subcarrier handling in NR	Intel Corporation	available	2017-01-05 05:16:46	2017-01-10 07:09:34
R1-1700393	Discussion on DL Beam Management	National Taiwan University	withdrawn	2017-01-05 08:03:09	2017-01-05 18:59:29
R1-1700394	DMRS Based Phase Noise Compensation for NR	AT&T	available	2017-01-05 13:36:26	2017-01-10 05:01:55
R1-1700395	Summary of 87-30 email discussion on NR MIMO calibration	ZTE, ZTE Microelectronics	revised	2017-01-05 16:00:45	2017-01-10 08:08:49

R1-1700396	Discussion on DL Beam Management	National Taiwan University	available	2017-01-05 19:18:50	2017-01-13 02:35:08
R1-1700397	Dynamic resource multiplexing of downlink control and data	Huawei, HiSilicon	available	2017-01-05 20:55:34	2017-01-09 21:09:25
R1-1700398	Discussion on PCFICH-like control channel	Huawei, HiSilicon	available	2017-01-05 20:55:34	2017-01-09 21:09:25
R1-1700399	On UCI transmission over PUCCH and PUSCH	Huawei, HiSilicon	available	2017-01-05 20:55:34	2017-01-09 21:09:25
R1-1700400	Number of HARQ processes	Huawei, HiSilicon	available	2017-01-05 20:55:34	2017-01-09 21:09:25
R1-1700401	Support of URLLC in DL	Huawei, HiSilicon	available	2017-01-05 20:55:34	2017-01-09 21:12:36
R1-1700402	Consideration of NR signals and channels mapping around LTE CRS	Huawei, HiSilicon	available	2017-01-05 20:55:34	2017-01-09 21:09:25
R1-1700403	Analysis and evaluation on RS configuration for RRM measurement of connected and idle UEs	Huawei, HiSilicon	available	2017-01-05 20:55:34	2017-01-09 21:12:36
R1-1700404	On the size of UE identity	Huawei, HiSilicon	available	2017-01-05 20:55:34	2017-01-09 21:09:25
R1-1700405	QCL indication of downlink control channel and beam management reference signals	Huawei, HiSilicon	available	2017-01-05 20:55:34	2017-01-09 21:12:36
R1-1700406	HARQ for polar codes	Huawei, HiSilicon	available	2017-01-05 20:55:34	2017-01-10 03:51:55
R1-1700407	Analysis on interference estimation for open loop transmission scheme	Huawei, HiSilicon	available	2017-01-05 20:55:34	2017-01-09 21:23:07
R1-1700408	Discussion on UL MIMO transmission	Huawei, HiSilicon	available	2017-01-05 20:55:34	2017-01-09 21:23:07
R1-1700409	Discussion on UL MU-MIMO between CP-OFDM and DFT-s-OFDM	Huawei, HiSilicon	available	2017-01-05 20:55:34	2017-01-09 21:23:07
R1-1700410	Evaluation of DPS-based coordinated transmission scheme	Huawei, HiSilicon	available	2017-01-05 20:55:34	2017-01-09 21:23:07
R1-1700411	Evaluation of non-coherent JT-based coordinated transmission scheme	Huawei, HiSilicon	available	2017-01-05 20:55:34	2017-01-09 21:23:07
R1-1700412	Number of codewords for physical data channel	Huawei, HiSilicon	available	2017-01-05 20:55:34	2017-01-09 21:23:07
R1-1700413	PRB bundling size for DL data precoding	Huawei, HiSilicon	available	2017-01-05 20:55:34	2017-01-09 21:23:07
R1-1700414	Design for Type I Feedback	Huawei, HiSilicon	noted	2017-01-05 20:55:34	2017-01-09 21:23:07
R1-1700415	Design for Type II Feedback	Huawei, HiSilicon	available	2017-01-05 20:55:34	2017-01-09 21:23:07
R1-1700416	Symmetric RS design for duplexing flexibility	Huawei, HiSilicon	available	2017-01-05 20:55:34	2017-01-09 21:38:31
R1-1700417	Discussion on Rural channel model for below 6GHz	Huawei, HiSilicon	noted	2017-01-05 20:55:34	2017-01-09 21:23:07
R1-1700418	Discussion on multi-band channel model	Huawei, HiSilicon	noted	2017-01-05 20:55:34	2017-01-09 21:23:07
R1-1700419	Discussion on PRB sharing between NR-PDCCH and eMBB data	Huawei, HiSilicon	available	2017-01-05 20:55:34	2017-01-09 21:12:36
R1-1700420	Discussion on the usage of mini-slot in unlicensed band below 6GHz	Huawei, HiSilicon	available	2017-01-05 20:55:34	2017-01-09 21:12:36
R1-1700421	Draft CR to TR36.873 on rural channel model	Huawei, HiSilicon	revised	2017-01-05 21:02:39	2017-01-09 21:23:07
R1-1700422	Frequency raster for synchronization signal and system carrier	Intel Corporation	noted	2017-01-05 22:06:01	2017-01-10 07:09:34
R1-1700423	Complexity and Performance - System Considerations	Coherent Logix	withdrawn	2017-01-05 22:48:45	
R1-1700424	About mini-slot design	ZTE, ZTE Microelectronics, Nokia, Ericsson	noted	2017-01-05 22:50:25	2017-01-10 03:43:04
R1-1700425	Scalable processing for accelerated DCI blind detection	Coherent Logix	available	2017-01-05 22:50:52	2017-01-09 21:10:54
R1-1700426	Discussion on 2-step RA procedure issues	ITRI	available	2017-01-06 00:48:16	2017-01-06 08:26:57
R1-1700427	Results of additional feature calibration	ITRI	available	2017-01-06 00:50:27	2017-01-06 08:26:57

R1-1700428	Enhanced redundancy matching and HARQ transmission process in NR	ITRI	available	2017-01-06 00:52:16	2017-01-06 08:26:57
R1-1700429	On transmission bandwidth and multiplexing synchronization signals	CMCC	withdrawn	2017-01-06 01:12:33	
R1-1700430	Beam sweeping using multi-width beams	CMCC	withdrawn	2017-01-06 01:12:33	
R1-1700431	RACH in Gradual UE-specific (GUS) initial access	CMCC	available	2017-01-06 01:12:33	2017-01-09 14:45:55
R1-1700432	On separating RSs for L3 mobility, L1/L2 mobility and data-related transmission	CMCC	available	2017-01-06 01:12:33	2017-01-09 14:45:55
R1-1700433	Backhaul information exchange for network coordination	CMCC	withdrawn	2017-01-06 01:12:33	
R1-1700434	Discussion and evaluation on spatial-based and panel-based MU-MIMO transmission schemes	CMCC	available	2017-01-06 01:12:33	2017-01-09 14:45:55
R1-1700435	Digital codebook design principle for NR MIMO	CMCC	available	2017-01-06 01:12:33	2017-01-09 14:45:55
R1-1700436	Discussion on UE triggered beam reporting for beam recovery	CMCC	available	2017-01-06 01:12:33	2017-01-09 14:45:55
R1-1700437	DMRS density for high speed scenario	CMCC	available	2017-01-06 01:12:33	2017-01-09 14:45:55
R1-1700438	Phase-tracking reference signal design for high-frequency systems	CMCC	available	2017-01-06 01:12:33	2017-01-09 14:45:55
R1-1700439	Phase 1 calibration results for NR MIMO	CMCC	available	2017-01-06 01:12:33	2017-01-09 14:45:55
R1-1700440	Discussion on DCI in NR	CMCC	available	2017-01-06 01:12:33	2017-01-09 14:45:55
R1-1700441	Discussion on long duration UL control channel design	CMCC	available	2017-01-06 01:12:33	2017-01-09 14:45:55
R1-1700442	Discussion on eMBB/URLLC multiplexing	CMCC	available	2017-01-06 01:12:33	2017-01-10 02:53:21
R1-1700443	Discussion on semi-static TDD configurations	CMCC	available	2017-01-06 01:12:33	2017-01-09 14:45:55
R1-1700444	Considerations on flexible duplex in NR	CMCC	noted	2017-01-06 01:12:33	2017-01-10 03:54:35
R1-1700445	New measurements on RMA 3D model	CMCC	noted	2017-01-06 01:12:33	2017-01-09 14:45:55
R1-1700446	3d extension for InH Scenario	CMCC	noted	2017-01-06 01:12:33	2017-01-09 14:45:55
R1-1700447	LoS Probability for InH Scenario	CMCC	noted	2017-01-06 01:12:33	2017-01-09 14:45:55
R1-1700448	Multiplexing of eMBB and URLLC in DL	NEC	available	2017-01-06 04:04:57	2017-01-10 05:13:08
R1-1700449	Number of component carriers in NR	NEC	available	2017-01-06 04:04:57	2017-01-10 05:13:08
R1-1700450	Sync signal design for different beam approaches	KT Corp.	available	2017-01-06 04:38:04	2017-01-09 05:51:46
R1-1700451	Discussion on mobility procedure	KT Corp.	available	2017-01-06 04:38:59	2017-01-09 05:51:46
R1-1700452	Consideration on URLLC HARQ design	Beijing Xiaomi Mobile Software	available	2017-01-06 05:22:35	2017-01-09 02:26:10
R1-1700453	Synchronizatoin signal transmission based on multi-beam for NR	Potevio	available	2017-01-06 05:41:16	2017-01-09 08:47:35
R1-1700454	Discussion on resource configuration for UL URLLC	Potevio	available	2017-01-06 05:41:16	2017-01-09 08:47:35
R1-1700455	Discussion on URLLC transmission aspects	Potevio	available	2017-01-06 05:41:16	2017-01-09 08:50:00
R1-1700456	Discussion on SS bandwidth and multiplexing	LG Electronics	available	2017-01-06 05:46:41	2017-01-10 05:00:01
R1-1700457	Discussion on SS frequency raster	LG Electronics	available	2017-01-06 05:46:41	2017-01-10 05:06:23
R1-1700458	Discussion on SS periodicity	LG Electronics	available	2017-01-06 05:46:41	2017-01-10 05:06:23
R1-1700459	NR Synchronization Signal Design	LG Electronics	noted	2017-01-06 05:46:41	2017-01-10 05:06:23
R1-1700460	NR PBCH Design	LG Electronics	available	2017-01-06 05:46:41	2017-01-10 05:06:23
R1-1700461	Discussion on paging design in NR	LG Electronics	available	2017-01-06 05:46:41	2017-01-10 05:06:23
R1-1700462	Discussion on NR PRACH Preamble	LG Electronics	revised	2017-01-06 05:46:41	2017-01-10 05:06:23
R1-1700463	Discussion on RACH procedure	LG Electronics	noted	2017-01-06 05:46:41	2017-01-10 05:06:23
R1-1700464	Discussion on 2 step RACH	LG Electronics	available	2017-01-06 05:46:41	2017-01-10 05:06:23

R1-1700465	Discussion on UL based measurement	LG Electronics	available	2017-01-06 05:46:41	2017-01-10 05:06:23
R1-1700466	Discussion on RRM measurement in NR	LG Electronics	available	2017-01-06 05:46:41	2017-01-10 05:06:23
R1-1700467	Discussion on UL-MIMO	LG Electronics	available	2017-01-06 05:46:41	2017-01-10 05:06:23
R1-1700468	Discussion on intra/inter-TRP CoMP	LG Electronics	available	2017-01-06 05:46:41	2017-01-10 05:06:23
R1-1700469	Discussion on diversity achieving schemes	LG Electronics	noted	2017-01-06 05:46:41	2017-01-10 05:06:23
R1-1700470	Discussion on DL and UL beam management procedure	LG Electronics	available	2017-01-06 05:46:41	2017-01-10 05:06:23
R1-1700471	Discussion on providing robustness for beamformed systems	LG Electronics	available	2017-01-06 05:46:41	2017-01-10 05:06:23
R1-1700472	On beam relationship between control channel and data channel	LG Electronics	available	2017-01-06 05:46:41	2017-01-10 05:06:23
R1-1700473	Discussion on CSI timing	LG Electronics	available	2017-01-06 05:46:41	2017-01-10 05:06:23
R1-1700474	Discussion on interference measurement	LG Electronics	available	2017-01-06 05:46:41	2017-01-10 05:06:23
R1-1700475	Discussion on CSI feedback	LG Electronics	available	2017-01-06 05:46:41	2017-01-10 05:06:23
R1-1700476	Discussion on CSI acquisition framework	LG Electronics	available	2017-01-06 05:46:41	2017-01-10 05:06:23
R1-1700477	Considerations on NR CSI-RS design for beam management	LG Electronics	available	2017-01-06 05:46:41	2017-01-10 05:06:23
R1-1700478	Considerations on NR CSI-RS design for CSI acquisition	LG Electronics	available	2017-01-06 05:46:41	2017-01-10 05:06:23
R1-1700479	Summary of [87-28] email discussion on DMRS design for DL data channel	LG Electronics	noted	2017-01-06 05:46:41	2017-01-17 02:28:57
R1-1700480	Summary of [87-29] email discussion on Simulation assumption for NR DMRS	LG Electronics	noted	2017-01-06 05:46:41	2017-01-17 02:28:57
R1-1700481	DL DMRS Design	LG Electronics	available	2017-01-06 05:46:41	2017-01-10 05:06:23
R1-1700482	Evaluation Result of NR DMRS	LG Electronics	revised	2017-01-06 05:46:41	2017-01-10 05:06:23
R1-1700483	UL DMRS Design	LG Electronics	available	2017-01-06 05:46:41	2017-01-10 05:06:23
R1-1700484	Discussion on Phase Tracking RS for DL	LG Electronics	available	2017-01-06 05:46:41	2017-01-10 05:06:23
R1-1700485	Discussion on Phase Tracking RS for UL	LG Electronics	available	2017-01-06 05:46:41	2017-01-10 05:06:23
R1-1700486	Considerations on NR SRS design	LG Electronics	available	2017-01-06 05:46:41	2017-01-10 05:06:23
R1-1700487	Discussion on QCL assumptions for NR	LG Electronics	available	2017-01-06 05:46:41	2017-01-10 05:06:23
R1-1700488	Phase I SLS calibration results for NR MIMO	LG Electronics	available	2017-01-06 05:46:41	2017-01-10 05:06:23
R1-1700489	Phase II SLS calibration results for NR MIMO	LG Electronics	revised	2017-01-06 05:46:41	2017-01-10 05:06:23
R1-1700490	Phase I LLS calibration results for NR MIMO	LG Electronics	available	2017-01-06 05:46:41	2017-01-10 05:06:23
R1-1700491	Phase II LLS calibration results for NR MIMO	LG Electronics	available	2017-01-06 05:46:41	2017-01-10 05:10:54
R1-1700492	Discussion on UL power control for NR	LG Electronics	available	2017-01-06 05:46:41	2017-01-10 05:10:54
R1-1700493	Discussion on control channel design	LG Electronics	available	2017-01-06 05:46:41	2017-01-10 05:10:54
R1-1700494	Discussion on reference signal for DL control channel	LG Electronics	available	2017-01-06 05:46:41	2017-01-10 05:10:54
R1-1700495	On DCI contents for NR	LG Electronics	available	2017-01-06 05:46:41	2017-01-10 05:10:54
R1-1700496	Discussion on NR DCI design	LG Electronics	available	2017-01-06 05:46:41	2017-01-10 05:10:54
R1-1700497	Further discussion on bandwidth adaptation	LG Electronics	available	2017-01-06 05:46:41	2017-01-10 05:10:54
R1-1700498	Indication of blank resource	LG Electronics	available	2017-01-06 05:46:41	2017-01-10 05:10:54
R1-1700499	Discussion on downlink design in multi-beam operation	LG Electronics	available	2017-01-06 05:46:41	2017-01-10 05:10:54
R1-1700500	Discussion on common signal considering fallback operation	LG Electronics	available	2017-01-06 05:46:41	2017-01-10 05:10:54
R1-1700501	Discussion on CSS and USS in NR	LG Electronics	available	2017-01-06 05:46:41	2017-01-10 05:10:54
R1-1700502	Overall structure of NR-PUCCH formats	LG Electronics	available	2017-01-06 05:46:41	2017-01-10 05:10:54
R1-1700503	Design of one-symbol NR-PUCCH format	LG Electronics	available	2017-01-06 05:46:41	2017-01-10 05:10:54
R1-1700504	Design of short duration NR-PUCCH format	LG Electronics	available	2017-01-06 05:46:41	2017-01-10 05:10:54
R1-1700505	Design of long duration NR-PUCCH format	LG Electronics	available	2017-01-06 05:46:41	2017-01-10 05:10:54

R1-1700506	Multiplexing of UL channels and signals in NR	LG Electronics	available	2017-01-06 05:46:41	2017-01-10 05:10:54
R1-1700507	Initial evaluation results on NR-PUCCH structures	LG Electronics	available	2017-01-06 05:46:41	2017-01-10 05:10:54
R1-1700508	Discussion on HARQ timing and resource for NR	LG Electronics	available	2017-01-06 05:46:41	2017-01-10 05:10:54
R1-1700509	Discussion on scheduling in time domain for NR	LG Electronics	available	2017-01-06 05:46:41	2017-01-10 05:10:54
R1-1700510	Discussion on potential HARQ operation for NR	LG Electronics	available	2017-01-06 05:46:41	2017-01-10 05:10:54
R1-1700511	Discussion on control signaling for HARQ in NR	LG Electronics	available	2017-01-06 05:46:41	2017-01-10 05:10:54
R1-1700512	Discussion on multiplexing of eMBB and URLLC	LG Electronics	available	2017-01-06 05:46:41	2017-01-10 05:10:54
R1-1700513	Discussion on URLLC UL transmission	LG Electronics	available	2017-01-06 05:46:41	2017-01-10 05:10:54
R1-1700514	Discussion on URLLC HARQ operation and reliability enhancement schemes	LG Electronics	available	2017-01-06 05:46:41	2017-01-10 05:10:54
R1-1700515	SLS results on coexistence between eMBB and URLLC	LG Electronics	available	2017-01-06 05:46:41	2017-01-10 05:10:54
R1-1700516	Discussion on frame structure for Mini-slot	LG Electronics	available	2017-01-06 05:46:41	2017-01-10 05:10:54
R1-1700517	Discussion on control/data and DM-RS design for Mini-slot	LG Electronics	available	2017-01-06 05:46:41	2017-01-10 05:10:54
R1-1700518	LDPC code design for eMBB	LG Electronics	available	2017-01-06 05:46:41	2017-01-10 05:10:54
R1-1700519	Performance results of LDPC code for eMBB	LG Electronics	available	2017-01-06 05:46:41	2017-01-10 05:10:54
R1-1700520	Discussion on MET LDPC codes for eMBB data channel	LG Electronics	available	2017-01-06 05:46:41	2017-01-10 05:10:54
R1-1700521	Discussion on maximum code block size for eMBB	LG Electronics	available	2017-01-06 05:46:41	2017-01-10 05:10:54
R1-1700522	Principles of Polar code design	LG Electronics	available	2017-01-06 05:46:41	2017-01-10 05:10:54
R1-1700523	Discussion on polar code for control channel	LG Electronics	noted	2017-01-06 05:46:41	2017-01-11 08:53:09
R1-1700524	Control channel coding scheme for small block length	LG Electronics	revised	2017-01-06 05:46:41	2017-01-10 05:10:54
R1-1700525	Evaluation results of duplexing flexibility in dense urban scenario	LG Electronics	noted	2017-01-06 05:46:41	2017-01-10 05:12:26
R1-1700526	Discussion on power control and sensing for duplexing flexibility	LG Electronics	available	2017-01-06 05:46:41	2017-01-10 05:12:26
R1-1700527	Discussion on cross-link interference cancellation for duplexing flexibility	LG Electronics	noted	2017-01-06 05:46:41	2017-01-10 05:12:26
R1-1700528	Cross-link interference management for coexistence between NR and LTE	LG Electronics	available	2017-01-06 05:46:41	2017-01-10 05:12:26
R1-1700529	Discussion on wider bandwidth including CA/DC	LG Electronics	available	2017-01-06 05:46:41	2017-01-10 05:12:26
R1-1700530	Discussion on NR-LTE coexistence for DL transmission	LG Electronics	noted	2017-01-06 05:46:42	2017-01-10 05:12:26
R1-1700531	Discussion on NR-LTE coexistence for UL transmission	LG Electronics	available	2017-01-06 05:46:42	2017-01-10 05:12:26
R1-1700532	Discussion on extended CP	LG Electronics	noted	2017-01-06 05:46:42	2017-01-10 05:12:26
R1-1700533	Discussion on the options in NR design	Panasonic Corporation	available	2017-01-06 07:05:42	2017-01-10 00:21:37
R1-1700534	Discussion on the term "eMBB usage", "URLLC usage" and "mMTC usage" in study item	Panasonic Corporation	available	2017-01-06 07:06:38	2017-01-10 00:21:37
R1-1700535	Relation among BCH, SIBs and subcells	Panasonic Corporation	available	2017-01-06 07:07:56	2017-01-10 00:21:37
R1-1700536	Paging design related to subcell	Panasonic Corporation	available	2017-01-06 07:08:56	2017-01-10 00:21:37
R1-1700537	Mobility procedure and subcell	Panasonic Corporation	available	2017-01-06 07:09:58	2017-01-10 00:21:37
R1-1700538	Beam management and subcell	Panasonic Corporation	available	2017-01-06 07:11:07	2017-01-10 00:21:37
R1-1700539	PCFICH like signalling	Panasonic Corporation	available	2017-01-06 07:12:26	2017-01-10 00:21:37
R1-1700540	DL control channel design	Panasonic Corporation	available	2017-01-06 07:13:29	2017-01-10 00:21:37
R1-1700541	HARQ timing design in	Panasonic Corporation	available	2017-01-06 07:14:40	2017-01-10 00:21:37
R1-1700542	Discussion on NR duplexing	Panasonic Corporation	available	2017-01-06 07:15:58	2017-01-10 00:21:37
R1-1700543	Discussion on uplink control channel for NR	Panasonic Corporation	available	2017-01-06 07:53:29	2017-01-09 23:51:40

R1-1700544	Discussion on flexible bandwidth operation in NR	Panasonic Corporation	available	2017-01-06 07:54:09	2017-01-09 23:51:40
R1-1700545	Remaining issues on NR frame structure focusing on frequency domain	Panasonic Corporation	noted	2017-01-06 07:54:37	2017-01-09 23:51:40
R1-1700546	Discussion on multi-beam based initial access for NR	Guangdong OPPO Mobile Telecom.	available	2017-01-06 08:44:15	2017-01-09 07:54:46
R1-1700547	Discussion on NR-PSS and NR-SSS design	Guangdong OPPO Mobile Telecom.	available	2017-01-06 08:48:41	2017-01-09 07:54:46
R1-1700548	Discussion on Random Access Procedure for NR	Guangdong OPPO Mobile Telecom.	available	2017-01-06 08:51:33	2017-01-09 01:54:50
R1-1700549	Beam association relationship between data and control channels	Guangdong OPPO Mobile Telecom.	available	2017-01-06 08:53:30	2017-01-09 07:42:53
R1-1700550	Discussion on Beam Management in NR	Guangdong OPPO Mobile Telecom.	available	2017-01-06 08:55:17	2017-01-09 01:54:50
R1-1700551	CSI-RS design for NR	Guangdong OPPO Mobile Telecom.	available	2017-01-06 08:57:44	2017-01-09 07:54:46
R1-1700552	SRS design for NR	Guangdong OPPO Mobile Telecom.	available	2017-01-06 09:00:38	2017-01-09 07:54:46
R1-1700553	Uplink power control for NR	Guangdong OPPO Mobile Telecom.	available	2017-01-06 09:02:43	2017-01-09 07:54:46
R1-1700554	Overview on URLLC design and the coexistance with eMBB	Lenovo	available	2017-01-06 09:03:23	2017-01-09 12:36:41
R1-1700555	On data scheduling of eMBB and URLLC	Lenovo	available	2017-01-06 09:03:23	2017-01-09 12:36:41
R1-1700556	Enhanced HARQ feedback for downlink transmission	Lenovo	available	2017-01-06 09:03:23	2017-01-09 12:36:41
R1-1700557	HARQ design for UL grant-free URLLC transmission	Lenovo	available	2017-01-06 09:03:23	2017-01-09 12:36:41
R1-1700558	UL eMBB transmission multiplexing with UL URLLC	Lenovo	available	2017-01-06 09:03:23	2017-01-09 12:36:41
R1-1700559	Discussion of CSI-RS for beam management	Lenovo	available	2017-01-06 09:03:23	2017-01-09 12:36:41
R1-1700560	Calibration results of additional features for channel model above 6GHZ	Lenovo	available	2017-01-06 09:03:23	2017-01-09 12:36:41
R1-1700561	Consideration on the resource configuration of PRACH for UEs with/without TX/RX reciprocity	Lenovo	available	2017-01-06 09:03:23	2017-01-09 12:36:41
R1-1700562	Views on DL control channel for NR	Guangdong OPPO Mobile Telecom.	noted	2017-01-06 09:04:16	2017-01-09 07:42:53
R1-1700563	DL control channel design for multi-beam transmission above 6GHz	Guangdong OPPO Mobile Telecom.	available	2017-01-06 09:06:18	2017-01-09 07:42:53
R1-1700564	RS design consideration for NR PDCCH	Guangdong OPPO Mobile Telecom.	available	2017-01-06 09:07:45	2017-01-09 07:42:53
R1-1700565	On NR PDCCH search space configuration	Guangdong OPPO Mobile Telecom.	available	2017-01-06 09:09:09	2017-01-09 07:42:53
R1-1700566	Discussion on uplink control channel in short duration	Guangdong OPPO Mobile Telecom.	available	2017-01-06 09:11:26	2017-01-09 01:54:50
R1-1700567	Discussion on uplink control channel in long duration	Guangdong OPPO Mobile Telecom.	available	2017-01-06 09:12:34	2017-01-09 01:54:50
R1-1700568	Multiplexing of UCI and UL data	Guangdong OPPO Mobile Telecom.	available	2017-01-06 09:14:16	2017-01-09 01:54:50

R1-1700569	Resource indication UL control channel	Guangdong OPPO Mobile Telecom.	available	2017-01-06 09:15:52	2017-01-09 07:42:53
R1-1700570	DL resource allocation and indication for NR	Guangdong OPPO Mobile Telecom.	available	2017-01-06 09:17:51	2017-01-09 07:42:53
R1-1700571	Uplink grant-less transmission for URLLC	Guangdong OPPO Mobile Telecom.	available	2017-01-06 09:19:10	2017-01-09 07:54:46
R1-1700572	On multiplexing eMBB and URLLC in DL	Guangdong OPPO Mobile Telecom.	available	2017-01-06 09:20:25	2017-01-09 07:42:53
R1-1700573	Discussion on mini-slot for mmWave eMBB	Guangdong OPPO Mobile Telecom.	available	2017-01-06 09:21:55	2017-01-09 07:42:53
R1-1700574	Discussion on the waveform for the one Tx port UE	Guangdong OPPO Mobile Telecom.	available	2017-01-06 09:23:41	2017-01-09 07:42:53
R1-1700575	Discussion of RRC measurement on mobility RS	Shenzhen Coolpad Technologies	withdrawn	2017-01-06 09:27:58	
R1-1700576	Design of NR synchronization signals	ETRI	available	2017-01-06 09:35:58	2017-01-10 02:18:33
R1-1700577	On 2-step RA procedure for NR	ETRI	available	2017-01-06 09:35:58	2017-01-10 02:18:33
R1-1700578	Discussion on DMRS design for high speed scenario	ETRI	revised	2017-01-06 09:35:58	2017-01-10 06:52:51
R1-1700579	Discussion on phase tracking RS design	ETRI	available	2017-01-06 09:35:58	2017-01-10 06:26:33
R1-1700580	Discussion for slot type indication	ETRI	available	2017-01-06 09:35:58	2017-01-10 02:18:33
R1-1700581	Discussion on control resource set and DMRS for DL control channel	ETRI	available	2017-01-06 09:35:58	2017-01-10 02:18:33
R1-1700582	Design considerations for UL control channel	ETRI	available	2017-01-06 09:35:58	2017-01-10 02:18:33
R1-1700583	Multiplexing eMBB and URLLC UL control channels	ETRI	available	2017-01-06 09:35:58	2017-01-10 02:18:33
R1-1700584	Discussion on NR reserved resources	ETRI	available	2017-01-06 09:35:58	2017-01-10 02:18:33
R1-1700585	Remaining issues on NR frequency domain frame structure	ETRI	available	2017-01-06 09:35:58	2017-01-10 02:18:33
R1-1700586	Discussion on eMBB and URLLC multiplexing in UL	III	available	2017-01-06 09:43:31	2017-01-09 01:11:49
R1-1700587	Design considerations for 2-step RACH	HTC Corporation	available	2017-01-06 09:56:24	2017-01-09 06:23:43
R1-1700588	Enhanced HARQ for NR	HTC Corporation	available	2017-01-06 09:58:10	2017-01-06 10:00:15
R1-1700589	Workplan for Study on NR Access Technology	NTT DOCOMO, INC.	available	2017-01-06 10:12:34	2017-01-10 04:22:29
R1-1700590	Draft TR 38.802 Study on New Radio (NR) Access Technology - Physical Layer Aspects	NTT DOCOMO, INC.	revised	2017-01-06 10:12:34	2017-01-19 14:07:59
R1-1700591	Text proposal of TR 38.912 Study on New Radio (NR) Access Technology	NTT DOCOMO, INC.	noted	2017-01-06 10:12:36	2017-01-17 02:28:57
R1-1700592	DL MIMO transmission schemes for beam management	NTT DOCOMO, INC.	available	2017-01-06 10:12:36	2017-01-10 04:22:29
R1-1700593	Higher-order MU-MIMO for NR	NTT DOCOMO, INC.	available	2017-01-06 10:12:36	2017-01-10 04:22:29
R1-1700594	Non-linear precoding for NR	NTT DOCOMO, INC.	available	2017-01-06 10:12:36	2017-01-10 04:22:29
R1-1700595	Views on beam recovery for NR	NTT DOCOMO, INC.	available	2017-01-06 10:12:36	2017-01-10 04:22:29
R1-1700596	CSI Acquisition Schemes for NR	NTT DOCOMO, INC.	available	2017-01-06 10:12:36	2017-01-10 04:22:29
R1-1700597	CSI Feedback Types for NR MIMO	NTT DOCOMO, INC.	available	2017-01-06 10:12:36	2017-01-10 04:22:29
R1-1700598	Hybrid beamforming for NR	NTT DOCOMO, INC.	available	2017-01-06 10:12:36	2017-01-10 04:22:29
R1-1700599	Definition of beam correspondence and beam correspondence determination mechanism	NTT DOCOMO, INC.	available	2017-01-06 10:12:36	2017-01-10 04:22:11
R1-1700600	CSI-RS design for NR	NTT DOCOMO, INC.	available	2017-01-06 10:12:36	2017-01-10 04:22:29
R1-1700601	Uplink power control considering waveform switching	NTT DOCOMO, INC.	available	2017-01-06 10:12:36	2017-01-10 04:22:11

R1-1700602	System-level calibration result for NR MIMO	NTT DOCOMO, INC.	available	2017-01-06 10:12:36	2017-01-10 04:22:29
R1-1700603	Discussion on mobility model for MIMO phase-3 calibration	NTT DOCOMO, INC.	available	2017-01-06 10:12:36	2017-01-10 04:22:29
R1-1700604	Clarification for spatial consistency procedure	NTT DOCOMO, INC.	noted	2017-01-06 10:12:36	2017-01-10 04:22:29
R1-1700605	Correction for calibration assumptions for spatial consistency	NTT DOCOMO, INC.	revised	2017-01-06 10:12:36	2017-01-10 04:22:29
R1-1700606	Views on DMRS	NTT DOCOMO, INC.	available	2017-01-06 10:12:36	2017-01-10 04:22:29
R1-1700607	Views on RS for phase tracking	NTT DOCOMO, INC.	available	2017-01-06 10:12:36	2017-01-10 04:22:29
R1-1700608	Discussion and evaluation on NR- PSS/SSS structure	NTT DOCOMO, INC.	available	2017-01-06 10:12:36	2017-01-10 04:22:11
R1-1700609	Discussion on SS periodicity for NR	NTT DOCOMO, INC.	available	2017-01-06 10:12:36	2017-01-10 04:22:11
R1-1700610	Discussion and evaluation on NR synchronization signal sequence design	NTT DOCOMO, INC.	noted	2017-01-06 10:12:36	2017-01-10 04:22:11
R1-1700611	Discussion on broadcast signal/channel design for NR	NTT DOCOMO, INC.	available	2017-01-06 10:12:36	2017-01-10 04:22:11
R1-1700612	Discussion on paging design for NR	NTT DOCOMO, INC.	available	2017-01-06 10:12:36	2017-01-10 04:22:11
R1-1700613	Views on random access channel for NR	NTT DOCOMO, INC.	available	2017-01-06 10:12:36	2017-01-10 04:22:11
R1-1700614	Discussion on 4-step random access procedure for NR	NTT DOCOMO, INC.	available	2017-01-06 10:12:36	2017-01-10 04:22:11
R1-1700615	Discussion on mobility procedure for NR	NTT DOCOMO, INC.	available	2017-01-06 10:12:36	2017-01-10 04:22:11
R1-1700616	Discussion on RS design for NR inter-cell RRM measurement	NTT DOCOMO, INC.	available	2017-01-06 10:12:36	2017-01-10 04:22:11
R1-1700617	Summary of [87-36]: Mini-slot designs for NR	NTT DOCOMO, INC.	noted	2017-01-06 10:12:36	2017-01-17 02:28:57
R1-1700618	Summary of [87-32]: UL L1/L2 control channel design for NR	NTT DOCOMO, INC.	noted	2017-01-06 10:12:36	2017-01-17 02:28:57
R1-1700619	Discussion on the NR-PDCCH design	NTT DOCOMO, INC.	available	2017-01-06 10:12:36	2017-01-10 04:14:30
R1-1700620	Monitoring of DL control channel for NR	NTT DOCOMO, INC.	available	2017-01-06 10:12:36	2017-01-10 04:14:30
R1-1700621	UCI transmission procedure with and without uplink data	NTT DOCOMO, INC.	available	2017-01-06 10:12:36	2017-01-10 04:14:30
R1-1700622	UL control channel structure in short duration	NTT DOCOMO, INC.	noted	2017-01-06 10:12:36	2017-01-10 04:14:30
R1-1700623	UL control channel structure in long duration	NTT DOCOMO, INC.	available	2017-01-06 10:12:36	2017-01-10 04:14:30
R1-1700624	Processing time and HARQ process number for NR	NTT DOCOMO, INC.	available	2017-01-06 10:12:36	2017-01-10 04:14:30
R1-1700625	Data scheduling and HARQ-ACK feedback procedures for NR	NTT DOCOMO, INC.	noted	2017-01-06 10:12:36	2017-01-10 04:14:30
R1-1700626	On multiplexing of eMBB and URLLC in downlink	NTT DOCOMO, INC.	available	2017-01-06 10:12:36	2017-01-10 04:14:30
R1-1700627	On UL grant free for URLLC	NTT DOCOMO, INC.	available	2017-01-06 10:12:36	2017-01-10 04:14:30
R1-1700628	Mini-slot for latency reduction	NTT DOCOMO, INC.	noted	2017-01-06 10:12:36	2017-01-10 04:14:30
R1-1700629	Mini-slot for analog beam-forming	NTT DOCOMO, INC.	available	2017-01-06 10:12:36	2017-01-10 04:14:30
R1-1700630	LTE-NR co-existence for downlink	NTT DOCOMO, INC.	available	2017-01-06 10:12:36	2017-01-10 04:14:30
R1-1700631	LTE-NR co-existence for uplink	NTT DOCOMO, INC.	noted	2017-01-06 10:12:36	2017-01-10 04:14:30
R1-1700632	Frequency-domain aspects of frame structure	NTT DOCOMO, INC.	available	2017-01-06 10:12:36	2017-01-10 04:14:30
R1-1700633	Performance evaluation of dynamic TDD in Indoor hotspot scenario	NTT DOCOMO, INC.	available	2017-01-06 10:12:36	2017-01-10 04:14:30
R1-1700634	Performance evaluation of dynamic TDD in dense urban scenario	NTT DOCOMO, INC.	noted	2017-01-06 10:12:36	2017-01-10 04:14:30
R1-1700635	Mechanism of data channel for dynamic TDD	NTT DOCOMO, INC.	noted	2017-01-06 10:12:36	2017-01-10 04:14:30
R1-1700636	Control channels/signals for dynamic TDD	NTT DOCOMO, INC.	available	2017-01-06 10:12:36	2017-01-10 04:14:30
R1-1700637	Views on wider bandwidth operations for NR	NTT DOCOMO, INC.	available	2017-01-06 10:12:36	2017-01-10 04:22:29
R1-1700638	Text Proposal to TR 38.804 on physical layer aspects	NTT DOCOMO, INC.	noted	2017-01-06 10:12:36	2017-01-10 04:22:29
R1-1700639	Configuration of control resource set and UE bandwidth	PANASONIC	available	2017-01-06 12:04:51	2017-01-09 15:24:05
R1-1700640	Considerations of grant-free transmission of UL URLLC	Sequans Communications	available	2017-01-06 12:09:51	2017-01-06 17:11:34

R1-1700641	Further waveform considerations for UL URLLC	Sequans Communications	available	2017-01-06 12:11:42	2017-01-06 21:26:27
R1-1700642	On dynamic resource sharing between URLLC and eMBB in DL	Sequans Communications	available	2017-01-06 12:12:47	2017-01-06 17:11:34
R1-1700643	On support of joint UCI feedback in NR CA	Sequans Communications	available	2017-01-06 12:13:53	2017-01-06 17:11:34
R1-1700644	IR-HARQ scheme support with double QC-LDPC codes of degree-3	National Taiwan University	available	2017-01-06 13:56:39	2017-01-06 14:58:16
R1-1700645	Evaluation on double QC-LDPC codes with degree-3 for URLLC	National Taiwan University	available	2017-01-06 14:00:40	2017-01-06 15:04:47
R1-1700646	On the need of PT-RS for DFTsOFDM	Mitsubishi Electric RCE	available	2017-01-06 14:34:19	2017-01-09 10:59:37
R1-1700647	Aggressive early Hybrid ARQ for NR	Fraunhofer HHI	available	2017-01-06 14:35:23	2017-01-06 14:42:58
R1-1700648	PAPR preserving transmit diversity for DFTsOFDM	Mitsubishi Electric RCE	available	2017-01-06 14:52:31	2017-01-09 10:59:37
R1-1700649	UW DFTsOFDM performance evaluation above 40GHz	Mitsubishi Electric RCE	available	2017-01-06 14:56:55	2017-01-09 10:59:37
R1-1700650	NR Physical Random Access Channel	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-06 15:18:45	2017-01-09 19:31:41
R1-1700651	NR Random Access Procedure	Nokia, Alcatel-Lucent Shanghai Bell	noted	2017-01-06 15:18:45	2017-01-09 19:31:41
R1-1700652	On 2-step Random Access Procedure	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-06 15:18:45	2017-01-09 19:31:41
R1-1700653	Discussion on PRACH configuration in NR	Fujitsu	available	2017-01-06 15:23:41	2017-01-09 22:05:30
R1-1700654	Discussion on RAR in NR	Fujitsu	available	2017-01-06 15:23:41	2017-01-09 22:05:30
R1-1700655	Discussion on paging in NR	Fujitsu	available	2017-01-06 15:23:41	2017-01-09 22:05:30
R1-1700656	System Level Simulation Result for NR MIMO Calibration – Phase I	Fujitsu	available	2017-01-06 15:23:41	2017-01-09 22:05:30
R1-1700657	Design of efficient CQI reports for high reliability transmission	Fujitsu	available	2017-01-06 15:23:41	2017-01-09 22:05:30
R1-1700658	DL Scheduling and UL control information for URLLC	Fujitsu	available	2017-01-06 15:23:41	2017-01-09 22:05:30
R1-1700659	Preemption based multiplexing eMBB and URLLC	Fujitsu	available	2017-01-06 15:23:41	2017-01-09 22:05:30
R1-1700660	Discussions on grant-free for UL URLLC	Fujitsu	available	2017-01-06 15:23:41	2017-01-09 22:05:30
R1-1700661	Discussion on reference signal in mini-slot	Fujitsu	available	2017-01-06 15:23:41	2017-01-09 22:05:30
R1-1700662	Implementation framework for duplexing in NR	Fujitsu	available	2017-01-06 15:23:41	2017-01-09 22:05:30
R1-1700663	Cross-link interference mitigation for duplexing in NR	Fujitsu	noted	2017-01-06 15:23:41	2017-01-09 22:05:30
R1-1700664	Further LLS results for UL non-orthogonal multiple access	Fujitsu	available	2017-01-06 15:23:41	2017-01-09 22:05:30
R1-1700665	On NR synchronization signal design	Sony	available	2017-01-06 16:18:57	2017-01-09 23:30:47
R1-1700666	NR synchronization signal burst set periodicity	Sony	available	2017-01-06 16:18:57	2017-01-09 23:30:47
R1-1700667	Consideration on NR broadcast signal/channel	Sony	available	2017-01-06 16:18:57	2017-01-09 23:30:47
R1-1700668	Discussions on 2 Steps RACH Procedure	Sony	available	2017-01-06 16:18:57	2017-01-09 23:30:47
R1-1700669	On Multiple Beams RACH Procedure	Sony	available	2017-01-06 16:18:57	2017-01-09 23:30:47
R1-1700670	UL mobility for NR	Sony	available	2017-01-06 16:18:57	2017-01-09 23:30:47
R1-1700671	Cell quality measurements for DL mobility	Sony	available	2017-01-06 16:18:57	2017-01-09 23:30:47
R1-1700672	Joint DL/UL beam management operation for NR	Sony	available	2017-01-06 16:18:57	2017-01-09 23:30:47

R1-1700673	Views on SRS design for NR	Sony	available	2017-01-06 16:18:57	2017-01-09 23:30:47
R1-1700674	Views on CSI-RS design for NR	Sony	available	2017-01-06 16:18:57	2017-01-09 23:30:47
R1-1700675	MU-MIMO impact on frame structure for NR	Sony	available	2017-01-06 16:18:57	2017-01-09 23:30:47
R1-1700676	Discussion on DL/UL data scheduling and HARQ procedure	Sony	available	2017-01-06 16:18:57	2017-01-09 23:30:47
R1-1700677	Considerations on Dynamic Resource Sharing for eMBB/URLLC in DL	Sony	available	2017-01-06 16:18:57	2017-01-09 23:30:47
R1-1700678	Discussion on Grant-free based transmission	Sony	available	2017-01-06 16:18:57	2017-01-09 23:30:47
R1-1700679	Non-uniform constellations for NR	Sony	available	2017-01-06 16:18:57	2017-01-09 23:30:47
R1-1700680	Discussion on CP lengths for 60 kHz SCS	Sony	noted	2017-01-06 16:18:57	2017-01-09 23:30:47
R1-1700681	Feedback for URLLC transmissions	Sony	available	2017-01-06 16:18:57	2017-01-09 23:30:47
R1-1700682	Considerations on initial LTE-NR coexistence	Sony	noted	2017-01-06 16:18:57	2017-01-09 23:30:47
R1-1700683	Way Forward on TP for Duplexing Flexibility in TR 38.802 v1.0.0	ZTE, ZTE Microelectronics	available	2017-01-06 19:04:01	2017-01-09 21:33:12
R1-1700684	On URLLC characteristics	Ericsson	available	2017-01-06 21:39:54	2017-01-09 18:31:40
R1-1700685	On URLLC design principles	Ericsson	available	2017-01-06 21:39:54	2017-01-09 18:31:40
R1-1700686	On aspects of downlink control for high-reliability communication	Ericsson	available	2017-01-06 21:39:54	2017-01-09 18:31:40
R1-1700687	On high-level considerations on URLLC design	Ericsson	available	2017-01-06 21:39:54	2017-01-09 18:31:40
R1-1700688	Discussion on URLLC puncturing of data	Ericsson	available	2017-01-06 21:39:54	2017-01-09 18:31:40
R1-1700689	Framework for grant-free acess for URLLC	Ericsson	available	2017-01-06 21:39:54	2017-01-09 18:31:40
R1-1700690	Contention resolution for grant-free access	Ericsson	available	2017-01-06 21:39:54	2017-01-09 18:31:40
R1-1700691	On Reference Signal Design for Grant-free Access	Ericsson	available	2017-01-06 21:39:54	2017-01-09 18:31:40
R1-1700692	Synchronization aspects for grant-free access	Ericsson	available	2017-01-06 21:39:54	2017-01-09 18:31:40
R1-1700693	Resource Configuration for Grant-free Access	Ericsson	available	2017-01-06 21:39:54	2017-01-09 18:31:40
R1-1700694	DM-RS design for multiple access	Ericsson	available	2017-01-06 21:39:54	2017-01-09 18:31:40
R1-1700695	On timing of uplink hybrid-ARQ acknowledgement	Ericsson	available	2017-01-06 21:39:54	2017-01-09 21:57:17
R1-1700696	On the number of HARQ processes	Ericsson	noted	2017-01-06 21:39:54	2017-01-09 21:57:17
R1-1700697	On wider bandwidth operations	Ericsson	available	2017-01-06 21:39:54	2017-01-09 21:58:10
R1-1700698	On UE capability aspects for LTE/NR tight interworking	Ericsson	noted	2017-01-06 21:39:54	2017-01-09 22:01:17
R1-1700699	On scrambling	Ericsson	available	2017-01-06 21:39:54	2017-01-09 18:33:05
R1-1700700	Satellite Aspects- Forward Compatibility Consideration for Random Access Preamble Format	DISH Network, Thales, Fraunhofer IIS, SES S.A.	noted	2017-01-06 22:05:58	2017-01-09 19:55:03
R1-1700701	A framework for initial access for NR	INTERDIGITAL COMMUNICATIONS	available	2017-01-06 22:41:33	2017-01-10 00:38:26
R1-1700702	Random access procedure	INTERDIGITAL COMMUNICATIONS	available	2017-01-06 22:44:21	2017-01-10 00:38:26
R1-1700703	2-step random access procedure	INTERDIGITAL COMMUNICATIONS	available	2017-01-06 22:49:23	2017-01-10 00:38:26
R1-1700704	Downlink control channel framework	INTERDIGITAL COMMUNICATIONS	available	2017-01-06 22:52:46	2017-01-10 00:38:26
R1-1700705	DL control channel common search space	INTERDIGITAL COMMUNICATIONS	available	2017-01-06 22:55:24	2017-01-10 00:38:26

R1-1700706	Multi-bit HARQ feedback	INTERDIGITAL COMMUNICATIONS	available	2017-01-06 22:58:52	2017-01-10 00:38:26
R1-1700707	HARQ feedback for downlink	INTERDIGITAL COMMUNICATIONS	available	2017-01-06 23:00:39	2017-01-10 00:38:26
R1-1700708	Impact of supporting different numerologies	INTERDIGITAL COMMUNICATIONS	available	2017-01-06 23:04:46	2017-01-10 00:38:26
R1-1700709	Bandwidth adaptation in NR	INTERDIGITAL COMMUNICATIONS	available	2017-01-06 23:07:32	2017-01-10 00:38:26
R1-1700710	Impact of UE Calibration in a Reciprocity-based UL MIMO Transmission	InterDigital Communications	available	2017-01-06 23:24:24	2017-01-10 02:35:23
R1-1700711	Non-linear Precoding for NR	InterDigital Communications	available	2017-01-06 23:25:44	2017-01-10 02:35:55
R1-1700712	Reciprocity-based UL Beamformed Transmit Diversity	InterDigital Communications	available	2017-01-06 23:26:51	2017-01-10 02:36:28
R1-1700713	On Enhanced Frequency Selective Precoding for MIMO Transmission	InterDigital Communications	available	2017-01-06 23:27:59	2017-01-10 02:38:07
R1-1700714	On CSI-RS design for NR	InterDigital Communications	available	2017-01-06 23:29:26	2017-01-10 02:38:41
R1-1700715	Considerations on UL DM-RS design for NR	InterDigital Communications	available	2017-01-06 23:30:37	2017-01-10 02:38:41
R1-1700716	On SRS design for NR	InterDigital Communications	available	2017-01-06 23:31:41	2017-01-10 02:38:41
R1-1700717	On UE-Specific search space design for DL control channel	InterDigital Communications	available	2017-01-06 23:33:35	2017-01-10 02:38:41
R1-1700718	Blocking probability of control channel for URLLC	InterDigital Communications	available	2017-01-06 23:35:46	2017-01-10 02:38:41
R1-1700719	URLLC Scheduling and HARQ considerations	InterDigital Communications	available	2017-01-06 23:36:42	2017-01-10 02:39:09
R1-1700720	High Reliable Transmission for URLLC by Network Coding	InterDigital Communications	available	2017-01-06 23:37:53	2017-01-10 02:39:09
R1-1700721	Preemption/superposition-based multiplexing of eMBB and URLLC	InterDigital Communications	available	2017-01-06 23:39:05	2017-01-10 02:39:09
R1-1700722	Scheduling-based URLLC and eMBB multiplexing	InterDigital Communications	available	2017-01-06 23:39:53	2017-01-10 02:39:09
R1-1700723	Considerations on beam recovery for NR	InterDigital Communications	available	2017-01-07 00:59:54	2017-01-10 02:39:09
R1-1700724	Preliminary performance evaluation of polar codes puncturing	InterDigital Communications	available	2017-01-07 01:06:43	2017-01-10 02:39:38
R1-1700725	Performance evaluation of URLLC channel codes	InterDigital Communications	available	2017-01-07 01:08:25	2017-01-10 02:39:38
R1-1700726	Evaluation of Spatial Modulation with Spatial Correlation and Imperfect Channel Estimation	InterDigital Communications	available	2017-01-07 01:09:43	2017-01-10 02:39:38
R1-1700727	DL synchronization signal structure in NR	Sharp	available	2017-01-07 01:52:24	2017-01-10 02:07:31
R1-1700728	DL HARQ and UL scheduling timing in NR	Sharp	available	2017-01-07 01:52:24	2017-01-10 02:07:31

R1-1700729	UCI reporting on PUCCH and PUSCH	Sharp	available	2017-01-07 01:52:24	2017-01-10 02:07:31
R1-1700730	5G NR short PUCCH considerations	Sharp	available	2017-01-07 01:52:24	2017-01-10 02:07:31
R1-1700731	5G NR long PUCCH considerations	Sharp	available	2017-01-07 01:52:24	2017-01-10 02:07:31
R1-1700732	Resource unit aggregation and control resource set duration for DL control channel in NR	Sharp	available	2017-01-07 01:52:24	2017-01-10 02:07:31
R1-1700733	DL Control Channel and data multiplexing in NR	Sharp	available	2017-01-07 01:52:24	2017-01-10 02:07:31
R1-1700734	Reference signals for DL Control Channel in NR	Sharp, MTI	available	2017-01-07 01:52:24	2017-01-10 02:07:31
R1-1700735	Numerology for DL synchronization signals	Sharp	available	2017-01-07 01:52:24	2017-01-10 02:07:31
R1-1700736	RACH procedure for multi-Tx beam operation	Sharp	available	2017-01-07 01:52:24	2017-01-10 02:07:31
R1-1700737	A narrative on potential solutions for eMBB and URLLC multiplexing contextualized by 5G requirements	Sharp	available	2017-01-07 01:52:24	2017-01-10 02:07:31
R1-1700738	Further results on Outer Codes for eMBB/URLLC coexistence	Sharp	available	2017-01-07 01:52:24	2017-01-10 02:07:31
R1-1700739	UL based mobility design and performance evaluation	Qualcomm Incorporated	available	2017-01-07 07:53:44	2017-01-10 06:40:43
R1-1700740	On codebook based UL MIMO transmission with non-precoded SRS	Ericsson	available	2017-01-07 07:55:28	2017-01-10 03:55:12
R1-1700741	On codebook based UL MIMO transmission with precoded SRS	Ericsson	available	2017-01-07 07:55:28	2017-01-10 03:55:12
R1-1700742	Robust UL Transmission Schemes	Ericsson	available	2017-01-07 07:55:28	2017-01-10 03:55:12
R1-1700743	Robust Transmission Schemes for PDSCH	Ericsson	available	2017-01-07 07:55:28	2017-01-10 03:55:12
R1-1700744	About the number of codewords	Ericsson	available	2017-01-07 07:55:28	2017-01-10 03:55:12
R1-1700745	UL transmission in NR	Ericsson	available	2017-01-07 07:55:28	2017-01-10 03:55:35
R1-1700746	On PDSCH and PUSCH to RE Mapping	Ericsson	available	2017-01-07 07:55:28	2017-01-10 03:55:35
R1-1700747	On PRB bundling for NR	Ericsson	available	2017-01-07 07:55:28	2017-01-10 03:10:31
R1-1700748	On robust beam management	Ericsson	noted	2017-01-07 07:55:28	2017-01-10 03:55:35
R1-1700749	On UL beam management	Ericsson	available	2017-01-07 07:55:28	2017-01-10 03:55:35
R1-1700750	On beam grouping	Ericsson	available	2017-01-07 07:55:28	2017-01-10 03:55:35
R1-1700751	Type I CSI Feedback	Ericsson	available	2017-01-07 07:55:28	2017-01-10 03:56:06
R1-1700752	Type II CSI Feedback	Ericsson	available	2017-01-07 07:55:28	2017-01-10 03:56:06
R1-1700753	About interference measurements	Ericsson	available	2017-01-07 07:55:28	2017-01-10 03:56:06
R1-1700754	On measurement restriction	Ericsson	available	2017-01-07 07:55:28	2017-01-10 03:56:06
R1-1700755	CSI Framework	Ericsson	available	2017-01-07 07:55:28	2017-01-10 03:56:06
R1-1700756	CSI reporting configurations	Ericsson	available	2017-01-07 07:55:28	2017-01-10 03:56:48
R1-1700757	Lightweight CSI feedback	Ericsson	available	2017-01-07 07:55:28	2017-01-10 03:56:48
R1-1700758	On Type I CSI feedback extension to multi-panel operation	Ericsson	available	2017-01-07 07:55:28	2017-01-10 03:56:48
R1-1700759	Preliminary simulation results on system performance with 64 ports	Ericsson	available	2017-01-07 07:55:28	2017-01-10 03:56:48
R1-1700760	On Supported Codebook Sizes	Ericsson	available	2017-01-07 07:55:28	2017-01-10 03:56:48
R1-1700761	On Dynamic Signalling for Aperiodic and Semi-Persistent CSI-RS	Ericsson	available	2017-01-07 07:55:28	2017-01-10 04:45:18
R1-1700762	On CSI-RS Pooling and Resource Allocation	Ericsson	available	2017-01-07 07:55:28	2017-01-10 04:45:18
R1-1700763	DL beam management overview	Ericsson	available	2017-01-07 07:55:28	2017-01-10 03:58:17
R1-1700764	CSI feedback for beam management	Ericsson	available	2017-01-07 07:55:28	2017-01-10 03:58:17
R1-1700765	On UE initiated beam recovery	Ericsson	available	2017-01-07 07:55:29	2017-01-10 03:58:17

R1-1700766	On CSI-RS design	Ericsson	available	2017-01-07 07:55:29	2017-01-10 03:58:17
R1-1700767	Design considerations for phase noise tracking RS (PTRS)	Ericsson	revised	2017-01-07 07:55:29	2017-01-17 22:00:00
R1-1700768	On PTRS time and frequency density	Ericsson	withdrawn	2017-01-07 07:55:29	
R1-1700769	SRS Design	Ericsson	available	2017-01-07 07:55:29	2017-01-10 03:10:31
R1-1700770	Introducing port coherency regions	Ericsson	withdrawn	2017-01-07 07:55:29	
R1-1700771	On spatial QCL definition	Ericsson	available	2017-01-07 07:55:29	2017-01-10 03:58:17
R1-1700772	On forming wide beams	Ericsson	available	2017-01-07 07:55:29	2017-01-10 03:58:53
R1-1700773	NR MIMO Phase 1 SNR system level calibration results for above 6 GHz	Ericsson	available	2017-01-07 07:55:29	2017-01-10 03:58:53
R1-1700774	NR MIMO Phase 1 SNR system level calibration results for below 6 GHz	Ericsson	available	2017-01-07 07:55:29	2017-01-10 03:58:53
R1-1700775	Phase 1 NR MIMO LLS Calibration Results	Ericsson	available	2017-01-07 07:55:29	2017-01-10 03:58:53
R1-1700776	Phase 3 NR MIMO calibration results	Ericsson	revised	2017-01-07 07:55:29	2017-01-10 03:58:53
R1-1700777	Evaluation Results and Considerations on Number of Codewords	Beijing Xinwei Telecom Techn.	available	2017-01-07 08:48:01	2017-01-10 03:28:39
R1-1700778	Evaluation and Disucssion on PRB Bundling Size	Beijing Xinwei Telecom Techn.	available	2017-01-07 08:48:01	2017-01-10 06:38:39
R1-1700779	Further Discussion on CSI Aquisition Settings and Beam Management	Beijing Xinwei Telecom Techn.	available	2017-01-07 08:48:01	2017-01-10 03:28:39
R1-1700780	DMRS Design and Evaluation Results	Beijing Xinwei Telecom Techn.	available	2017-01-07 08:48:01	2017-01-10 03:28:39
R1-1700781	Discussion and Evaluation of Phase Tracking RS Design	Beijing Xinwei Telecom Techn.	available	2017-01-07 08:48:01	2017-01-10 06:38:39
R1-1700782	NR MIMO Link Level Phase 2 Calibration Results	Beijing Xinwei Telecom Techn.	available	2017-01-07 08:48:01	2017-01-10 03:28:39
R1-1700783	NR MIMO System Level Phase 2 Calibration Results	Beijing Xinwei Telecom Techn.	available	2017-01-07 08:48:01	2017-01-10 03:28:39
R1-1700784	Synchronization signal bandwidth and multiplexing consideration	Qualcomm Incorporated	available	2017-01-07 16:07:39	2017-01-10 06:27:41
R1-1700785	Synchronization signal frequency raster consideration	Qualcomm Incorporated	noted	2017-01-07 16:07:39	2017-01-10 06:27:41
R1-1700786	Synchronization signal periodicity consideration	Qualcomm Incorporated	available	2017-01-07 16:07:39	2017-01-10 06:27:41
R1-1700787	Synchronization signal sequence design consideration	Qualcomm Incorporated	available	2017-01-07 16:07:39	2017-01-10 06:27:41
R1-1700788	PBCH design consideration	Qualcomm Incorporated	noted	2017-01-07 16:07:39	2017-01-10 06:27:41
R1-1700789	Paging design consideration	Qualcomm Incorporated	available	2017-01-07 16:07:39	2017-01-10 06:27:41
R1-1700790	PRACH design consideration	Qualcomm Incorporated	available	2017-01-07 16:07:39	2017-01-10 06:27:41
R1-1700791	4 step RACH procedure consideration	Qualcomm Incorporated	available	2017-01-07 16:07:39	2017-01-10 06:27:41

R1-1700792	2 step RACH procedure consideration	Qualcomm Incorporated	noted	2017-01-07 16:07:39	2017-01-10 06:27:41
R1-1700793	DL based Mobility measurement consideration	Qualcomm Incorporated	available	2017-01-07 16:07:39	2017-01-10 06:27:41
R1-1700794	UL based mobility design and performance evaluation	Qualcomm Incorporated	withdrawn	2017-01-07 16:07:39	
R1-1700795	CW to layer mapping	Qualcomm Incorporated	available	2017-01-07 16:07:39	2017-01-10 06:54:33
R1-1700796	DL MIMO transmission schemes	Qualcomm Incorporated	available	2017-01-07 16:07:39	2017-01-10 06:40:29
R1-1700797	UL MIMO transmission schemes	Qualcomm Incorporated	noted	2017-01-07 16:07:39	2017-01-10 06:40:29
R1-1700798	Discussion on PRB bundling	Qualcomm Incorporated	available	2017-01-07 16:07:39	2017-01-10 06:54:33
R1-1700799	Network OTA reciprocity calibration and phase synchronization	Qualcomm Incorporated	available	2017-01-07 16:07:39	2017-01-10 05:46:53
R1-1700800	Beam management for NR	Qualcomm Incorporated	available	2017-01-07 16:07:39	2017-01-10 06:05:24
R1-1700801	Discussion on CSI acquisition	Qualcomm Incorporated	available	2017-01-07 16:07:39	2017-01-10 06:45:49
R1-1700802	Beam recovery request	Qualcomm Incorporated	withdrawn	2017-01-07 16:07:39	
R1-1700803	Beam recovery procedures	Qualcomm Incorporated	noted	2017-01-07 16:07:39	2017-01-10 06:05:24
R1-1700804	Discussion on CSI-RS design	Qualcomm Incorporated	available	2017-01-07 16:07:39	2017-01-10 06:48:59
R1-1700805	Discussion on UL DMRS design	Qualcomm Incorporated	available	2017-01-07 16:07:39	2017-01-10 07:04:59
R1-1700806	Discussion on DL DMRS design	Qualcomm Incorporated	noted	2017-01-07 16:07:39	2017-01-10 07:04:59
R1-1700807	Evaluation of DL DMRS design	Qualcomm Incorporated	revised	2017-01-07 16:07:39	2017-01-10 07:04:59
R1-1700808	Phase and frequency tracking reference signal considerations	Qualcomm Incorporated	available	2017-01-07 16:07:39	2017-01-10 05:58:14
R1-1700809	Discussion on SRS design	Qualcomm Incorporated	available	2017-01-07 16:07:39	2017-01-10 07:04:59
R1-1700810	Discussion on QCL	Qualcomm Incorporated	available	2017-01-07 16:07:39	2017-01-10 07:04:59
R1-1700811	Discussion on tracking RS and RLM	Qualcomm Incorporated	available	2017-01-07 16:07:39	2017-01-10 07:04:59
R1-1700812	Phase 1 and Phase 2 calibration results for sub6GHz	Qualcomm Incorporated	available	2017-01-07 16:07:39	2017-01-10 07:04:59
R1-1700813	Phase 1 and Phase 2 calibration results for above 6GHz	Qualcomm Incorporated	revised	2017-01-07 16:07:39	2017-01-10 05:58:14

R1-1700814	L1 broadcast control channel	Qualcomm Incorporated	available	2017-01-07 16:07:39	2017-01-10 05:46:53
R1-1700815	2-Stage DCI	Qualcomm Incorporated	available	2017-01-07 16:07:39	2017-01-10 05:46:53
R1-1700816	Common control resource set and UE-specific control resource set	Qualcomm Incorporated	available	2017-01-07 16:07:39	2017-01-10 05:46:53
R1-1700817	UE power saving for PDCCH monitoring	Qualcomm Incorporated	available	2017-01-07 16:07:39	2017-01-10 05:46:53
R1-1700818	Methodology for UE DOU analysis	Qualcomm Incorporated	available	2017-01-07 16:07:39	2017-01-10 05:46:53
R1-1700819	Evaluation of frame structure design for UE power consumption	Qualcomm Incorporated	available	2017-01-07 16:07:39	2017-01-10 05:46:53
R1-1700820	UE power evaluation for DRX with wake-up signaling	Qualcomm Incorporated	noted	2017-01-07 16:07:39	2017-01-10 05:46:53
R1-1700821	WF on evaluation for wake-up signal	Qualcomm Incorporated	available	2017-01-07 16:07:39	2017-01-10 05:46:53
R1-1700822	Channel multiplexing for long PUCCH	Qualcomm Incorporated	noted	2017-01-07 16:07:39	2017-01-10 05:46:53
R1-1700823	Channelization of short PUCCH	Qualcomm Incorporated	available	2017-01-07 16:07:39	2017-01-10 05:47:25
R1-1700824	Location of short PUCCH	Qualcomm Incorporated	available	2017-01-07 16:07:39	2017-01-10 05:47:25
R1-1700825	UL transmit diversity for PUCCH	Qualcomm Incorporated	available	2017-01-07 16:07:39	2017-01-10 05:47:25
R1-1700826	Number of HARQ processes	Qualcomm Incorporated	available	2017-01-07 16:07:39	2017-01-10 05:47:25
R1-1700827	URLLC/eMBB dynamic multiplexing schemes	Qualcomm Incorporated	available	2017-01-07 16:07:39	2017-01-10 07:20:08
R1-1700828	Simultaneous scheduling request and data transmission for uplink URLLC	Qualcomm Incorporated	available	2017-01-07 16:07:39	2017-01-10 07:20:08
R1-1700829	Mini-slot design for URLLC	Qualcomm Incorporated	noted	2017-01-07 16:07:39	2017-01-10 07:20:08
R1-1700830	LDPC rate compatible design	Qualcomm Incorporated	available	2017-01-07 16:07:39	2017-01-10 07:16:21
R1-1700831	LDPC design considerations	Qualcomm Incorporated	noted	2017-01-07 16:07:40	2017-01-10 07:16:21
R1-1700832	Design of Polar codes for control channel	Qualcomm Incorporated	noted	2017-01-07 16:07:40	2017-01-10 07:16:21
R1-1700833	Comparison of Polar codes for control channel	Qualcomm Incorporated	revised	2017-01-07 16:07:40	2017-01-10 07:16:21
R1-1700834	Block codes for very small block length	Qualcomm Incorporated	available	2017-01-07 16:07:40	2017-01-10 07:16:21
R1-1700835	Energy efficiency of channel coding	Qualcomm Incorporated	available	2017-01-07 16:07:40	2017-01-10 07:16:21

R1-1700836	Polar code information bit allocation and nested extension construction	Qualcomm Incorporated	revised	2017-01-07 16:07:40	2017-01-10 07:16:21
R1-1700837	PBCH channel coding	Qualcomm Incorporated	available	2017-01-07 16:07:40	2017-01-10 05:47:25
R1-1700838	Dynamic TDD performance evaluation	Qualcomm Incorporated	noted	2017-01-07 16:07:40	2017-01-10 07:26:16
R1-1700839	Dynamic TDD interference management considerations	Qualcomm Incorporated	noted	2017-01-07 16:07:40	2017-01-10 07:26:16
R1-1700840	Views on wideband NR operation	Qualcomm Incorporated	noted	2017-01-07 16:07:40	2017-01-10 07:35:28
R1-1700841	NR-LTE coexistence	Qualcomm Incorporated	noted	2017-01-07 16:07:40	2017-01-10 07:26:16
R1-1700842	Single UL NSA operation	Qualcomm Incorporated	withdrawn	2017-01-07 16:07:40	
R1-1700843	Considerations on ECP use cases with 60kHz SCS	Qualcomm Incorporated	noted	2017-01-07 16:07:40	2017-01-10 07:36:55
R1-1700844	Pilot Scrambling Sequences for DMRS Port Multiplexing	Cohere Technologies	available	2017-01-07 18:31:41	2017-01-10 00:48:18
R1-1700845	PAPR and ACLR performance for SC-CPS waveforms including pi/2-BPSK	Idaho National Laboratory	available	2017-01-07 20:14:05	2017-01-09 19:31:02
R1-1700846	Broadcast Signal and Channel Design in NR	InterDigital Communications	available	2017-01-08 07:16:22	2017-01-10 05:26:47
R1-1700847	Initial Synchronization Signal Design in NR	InterDigital Communications	available	2017-01-08 07:19:56	2017-01-10 05:26:47
R1-1700848	Initial Calibration Results of NR MIMO	CATR	available	2017-01-08 11:37:18	2017-01-09 02:00:41
R1-1700849	Comparison of pi/2 BPSK with and without frequency domain pulse shaping: Results with PA model	IITH	revised	2017-01-08 14:30:51	2017-01-09 10:16:21
R1-1700850	Simulation results on Phase 1 NR MIMO calibration	ZTE, ZTE Microelectronics	available	2017-01-08 16:10:07	2017-01-10 08:08:49
R1-1700851	Simulation results on Phase 2 NR MIMO calibration	ZTE, ZTE Microelectronics	available	2017-01-08 16:10:07	2017-01-10 08:08:49
R1-1700852	Introducing port coherency regions	Ericsson Inc.	available	2017-01-08 17:58:23	2017-01-10 03:59:15
R1-1700853	Design considerations for mini-slots	InterDigital Communications	available	2017-01-08 20:38:46	2017-01-10 02:39:38
R1-1700854	Study of Time & Frequency Density of UE-Specific & Cell-Specific Phase Noise RS With Different CPE Estimation Techniques	National Instruments Corp.	available	2017-01-08 22:22:20	2017-01-10 00:41:58
R1-1700855	On Type I CSI feedback for NR	InterDigital Communications	available	2017-01-08 23:34:01	2017-01-10 02:39:38
R1-1700856	On CSI Measurement for NR	InterDigital Communications	available	2017-01-08 23:36:04	2017-01-10 02:39:59
R1-1700857	PT-RS performance evaluation with different time domain densities	InterDigital Communications	available	2017-01-08 23:37:52	2017-01-10 02:39:59
R1-1700858	Downlink scheduling using slots and mini-slots	INTERDIGITAL COMMUNICATIONS	available	2017-01-09 00:12:27	2017-01-10 02:39:59

R1-1700859	Discussion on RACH procedure and resources	Cohere Technologies	revised	2017-01-09 01:41:37	2017-01-10 05:21:17
R1-1700860	Numerology indication for a mixed numerology carrier	NEC	available	2017-01-09 01:44:09	2017-01-09 02:44:44
R1-1700861	DCI monitoring configuration for mini-slot	NEC	available	2017-01-09 01:44:09	2017-01-09 02:44:44
R1-1700862	Time domain resource allocation for mini-slot	NEC	available	2017-01-09 01:44:09	2017-01-09 02:44:44
R1-1700863	Design for beamformed synchronization signals	NEC	available	2017-01-09 01:44:09	2017-01-09 02:44:44
R1-1700864	Considerations on the design of uplink control channel	NEC	available	2017-01-09 01:44:09	2017-01-09 02:44:44
R1-1700865	Discussion on NR paging design	Beijing Xiaomi Mobile Software	available	2017-01-09 01:45:48	2017-01-09 06:46:52
R1-1700866	Evaluation of LDPC codes for eMBB data channels	NTT DOCOMO, INC.	revised	2017-01-09 01:46:15	2017-01-10 11:54:54
R1-1700867	Discussion on Polar codes design	NTT DOCOMO, INC.	available	2017-01-09 01:46:15	2017-01-10 11:54:10
R1-1700868	UL power control in multi-beam based approaches	ASUSTEK COMPUTER (SHANGHAI)	available	2017-01-09 01:46:53	2017-01-10 01:48:50
R1-1700869	NR HARQ Procedures in Different UL/DL Slot Length	KT Corp.	available	2017-01-09 02:08:43	2017-01-09 11:23:19
R1-1700870	Discussion on the MRS design and RRM measurement	Shenzhen Coolpad Technologies	available	2017-01-09 02:15:13	2017-01-09 09:47:29
R1-1700871	Considerations on SS periodicity for Synchronization in NR	InterDigital Communications	available	2017-01-09 02:32:37	2017-01-10 05:26:47
R1-1700872	On Indicating HARQ timing and PUCCH resource	ZTE Corporation, ZTE Microelectronics	available	2017-01-09 03:11:28	2017-01-10 06:48:26
R1-1700873	Views on abstraction techniques of nonlinear precoding schemes for SLS	Mitsubishi Electric Co.	available	2017-01-09 03:31:57	2017-01-10 04:42:46
R1-1700874	DMRS designs for NR MIMO	Mitsubishi Electric Co.	available	2017-01-09 03:34:11	2017-01-10 04:42:46
R1-1700875	Performance evaluations of DMRS designs for NR MIMO	Mitsubishi Electric Co.	available	2017-01-09 03:35:52	2017-01-10 04:42:46
R1-1700876	Performance evaluation of nonlinear precoding schemes with channel estimation	Mitsubishi Electric Co.	available	2017-01-09 03:37:45	2017-01-10 04:42:46
R1-1700877	Views on possible specification impacts of nonlinear precoding schemes	Mitsubishi Electric Co.	available	2017-01-09 03:39:34	2017-01-10 04:42:46
R1-1700878	Performance evaluations of UW-DFT-s-OFDM in the 30GHz high speed train scenario	Mitsubishi Electric Co.	available	2017-01-09 03:41:27	2017-01-10 04:42:46
R1-1700879	Concatenation based wideband synchronization signal	Motorola Mobility	available	2017-01-09 03:51:00	2017-01-10 06:56:40
R1-1700880	Physical channel design for 2-step RACH	Motorola Mobility	available	2017-01-09 03:51:00	2017-01-17 02:28:57
R1-1700881	Design for short duration uplink control channel	Motorola Mobility	available	2017-01-09 03:51:00	2017-01-10 06:43:59
R1-1700882	Downlink Control Channel for NR	Motorola Mobility	available	2017-01-09 03:51:00	2017-01-10 06:43:59
R1-1700883	Discussion on UE capability aspects for LTE/NR tight interworking	Samsung	revised	2017-01-09 04:15:33	2017-01-10 03:54:08
R1-1700884	SS BW and multiplexing	Samsung	available	2017-01-09 04:15:33	2017-01-10 04:04:54
R1-1700885	SS frequency raster	Samsung	available	2017-01-09 04:15:33	2017-01-10 05:20:51
R1-1700886	SS periodicity	Samsung	available	2017-01-09 04:15:33	2017-01-10 01:00:07
R1-1700887	SS sequence design	Samsung	available	2017-01-09 04:15:33	2017-01-10 02:55:43
R1-1700888	System information delivery	Samsung	noted	2017-01-09 04:15:33	2017-01-10 05:20:51
R1-1700889	Paging channel design	Samsung	available	2017-01-09 04:15:33	2017-01-10 01:26:52
R1-1700890	PRACH design	Samsung	available	2017-01-09 04:15:33	2017-01-10 05:36:18
R1-1700891	NR 4-step random access procedure	Samsung	available	2017-01-09 04:15:33	2017-01-10 05:17:08

R1-1700892	NR 2-step random access procedure	Samsung	available	2017-01-09 04:15:33	2017-01-10 05:17:08
R1-1700893	Mobility support for RRC Inactive UEs	Samsung	available	2017-01-09 04:15:33	2017-01-09 14:03:17
R1-1700894	Mobility RS, measurements and procedure	Samsung	noted	2017-01-09 04:15:33	2017-01-10 01:00:07
R1-1700895	Transmission schemes, transmission modes and control signaling	Samsung	available	2017-01-09 04:15:33	2017-01-10 01:00:07
R1-1700896	DMRS-based spatial multiplexing for DL NR MIMO	Samsung	available	2017-01-09 04:15:34	2017-01-10 00:22:37
R1-1700897	DMRS-based spatial multiplexing for UL NR MIMO	Samsung	available	2017-01-09 04:15:34	2017-01-10 00:22:37
R1-1700898	Codeword-to-layer mapping for DL and UL NR MIMO	Samsung	revised	2017-01-09 04:15:34	2017-01-10 00:22:37
R1-1700899	DMRS-based precoder cycling and simulation results	Samsung	available	2017-01-09 04:15:34	2017-01-09 23:13:40
R1-1700900	Discussions on open- and semi-open-loop transmissions for NR	Samsung	available	2017-01-09 04:15:34	2017-01-10 04:25:56
R1-1700901	Initial results on network coordination	Samsung	available	2017-01-09 04:15:34	2017-01-10 02:30:45
R1-1700902	Discussions on NR network coordination	Samsung	available	2017-01-09 04:15:34	2017-01-10 02:30:45
R1-1700903	Transmission and reception of coordinated interference cancellation	Samsung	available	2017-01-09 04:15:34	2017-01-10 04:46:05
R1-1700904	Network coordination for coordinated interference cancellation	Samsung	available	2017-01-09 04:15:34	2017-01-10 04:46:05
R1-1700905	Physical layer abstraction method for coordinated interference cancellation	Samsung	available	2017-01-09 04:15:34	2017-01-10 04:46:05
R1-1700906	Evaluation assumption for advanced receivers based on network coordination	Samsung	available	2017-01-09 04:15:34	2017-01-10 04:46:05
R1-1700907	Initial evaluation results for advanced receivers based on network coordination	Samsung	available	2017-01-09 04:15:34	2017-01-10 04:46:05
R1-1700908	CSI acquisition for DL NR MIMO	Samsung	revised	2017-01-09 04:15:34	2017-01-10 00:22:37
R1-1700909	CSI acquisition for UL NR MIMO	Samsung	available	2017-01-09 04:15:34	2017-01-10 00:22:37
R1-1700910	Type II CSI reporting for NR	Samsung	available	2017-01-09 04:15:34	2017-01-10 02:21:03
R1-1700911	Type I CSI reporting for NR	Samsung	available	2017-01-09 04:15:34	2017-01-09 23:13:40
R1-1700912	Codebook design framework for NR MIMO	Samsung	available	2017-01-09 04:15:34	2017-01-09 23:13:40
R1-1700913	Simulation results for explicit (Type II) CSI reporting for NR MIMO	Samsung	available	2017-01-09 04:15:34	2017-01-10 02:21:03
R1-1700914	UL MIMO codebook	Samsung	available	2017-01-09 04:15:34	2017-01-09 23:13:40
R1-1700915	Overview of beam management for > 6GHz	Samsung	available	2017-01-09 04:15:34	2017-01-10 03:50:14
R1-1700916	Cell-specific measurements for beam management for > 6GHz	Samsung	available	2017-01-09 04:15:34	2017-01-10 03:50:14
R1-1700917	Rx beam mode for beam management	Samsung	available	2017-01-09 04:15:34	2017-01-10 03:50:14
R1-1700918	Beam management for control channel	Samsung	available	2017-01-09 04:15:34	2017-01-10 03:50:14
R1-1700919	Discussions on periodic and semi-persistent CSI reporting for NR	Samsung	noted	2017-01-09 04:15:34	2017-01-10 04:25:56
R1-1700920	Discussions on aperiodic CSI reporting for NR	Samsung	available	2017-01-09 04:15:34	2017-01-10 04:25:56
R1-1700921	Discussions on channel and interference measurements for NR	Samsung	available	2017-01-09 04:15:34	2017-01-10 04:25:56
R1-1700922	Discussions on service specific CSI for NR	Samsung	available	2017-01-09 04:15:34	2017-01-10 04:25:56
R1-1700923	Discussion on UE initiated beam switching	Samsung	available	2017-01-09 04:15:34	2017-01-10 04:25:01
R1-1700924	Discussion on NW initiated beam switching	Samsung	available	2017-01-09 04:15:34	2017-01-10 04:25:01
R1-1700925	Discussion on beam correspondence	Samsung	available	2017-01-09 04:15:34	2017-01-10 04:55:45

R1-1700926	Discussion on UL beam management	Samsung	available	2017-01-09 04:15:34	2017-01-10 04:56:04
R1-1700927	CSI-RS for beam management	Samsung	available	2017-01-09 04:15:34	2017-01-10 03:50:14
R1-1700928	Discussions on CSI-RS design for NR MIMO	Samsung	available	2017-01-09 04:15:34	2017-01-10 02:30:45
R1-1700929	PRB bundling and precoding granularity in UL DMRS	Samsung	available	2017-01-09 04:15:34	2017-01-10 01:08:44
R1-1700930	Precoding granularity of NR DMRS	Samsung	available	2017-01-09 04:15:34	2017-01-10 04:25:57
R1-1700931	Evaluation results for NR DMRS patterns	Samsung	available	2017-01-09 04:15:34	2017-01-10 05:38:57
R1-1700932	Time/Frequency pattern for PTRS	Samsung	available	2017-01-09 04:15:34	2017-01-10 05:36:18
R1-1700933	SRS design for NR	Samsung	available	2017-01-09 04:15:34	2017-01-10 03:50:14
R1-1700934	On QCL for NR	Samsung	available	2017-01-09 04:15:34	2017-01-10 01:00:07
R1-1700935	MIMO Phase-2 LLS calibration results on 4GHz frequency band	Samsung	available	2017-01-09 04:15:34	2017-01-12 10:38:55
R1-1700936	MIMO Phase-1 SLS calibration results on 30GHz frequency band	Samsung	available	2017-01-09 04:15:34	2017-01-10 05:22:22
R1-1700937	MIMO Phase-1 LLS calibration results on 30GHz frequency band	Samsung	available	2017-01-09 04:15:34	2017-01-10 05:22:22
R1-1700938	MIMO Phase-2 SLS calibration results on 30GHz frequency band	Samsung	available	2017-01-09 04:15:34	2017-01-10 05:22:22
R1-1700939	MIMO Phase-2 LLS calibration results on 30GHz frequency band	Samsung	available	2017-01-09 04:15:34	2017-01-13 10:01:29
R1-1700940	UL power control aspects	Samsung	available	2017-01-09 04:15:34	2017-01-10 05:14:54
R1-1700941	Single Carrier Wide BW Operational Aspects	Samsung	available	2017-01-09 04:15:34	2017-01-10 04:41:13
R1-1700942	UE-Group Common Control Signaling	Samsung	noted	2017-01-09 04:15:34	2017-01-10 01:01:38
R1-1700943	Operation with Reduced Bandwidth for DL Control Channel Monitoring	Samsung	available	2017-01-09 04:15:34	2017-01-10 01:01:38
R1-1700944	Transmission Schemes for DL Control Channels	Samsung	available	2017-01-09 04:15:34	2017-01-10 01:01:38
R1-1700945	Bandwidth Adaptation for UE Power Savings	Samsung	available	2017-01-09 04:15:34	2017-01-10 05:20:51
R1-1700946	Resource mapping aspects for NR-PDCCH	Samsung	available	2017-01-09 04:15:34	2017-01-10 05:20:51
R1-1700947	Performance Evaluation of DL Control Channels	Samsung	noted	2017-01-09 04:15:34	2017-01-10 01:26:52
R1-1700948	On UCI Multiplexing in PUSCH	Samsung	available	2017-01-09 04:15:34	2017-01-10 01:01:38
R1-1700949	On UCI Multiplexing with Multi-Layer UL Data Transmissions	Samsung	available	2017-01-09 04:15:34	2017-01-10 01:01:38
R1-1700950	UCI and data multiplexing for slot aggregation	Samsung	available	2017-01-09 04:15:34	2017-01-10 05:14:25
R1-1700951	UL Control Channel Design: Long Format	Samsung	available	2017-01-09 04:15:34	2017-01-10 05:20:51
R1-1700952	UL Control Channel Design: Short Format	Samsung	available	2017-01-09 04:15:34	2017-01-10 05:20:51
R1-1700953	UCI and Data Multiplexing	Samsung	available	2017-01-09 04:15:34	2017-01-10 05:14:54
R1-1700954	Scaled Numerology for UL Control Channels	Samsung	available	2017-01-09 04:15:34	2017-01-10 05:14:54
R1-1700955	Performance Evaluation of UL Control Channels	Samsung	available	2017-01-09 04:15:34	2017-01-10 05:14:54
R1-1700956	HARQ-ACK feedback for CA with Different Numerologies	Samsung	available	2017-01-09 04:15:34	2017-01-10 01:01:38
R1-1700957	HARQ-ACK Feedback with Flexible Timing	Samsung	available	2017-01-09 04:15:34	2017-01-10 05:17:08
R1-1700958	TB/CB handling for eMBB	Samsung	noted	2017-01-09 04:15:34	2017-01-10 05:17:08
R1-1700959	Discussion on partial retransmission for eMBB	Samsung	available	2017-01-09 04:15:34	2017-01-10 05:14:25
R1-1700960	Evaluation results of partial retransmission for eMBB	Samsung	available	2017-01-09 04:15:34	2017-01-10 05:14:25
R1-1700961	DCI Formats and Contents for NR	Samsung	available	2017-01-09 04:15:34	2017-01-10 05:20:51
R1-1700962	Slot aggregation in DL	Samsung	available	2017-01-09 04:15:34	2017-01-10 05:20:51
R1-1700963	UL Power Control for CA with Different Numerologies	Samsung	available	2017-01-09 04:15:34	2017-01-10 01:01:38

R1-1700964	DMRS consideration for mutiplexing of eMBB and URLLC	Samsung	available	2017-01-09 04:15:34	2017-01-10 05:17:08
R1-1700965	UL Data Channel Transmission for URLLC	Samsung	withdrawn	2017-01-09 04:15:34	
R1-1700966	Preemption-based multiplexing between eMBB and URLLC for DL	Samsung	available	2017-01-09 04:15:34	2017-01-10 05:14:25
R1-1700967	URLLC control channel	Samsung	available	2017-01-09 04:15:34	2017-01-10 01:26:52
R1-1700968	Performance of eMBB receiver with blind detection for preempted eMBB resources	Samsung	available	2017-01-09 04:15:34	2017-01-10 04:30:49
R1-1700969	Evaluation Results of Superposition for Multiplexing eMBB and URLLC	Samsung	available	2017-01-09 04:15:34	2017-01-10 04:30:49
R1-1700970	Performance of eMBB with HARQ retransmission for multiplexing eMBB and URLLC	Samsung	available	2017-01-09 04:15:34	2017-01-10 04:30:49
R1-1700971	Dynamic TDD for Latency Reduction	Samsung	available	2017-01-09 04:15:34	2017-01-10 04:09:04
R1-1700972	Summary of e-mail discussion on multiplexing eMBB and URLLC in DL	Samsung	noted	2017-01-09 04:15:34	2017-01-10 05:12:31
R1-1700973	User plane latency for URLLC	Samsung	available	2017-01-09 04:15:34	2017-01-10 05:22:22
R1-1700974	Dynamic Resource Selection for UL URLLC Channels	Samsung	available	2017-01-09 04:15:34	2017-01-10 01:01:38
R1-1700975	Design Aspects of Mini-slot Structure	Samsung	available	2017-01-09 04:15:34	2017-01-10 05:20:51
R1-1700976	Discussion on LDPC Code Design	Samsung	noted	2017-01-09 04:15:34	2017-01-10 05:49:26
R1-1700977	Discussion on Rate Matching for LDPC Codes	Samsung	available	2017-01-09 04:15:34	2017-01-10 05:49:26
R1-1700978	Discussion on Polar Code Design	Samsung	available	2017-01-09 04:15:34	2017-01-10 05:49:26
R1-1700979	Discussion on CA-Polar and PC-Polar Codes	Samsung	noted	2017-01-09 04:15:34	2017-01-10 05:49:26
R1-1700980	Discussion on Channel Coding for eMBB Data Channel	Samsung	available	2017-01-09 04:15:34	2017-01-10 05:49:26
R1-1700981	Discussion on Channel Coding for URLLC Channel	Samsung	available	2017-01-09 04:15:34	2017-01-10 05:49:26
R1-1700982	Channel Coding for Short-Length Information	Samsung	available	2017-01-09 04:15:34	2017-01-10 05:49:26
R1-1700983	Discussion on moduation schemes for high spectral efficiency	Samsung	available	2017-01-09 04:15:34	2017-01-10 04:46:05
R1-1700984	Performance evaluation of dynamic TDD	Samsung	noted	2017-01-09 04:15:34	2017-01-10 00:26:34
R1-1700985	Cross-link interference management based on UE measurements	Samsung	noted	2017-01-09 04:15:34	2017-01-10 00:26:34
R1-1700986	Cross-link interference management based on coordinated beamforming	Samsung	available	2017-01-09 04:15:34	2017-01-10 04:10:45
R1-1700987	Wider Bandwidth Operation: CA/DC vs. Single Carrier	Samsung	available	2017-01-09 04:15:34	2017-01-10 05:20:51
R1-1700988	LTE-NR Coexistence for DL	Samsung	available	2017-01-09 04:15:34	2017-01-10 05:20:51
R1-1700989	LTE-NR Coexistence for UL	Samsung	noted	2017-01-09 04:15:34	2017-01-10 05:12:31
R1-1700990	e-mail discussion summary [87-35] on updating calibration results on additional features	Samsung	noted	2017-01-09 04:15:34	2017-01-10 01:00:07
R1-1700991	Draft CR for TR38.900 to update calibration results on additional features	Samsung	revised	2017-01-09 04:15:35	2017-01-10 01:00:07
R1-1700992	Extended CP Aspects	Samsung	noted	2017-01-09 04:15:35	2017-01-10 05:14:54
R1-1700993	Basic channel structure for grant-free based multiple access	Samsung	available	2017-01-09 04:15:35	2017-01-10 05:17:08
R1-1700994	Indication of Reserved Resources	Samsung	available	2017-01-09 04:15:35	2017-01-10 05:20:51
R1-1700995	DC subcarrier handling	Samsung	available	2017-01-09 04:15:35	2017-01-10 05:20:51
R1-1700996	Guard-band Considering Inter-numerology Interference	Samsung	available	2017-01-09 04:15:35	2017-01-10 05:12:31
R1-1700997	Remaining Issues on RB Grid	Samsung	available	2017-01-09 04:15:35	2017-01-10 01:26:52

R1-1700998	Design aspects of frequency domain spectral shaping for DFT-s-OFDM	Samsung	available	2017-01-09 04:15:35	2017-01-10 05:22:22
R1-1700999	Modulation/waveform optimization for further PAPR reduction	Samsung	available	2017-01-09 04:15:35	2017-01-10 05:22:22
R1-1701000	Performance evaluation results of DFT-s-OFDM with FDSS	Samsung	available	2017-01-09 04:15:35	2017-01-10 05:22:22
R1-1701001	DFT-based IGMA	Samsung	available	2017-01-09 04:15:35	2017-01-10 05:17:08
R1-1701002	PAPR evaluation results for DFT-based IGMA	Samsung	available	2017-01-09 04:15:35	2017-01-10 05:17:08
R1-1701003	Grant-free Based Multiple Access	Samsung	available	2017-01-09 04:15:35	2017-01-10 05:17:08
R1-1701004	Collision Analysis of Grant-Free Based Multiple Access	Samsung	available	2017-01-09 04:15:35	2017-01-10 05:17:08
R1-1701005	Overview of NR Unlicensed and Shared Spectrums	Samsung	available	2017-01-09 04:15:35	2017-01-10 02:56:38
R1-1701006	Discussion on vehicular communications for NR	Samsung	available	2017-01-09 04:15:35	2017-01-10 06:07:29
R1-1701007	Discussions on the multiplexing for eMBB and URLLC	CATR	available	2017-01-09 05:13:05	2017-01-09 05:17:48
R1-1701008	Views on protomatrix selection for LDPC	CATR	available	2017-01-09 05:15:16	2017-01-09 05:17:48
R1-1701009	HARQ retransmission in grant-free NOMA	HTC Corporation	available	2017-01-09 06:34:21	2017-01-10 05:12:22
R1-1701010	On the DL control channel DM-RS design for NR	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 06:49:32	2017-01-10 01:17:02
R1-1701011	On the PDCCH search space structure for NR	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 06:49:32	2017-01-10 01:17:02
R1-1701012	Dynamic reuse of DL control resources for data in NR	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 06:49:32	2017-01-10 04:35:29
R1-1701013	On the usage of PDCCH DMRS as a complementary synchronization signal in DL	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 06:49:32	2017-01-10 01:17:02
R1-1701014	On the design of long PUCCH for NR	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 06:49:32	2017-01-10 01:17:02
R1-1701015	On the design of short PUCCH for NR	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 06:49:32	2017-01-10 01:17:02
R1-1701016	UCI multiplexing in the presence of UL data	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 06:49:32	2017-01-10 01:17:02
R1-1701017	DFT-S-OFDM impacts in the NR UL design	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 06:49:32	2017-01-10 01:17:02
R1-1701018	On HARQ feedback determination	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 06:49:32	2017-01-10 01:17:02
R1-1701019	On HARQ/scheduling timing and self-contained operation	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 06:49:32	2017-01-10 01:17:02
R1-1701020	Enriched feedback for adaptive HARQ	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 06:49:32	2017-01-10 01:17:02
R1-1701021	HARQ operation for large transport block sizes	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 06:49:32	2017-01-10 01:17:03
R1-1701022	On the Number of HARQ Processes	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 06:49:32	2017-01-10 01:17:03
R1-1701023	Punctured Scheduling for Low Latency Downlink Transmissions	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 06:49:32	2017-01-10 01:17:03
R1-1701024	Pause-Resume Scheduling for Low Latency Uplink Transmissions	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 06:49:32	2017-01-10 01:17:03

R1-1701025	Overview of UL data transmission schemes for URLLC	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 06:49:32	2017-01-10 01:17:03
R1-1701026	Contention-based grant-free transmission for URLLC	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 06:49:32	2017-01-10 01:17:02
R1-1701027	Flexible semi-persistent scheduling for UL URLLC	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 06:49:32	2017-01-10 01:17:02
R1-1701028	LDPC design for eMBB data	Nokia, Alcatel-Lucent Shanghai Bell	noted	2017-01-09 07:46:15	2017-01-09 20:26:54
R1-1701029	Code segmentation for eMBB data	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 07:46:15	2017-01-09 20:26:54
R1-1701030	CRC attachment for eMBB data	Nokia, Alcatel-Lucent Shanghai Bell	noted	2017-01-09 07:46:15	2017-01-09 20:26:54
R1-1701031	Padding for LDPC codes	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 07:46:15	2017-01-09 20:26:54
R1-1701032	Polar code design for DL control	Nokia, Alcatel-Lucent Shanghai Bell	noted	2017-01-09 07:46:15	2017-01-09 20:26:54
R1-1701033	Polar codes design for UL control	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 07:46:15	2017-01-09 20:26:54
R1-1701034	Coding for Short Blocks in Control Channel	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 07:46:15	2017-01-09 20:54:31
R1-1701035	LDPC design for URLLC codes	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 07:46:15	2017-01-09 20:26:54
R1-1701036	Summary of e-mail discussions on downlink control signaling	Ericsson LM	noted	2017-01-09 08:10:40	2017-01-13 21:27:32
R1-1701037	Synchronization Signal Structure	Innovative Technology Lab Co.	available	2017-01-09 08:26:34	2017-01-10 07:07:11
R1-1701038	Considerations on Sequence Design for Synchronization Signal	Innovative Technology Lab Co.	available	2017-01-09 08:29:52	2017-01-10 13:14:26
R1-1701039	Rotated modulations for DFT-S-OFDM uplink	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 08:39:29	2017-01-09 19:49:52
R1-1701040	Draft LS to RAN4 on rotated modulations for DFT-S-OFDM uplink	Nokia, Alcatel-Lucent Shanghai Bell	noted	2017-01-09 08:39:29	2017-01-09 19:49:52
R1-1701041	Synchronization in NR considering beam sweeping	ASUSTEK COMPUTER (SHANGHAI)	available	2017-01-09 08:47:11	2017-01-10 05:07:38
R1-1701042	Signaling of broadcast channel considering multiple numerologies	ASUSTEK COMPUTER (SHANGHAI)	available	2017-01-09 08:51:06	2017-01-10 05:07:56
R1-1701043	Resource allocation for data channel in NR	ASUSTEK COMPUTER (SHANGHAI)	available	2017-01-09 08:52:51	2017-01-10 05:08:07
R1-1701044	On mMTC, NB-IoT and eMTC battery life evaluation	Ericsson LM	available	2017-01-09 08:59:25	2017-01-09 09:28:15
R1-1701045	On mMTC, NB-IoT and eMTC latency evaluation	Ericsson LM	available	2017-01-09 09:03:16	2017-01-09 09:28:15
R1-1701046	NR extended cyclic prefix	Ericsson	noted	2017-01-09 09:03:25	2017-01-10 00:52:22
R1-1701047	On mMTC multiple access	Ericsson LM	available	2017-01-09 09:07:21	2017-01-09 09:28:15

R1-1701048	On NB-IoT, eMTC and NR coexistence	Ericsson LM	available	2017-01-09 09:11:51	2017-01-09 09:28:15
R1-1701049	Discussion on NR RRM measurements for IDLE and CONNECTED states	China Unicom	available	2017-01-09 09:15:25	2017-01-10 05:29:17
R1-1701050	On the evolution of mMTC	Ericsson LM	available	2017-01-09 09:21:06	2017-01-09 09:28:15
R1-1701051	On the mini-slot scenarios in NR	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 11:05:34	2017-01-09 21:15:28
R1-1701052	On the mini-slot design in NR	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 11:05:34	2017-01-09 21:15:28
R1-1701053	On the signalling support for forward compatibility	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 11:05:34	2017-01-09 21:15:28
R1-1701054	Forward compatibility: NR performance via Aerial platforms	Thales, Fraunhofer IIS, Dish Network	noted	2017-01-09 11:26:57	2017-01-09 18:13:51
R1-1701055	On LTE and NR coexistence in the same frequency	Nokia, Alcatel-Lucent Shanghai Bell	noted	2017-01-09 11:42:27	2017-01-09 20:50:30
R1-1701056	SS Block Bandwidth, Numerology and Multiplexing	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 11:47:43	2017-01-09 16:43:46
R1-1701057	On synchronization signal frequency raster	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 11:47:43	2017-01-09 16:43:46
R1-1701058	On Requirements and Design of SS Burst Set	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 11:47:43	2017-01-09 16:43:46
R1-1701059	Syncrhonization signal design and performance analysis	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 11:47:43	2017-01-09 16:43:46
R1-1701060	PBCH design	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 11:47:43	2017-01-09 16:43:46
R1-1701061	Paging in NR	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 11:47:43	2017-01-09 16:43:46
R1-1701062	Considerations on DL and UL mobility in NR	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 11:47:43	2017-01-09 16:43:46
R1-1701063	DL Signals for Mobility Measurements and mobility schemes in NR	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 11:47:43	2017-01-09 16:43:46
R1-1701064	Cell Identification in NR	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 11:47:43	2017-01-09 16:43:46
R1-1701065	On gNB Energy Consumption	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 11:47:43	2017-01-09 16:43:46
R1-1701066	Discussion on Blind Decoding for NR-PDCCH	WILUS Inc.	available	2017-01-09 11:50:33	2017-01-10 06:22:13
R1-1701067	Discussion on Multiplexing between eMBB and URLLC in DL	WILUS Inc.	available	2017-01-09 11:50:33	2017-01-10 06:22:13
R1-1701068	Hybrid beamforming and transmit diversity scheme	CEWiT	available	2017-01-09 13:39:42	2017-01-10 06:43:35
R1-1701069	Beam sweeping using multi-width beams	CMCC	available	2017-01-09 14:01:23	2017-01-09 14:45:55
R1-1701070	On transmission bandwidth and multiplexing synchronization signals	CMCC	available	2017-01-09 14:12:35	2017-01-09 14:45:55
R1-1701071	On the number of codewords in NR	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 14:14:18	2017-01-09 19:40:38
R1-1701072	UE advanced receiver utilization in NR	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 14:14:18	2017-01-09 19:40:38

R1-1701073	Impact of Antenna Panel Array Structures in UMa 30GHz	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 14:14:18	2017-01-09 21:20:54
R1-1701074	High-level principles for beam coordination and Link Adaptation in NR	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 14:14:18	2017-01-09 19:40:38
R1-1701075	Non-coherent Multi-node Transmission for URLLC in the 5G New Radio	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 14:14:18	2017-01-09 19:40:38
R1-1701076	Decoupled control and data transmission for NR	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 14:14:18	2017-01-09 19:40:38
R1-1701077	On the support of open-loop transmission in NR	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 14:14:18	2017-01-09 19:40:38
R1-1701078	DL transmission mode configuration for NR	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 14:14:18	2017-01-09 19:40:38
R1-1701079	UL MIMO transmission in NR	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 14:14:18	2017-01-10 06:34:39
R1-1701080	On the support for frequency selective precoding in UL MIMO	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 14:14:18	2017-01-10 06:34:39
R1-1701081	On the utilization of multi-panel arrays at the UE in UMa 30GHz	Nokia, Alcatel-Lucent Shanghai Bell	withdrawn	2017-01-09 14:14:18	
R1-1701082	DL SU-MIMO Performance Characteristics in UMa 30GHz	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 14:14:18	2017-01-09 19:40:38
R1-1701083	DL MU-MIMO Performance Characteristics in UMa 30GHz	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 14:14:18	2017-01-09 19:40:38
R1-1701084	Network Coordination to support advanced receivers	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 14:14:18	2017-01-09 19:40:38
R1-1701085	Interference Aware Inter Cell Rank Coordination	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 14:14:18	2017-01-09 19:40:38
R1-1701086	Nonlinear Precoding for Interference Mitigation in HetNets	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 14:14:18	2017-01-09 19:40:39
R1-1701087	On MU MIMO non-linear precoding in NR	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 14:14:18	2017-01-09 19:40:39
R1-1701088	On beam grouping reporting in NR	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 14:14:18	2017-01-10 06:34:39
R1-1701089	Beam management - DCI monitoring	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 14:14:18	2017-01-09 19:40:39
R1-1701090	Beam Measurements and TX/RX Beam Correspondence	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 14:14:18	2017-01-09 19:40:39
R1-1701091	Beam Management – Beam Reporting	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 14:14:18	2017-01-09 19:40:39
R1-1701092	Beam Recovery in NR	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 14:14:18	2017-01-09 19:40:38
R1-1701093	Multi-beam control channel transmission	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 14:14:18	2017-01-09 19:40:38
R1-1701094	Beam Management – Beam Reciprocity Impacts	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 14:14:18	2017-01-09 19:40:38

R1-1701095	On the need for UL beam management	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 14:14:18	2017-01-09 19:40:38
R1-1701096	DRX and Beam Management	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 14:14:18	2017-01-09 19:40:38
R1-1701097	On the impact of number of UE panels	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 14:14:18	2017-01-09 19:40:38
R1-1701098	On type I CSI feedback in NR	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 14:14:18	2017-01-09 19:40:38
R1-1701099	On the CSI timing relationhips	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 14:14:18	2017-01-09 19:40:38
R1-1701100	On the channel and interference estimation in NR	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 14:14:18	2017-01-09 19:42:14
R1-1701101	On the CSI-RS configurations for NR CSI acquisition	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 14:14:18	2017-01-09 19:42:14
R1-1701102	On CSI-RS Design for DL Beam Management	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 14:14:18	2017-01-09 19:42:14
R1-1701103	On the DL DMRS structure for NR physical data channels	Nokia, Alcatel-Lucent Shanghai Bell	noted	2017-01-09 14:14:18	2017-01-09 19:42:14
R1-1701104	DL DMRS patterns link performance evaluation	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 14:14:18	2017-01-09 19:42:14
R1-1701105	On PT-RS Design for NR	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 14:14:18	2017-01-09 19:42:14
R1-1701106	UL SRS design considerations in NR	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 14:14:18	2017-01-09 19:42:14
R1-1701107	On QCL Framework and Configurations in NR	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 14:14:18	2017-01-09 19:42:14
R1-1701108	Dynamic network coordination for URLLC in the 5G New Radio	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 14:14:18	2017-01-09 19:42:14
R1-1701109	Power control for MIMO	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 14:14:18	2017-01-09 19:42:14
R1-1701110	TR25.996_draftCR_Correction_of_Channel_Coefficient_Indexes	Fraunhofer HHI	revised	2017-01-09 14:16:02	2017-01-09 16:04:52
R1-1701111	TR25.996_draftCR_Correction_of_Circular_Angle_Spread	Fraunhofer HHI, Ericsson	revised	2017-01-09 14:18:24	2017-01-09 16:04:52
R1-1701112	TR36.814_draftCR_Align_LSP_Notation	Fraunhofer HHI, Ericsson	revised	2017-01-09 14:19:55	2017-01-09 16:04:52
R1-1701113	TR36.814_draftCR_Correction_of_B-22	Fraunhofer HHI	revised	2017-01-09 14:21:23	2017-01-09 16:04:52
R1-1701114	TR36.814_draftCR_Incorrect_Reference_to_LSP_Table	Fraunhofer HHI, Ericsson	revised	2017-01-09 14:22:37	2017-01-09 16:04:52
R1-1701115	TR36.814_draftCR_Normalize_Cluster_Powers	Fraunhofer HHI, Ericsson	revised	2017-01-09 14:23:44	2017-01-09 16:04:52
R1-1701116	TR36.814_draftCR_Notation_of_Cluster_Angular_Spreads	Fraunhofer HHI	revised	2017-01-09 14:24:53	2017-01-09 16:04:52
R1-1701117	On DL Control Signaling Structure	Ericsson	available	2017-01-09 14:27:29	2017-01-10 05:35:09
R1-1701118	On Blind Detection of DL Control Channels	Ericsson	available	2017-01-09 14:27:29	2017-01-10 05:35:09

R1-1701119	On DM-RS for DL Control Channels	Ericsson	available	2017-01-09 14:27:29	2017-01-10 05:35:09
R1-1701120	On Two-Stage DCI	Ericsson	available	2017-01-09 14:27:29	2017-01-10 05:35:09
R1-1701121	On PCFICH-like Channels	Ericsson	available	2017-01-09 14:27:29	2017-01-10 05:35:09
R1-1701122	Short PUCCH Transmission - Impact on PUSCH Performance	Ericsson	available	2017-01-09 14:27:29	2017-01-10 05:35:09
R1-1701123	Short PUCCH Transmission - Impact on Short PUSCH	Ericsson	noted	2017-01-09 14:27:29	2017-01-10 05:35:09
R1-1701124	On Long PUCCH	Ericsson	available	2017-01-09 14:27:29	2017-01-10 05:35:09
R1-1701125	On Long PUCCH for Medium to Large Payload Sizes	Ericsson	revised	2017-01-09 14:27:29	2017-01-10 05:35:09
R1-1701126	Performance of Dynamic TDD in a Dense Urban Environment	Ericsson	noted	2017-01-09 14:27:29	2017-01-10 05:39:10
R1-1701127	Performance of Dynamic TDD in an Indoor Hotspot Environment at 4 GHz	Ericsson	available	2017-01-09 14:27:29	2017-01-10 05:39:10
R1-1701128	Performance of Dynamic TDD in an Indoor Hotspot Environment at 30 GHz	Ericsson	available	2017-01-09 14:27:29	2017-01-10 05:39:10
R1-1701129	Cross-Link Interference Mitigation for Dynamic TDD in Dense Urban Environments	Ericsson	noted	2017-01-09 14:27:29	2017-01-10 05:39:10
R1-1701130	Cross-Link Interference Mitigation for Dynamic TDD in Indoor Hotspot Environments	Ericsson	available	2017-01-09 14:27:29	2017-01-10 05:39:10
R1-1701131	On Coexistence Between LTE and NR	Ericsson	noted	2017-01-09 14:27:29	2017-01-10 05:36:10
R1-1701132	On NR Operation in the 60 GHz Unlicensed Band	Ericsson	available	2017-01-09 14:27:29	2017-01-10 05:37:13
R1-1701133	On Channel Access Mechanisms for NR in Unlicensed Spectrum	Ericsson	available	2017-01-09 14:27:29	2017-01-10 05:37:13
R1-1701134	Technology Components for Unlicensed Operation	Ericsson	available	2017-01-09 14:27:29	2017-01-10 05:37:13
R1-1701135	On Autonomous UL Transmissions for NR in Unlicensed Spectrum	Ericsson	available	2017-01-09 14:27:29	2017-01-10 05:37:13
R1-1701136	Discussion of Multi-Antenna and Highly Directional Beam-Forming for Operation in Unlicensed Spectrum	Ericsson	available	2017-01-09 14:27:29	2017-01-10 05:37:13
R1-1701137	On Physical Layer Design Policies for Unlicensed Operation of NR	Ericsson	available	2017-01-09 14:27:29	2017-01-10 05:37:13
R1-1701138	Initial results on number of beams to be maintained	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 14:32:45	2017-01-10 06:34:39
R1-1701139	Discussion on eMBB and URLLC mixing	Convida Wireless LLC	available	2017-01-09 14:50:34	2017-01-10 05:28:42
R1-1701140	Control Channel Design with Mini Slot	Convida Wireless LLC	available	2017-01-09 14:55:08	2017-01-10 05:28:42
R1-1701141	TR36.873_draftCR_Incorrect_Reference	Fraunhofer HHI, Ericsson	revised	2017-01-09 15:00:50	2017-01-09 16:04:52
R1-1701142	TR36.873_draftCR_Align_LSP_Notation	Fraunhofer HHI, Ericsson	revised	2017-01-09 15:02:14	2017-01-09 16:04:52
R1-1701143	TR36.873_draftCR_Section_7.1	Fraunhofer HHI, Ericsson	revised	2017-01-09 15:03:30	2017-01-09 16:04:52
R1-1701144	On the number of symbols in a slot and TTI for mini-slot multiplexing	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 15:04:36	2017-01-09 21:30:50
R1-1701145	On the benefits of mini-slot for eMBB use cases	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 15:04:36	2017-01-09 21:15:28
R1-1701146	Dynamic TDD Interference Mitigation Concepts in NR	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 15:04:36	2017-01-09 16:47:01

R1-1701147	UL Interference Coordination and Power Control	Nokia, Alcatel-Lucent Shanghai Bell	noted	2017-01-09 15:04:36	2017-01-09 16:47:01
R1-1701148	Solutions for wider bandwidth options	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 15:04:36	2017-01-09 21:15:28
R1-1701149	On extended CP for 60 kHz SCS	Nokia, Alcatel-Lucent Shanghai Bell	noted	2017-01-09 15:04:36	2017-01-09 20:52:48
R1-1701150	Intra-carrier sub-band for mixed numerology	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 15:04:36	2017-01-09 21:15:28
R1-1701151	Guard band arrangement supporting mixed numerology	Nokia, Alcatel-Lucent Shanghai Bell	available	2017-01-09 15:04:36	2017-01-09 21:23:19
R1-1701152	TR36.873_draftCR_Scenarios	Fraunhofer HHI, Ericsson	revised	2017-01-09 15:04:38	2017-01-09 16:04:52
R1-1701153	TR36.873_draftCR_Notation_of_Cluster_Angular_Spreads	Fraunhofer HHI, Ericsson	revised	2017-01-09 15:05:51	2017-01-09 16:04:52
R1-1701154	UE capability aspects for LTE/NR tight interworking	Nokia, Alcatel-Lucent Shanghai Bell	noted	2017-01-09 15:08:07	2017-01-09 16:49:41
R1-1701155	TR36.873_draftCR_Normalize_Cluster_Powers	Fraunhofer HHI, Ericsson	revised	2017-01-09 15:12:11	2017-01-09 16:04:52
R1-1701156	TR36.873_draftCR_Incorrect_Reference_to_LSP_Table	Fraunhofer HHI, Ericsson	revised	2017-01-09 15:13:22	2017-01-09 16:04:52
R1-1701157	TR36.873_draftCR_Section_7.2	Fraunhofer HHI	revised	2017-01-09 15:20:49	2017-01-09 16:04:52
R1-1701158	TR38.900_draftCR_Ground_Reflection_Model	Fraunhofer HHI	revised	2017-01-09 15:22:05	2017-01-09 16:04:52
R1-1701159	TR38.900_draftCR_Initial_Phase	Fraunhofer HHI	not pursued	2017-01-09 15:23:06	2017-01-09 16:04:52
R1-1701160	TR38.900_draftCR_Normalize_Cluster_Powers	Fraunhofer HHI, Ericsson	revised	2017-01-09 15:24:04	2017-01-09 16:04:52
R1-1701161	On DL and UL phase noise tracking RS (PTRS)	Ericsson	available	2017-01-09 15:25:15	2017-01-10 03:10:31
R1-1701162	Signal Space Diversity Use in NR	Sony	available	2017-01-09 15:33:42	2017-01-09 23:30:47
R1-1701163	Correction for scenario description	Ericsson, Fraunhofer HHI	revised	2017-01-09 15:51:00	2017-01-10 03:18:53
R1-1701164	Correction for spatial consistency	Ericsson	revised	2017-01-09 15:51:00	2017-01-10 03:18:53
R1-1701165	Correction for blockage model B and its calibration assumptions	Ericsson	revised	2017-01-09 15:51:00	2017-01-10 03:18:53
R1-1701166	Clarifications on blockage model B	Ericsson	noted	2017-01-09 15:51:00	2017-01-10 03:18:53
R1-1701167	Correction for initial phase	Ericsson	not pursued	2017-01-09 15:51:00	2017-01-10 03:18:53
R1-1701168	Correction for low and high frequency model harmonization	Ericsson, Samsung, NTT DOCOMO, Nokia	revised	2017-01-09 15:51:00	2017-01-10 03:19:17
R1-1701169	Correction for fast fading model	Ericsson	revised	2017-01-09 15:51:00	2017-01-10 03:19:17
R1-1701170	On channel model harmonization	Ericsson	noted	2017-01-09 15:51:00	2017-01-10 03:19:17
R1-1701171	Correction for spatially-consistent UT mobility modelilng	Ericsson, Nokia	revised	2017-01-09 15:51:00	2017-01-10 03:19:17
R1-1701172	Correction for correlation modeling for multi-frequency simulations	Ericsson, Fraunhofer HHI	revised	2017-01-09 15:51:00	2017-01-10 03:19:17
R1-1701173	On UL DMRS design	Ericsson	available	2017-01-09 15:51:00	2017-01-10 03:10:31
R1-1701174	On DL DMRS design	Ericsson	available	2017-01-09 15:51:00	2017-01-10 03:10:31
R1-1701175	Multi-antenna requirements for NR	Ericsson	available	2017-01-09 15:51:00	2017-01-10 03:59:15

R1-1701176	Correction for channel generation for multi-frequency simulations	Ericsson	revised	2017-01-09 15:51:00	2017-01-10 03:19:33
R1-1701177	Uplink operation for LTE+NR Dual Connectivity	VODAFONE Group Plc	revised	2017-01-09 15:58:04	2017-01-09 17:20:49
R1-1701178	Discussion on Synchronization Signal Periodicity	ORANGE	available	2017-01-09 16:07:44	2017-01-09 18:25:51
R1-1701179	UL Data Channel Transmission for URLLC	Samsung Research America	available	2017-01-09 19:24:58	2017-01-10 01:04:51
R1-1701180	Comparison of pi/2 BPSK with and without frequency domain pulse shaping: Results with PA model	TSDSI	available	2017-01-09 19:31:20	2017-01-17 02:28:57
R1-1701181	On long PUCCH with simultaneous data transmission	Ericsson LM	available	2017-01-09 19:39:01	2017-01-10 05:35:09
R1-1701182	Discussion on UE capability aspects for LTE/NR tight interworking	Samsung	noted	2017-01-10 10:47:19	2017-01-10 11:07:50
R1-1701183	On Long PUCCH for Medium to Large Payload Sizes	Ericsson LM	available	2017-01-11 11:38:12	2017-01-11 13:00:18
R1-1701184	Phase 3 channel model calibration results	Ericsson	available	2017-01-12 09:46:14	2017-01-12 22:27:11
R1-1701185	Discussion on DMRS design for high speed scenario	ETRI	revised	2017-01-12 09:48:02	2017-01-13 10:22:37
R1-1701186	Comparison of Polar codes for control channel	Qualcomm Incorporated	noted	2017-01-12 22:28:15	2017-01-17 02:28:57
R1-1701187	Polar code information bit allocation and nested extension construction	Qualcomm Incorporated	available	2017-01-12 22:28:47	2017-01-18 14:10:22
R1-1701188	Beam grouping evaluation for beam management	ZTE, ZTE Microelectronics	available	2017-01-12 22:30:36	2017-01-17 02:28:57
R1-1701189	On Type I codebook design for NR MIMO	ZTE, ZTE Microelectronics	available	2017-01-12 22:33:01	2017-01-17 02:28:57
R1-1701190	Hybrid CSI feedback for NR MIMO	ZTE, ZTE Microelectronics	available	2017-01-12 22:33:27	2017-01-17 02:28:57
R1-1701191	Summary of 87-30 email discussion on NR MIMO calibration	ZTE, ZTE Microelectronics	withdrawn	2017-01-12 22:33:50	
R1-1701192	Discussion on DL Beam Management	Intel Corporation	available	2017-01-13 10:29:03	2017-01-17 02:28:57
R1-1701193	Evaluation results for DM-RS	Intel Corporation	available	2017-01-13 11:50:30	2017-01-14 07:54:57
R1-1701194	CSI acquisition for DL NR MIMO	Samsung	available	2017-01-14 07:55:33	2017-01-17 02:28:57
R1-1701195	Correction for low and high frequency model harmonization	Ericsson, Samsung, NTT DOCOMO, Nokia, Intel, Telstra	revised	2017-01-15 20:47:55	2017-01-17 02:28:57
R1-1701196	Discussion on DMRS design for high speed scenario	ETRI	available	2017-01-15 23:23:43	2017-01-17 02:28:57
R1-1701197	Evaluation of DL DMRS design	Qualcomm Incorporated	available	2017-01-16 00:55:36	2017-01-17 02:28:57
R1-1701198	Uplink operation for LTE+NR Dual Connectivity	VODAFONE Group Plc	noted	2017-01-16 16:16:34	2017-01-17 02:28:57
R1-1701199	Discussion on NR PRACH Preamble	LG Electronics	available	2017-01-16 18:05:39	2017-01-17 02:28:57
R1-1701200	Evaluation Result of NR DMRS	LG Electronics	available	2017-01-16 18:05:39	2017-01-17 02:28:57
R1-1701201	Codeword-to-layer mapping for DL and UL NR MIMO	Samsung	available	2017-01-16 18:05:39	2017-01-22 14:27:24
R1-1701202	Desing of Interference Measurement and Feedback in NR	AT&T	noted	2017-01-16 18:05:39	2017-01-17 02:28:57
R1-1701203	On Type I feedback	CATT	withdrawn	2017-01-16 18:06:32	
R1-1701204	WF on Synchronization Signal Periodicity	AT&T, Orange	withdrawn	2017-01-17 02:23:41	

R1-1701205	WF on NR Paging	Samsung, Huawei, HiSilicon, CATT, Panasonic, NTT DOCOMO, Fujitsu, LG Electronics, MediaTek, Ericsson, Xiaomi	withdrawn	2017-01-17 02:23:41	2017-01-20 06:04:47
R1-1701206	Uplink URLLC transmission without grant	Intel Corporation	available	2017-01-17 02:23:41	2017-01-18 14:10:22
R1-1701207	WF on mini-slots	ZTE, ZTE Microelectronics, Ericsson, Nokia, Qualcomm, Convida Wireless	noted	2017-01-17 02:23:41	2017-01-17 14:27:49
R1-1701208	WF on NR slot structure indication	CATT	withdrawn	2017-01-17 02:23:41	
R1-1701209	WF on DMRS	NTT DOCOMO, INC.	noted	2017-01-17 02:23:41	2017-01-17 02:28:57
R1-1701210	High performance LDPC design features	MediaTek Inc.	revised	2017-01-17 02:23:41	2017-01-17 02:28:57
R1-1701211	High efficiency LDPC design features	MediaTek	noted	2017-01-17 02:23:41	2017-01-17 02:28:57
R1-1701212	Polar code design features for control channels	MediaTek	noted	2017-01-17 02:23:41	2017-01-18 14:10:22
R1-1701213	WF on control signaling for transmission direction change	LG Electronics, ZTE, ZTE Microelectronics	available	2017-01-17 02:23:41	2017-01-19 14:07:58
R1-1701214	WF on URLLC & eMBB with Indication	Sony, Sequans, MediaTek	noted	2017-01-17 02:23:41	2017-01-18 14:10:22
R1-1701215	Way Forward on SRS for duplexing flexibility	Huawei, HiSilicon, CATT, DoCoMo, CATR, Deutsche Telekom, LG Electronics	noted	2017-01-17 02:23:41	2017-01-19 14:07:58
R1-1701216	Way Forward on cross-link interference mitigation for duplexing flexibility	Huawei, HiSilicon	withdrawn	2017-01-17 02:23:41	
R1-1701217	WF on inter-TRP signaling for duplexing flexibility	LG Electronics, ZTE, ZTE Microelectronics, MediaTek, CATT	noted	2017-01-17 02:23:41	2017-01-19 14:07:58
R1-1701218	WF on Cross-link Interference Measurement for Duplexing Flexibility	LG Electronics, ZTE, ZTE Microelectronics	noted	2017-01-17 02:23:41	2017-01-19 14:07:58
R1-1701219	Phase II SLS calibration results for NR MIMO	LG Electronics	available	2017-01-17 02:23:41	2017-01-17 14:27:49
R1-1701220	WF for NR DL control CCE	ZTE, ZTE Microelectronics, Qualcomm, Huawei, HiSilicon, OPPO	noted	2017-01-17 14:04:17	2017-01-18 14:10:22
R1-1701221	Correction for blockage model B and its calibration assumptions	Ericsson, Fraunhofer HHI	revised	2017-01-17 14:04:18	2017-01-17 14:27:49
R1-1701222	[Draft] LS on wider bandwidth operation for NR	NTT DOCOMO, INC.	revised	2017-01-17 14:04:18	2017-01-17 14:27:49
R1-1701223	LS on wider bandwidth operation for NR	RAN1, NTT DOCOMO, INC.	approved	2017-01-17 14:04:18	2017-01-17 14:27:49

R1-1701224	Draft CR to TR36.873 on indoor hotspot channel model	CMCC	revised	2017-01-17 14:04:18	2017-01-20 06:04:47
R1-1701225	Correction for low and high frequency model harmonization	Ericsson, Samsung, NTT DOCOMO, Nokia, Intel, Telstra	revised	2017-01-17 14:04:18	2017-01-18 14:10:22
R1-1701226	Correction for calibration assumptions for spatial consistency	NTT DOCOMO, INC.	revised	2017-01-17 14:04:18	2017-01-19 14:07:58
R1-1701227	TR36.814_CR_Notation_of_Cluster_Angular_Spreads	Fraunhofer HHI	agreed	2017-01-17 14:04:18	2017-01-20 06:17:24
R1-1701228	CR covering R1-1700445	ETSI	withdrawn	2017-01-17 14:04:18	
R1-1701229	void	ETSI	withdrawn	2017-01-17 14:04:19	
R1-1701230	WF on other criteria for LDPC design comparison	ZTE, ZTE Microelectronics, Huawei, HiSilicon, CATT, MediaTek	noted	2017-01-17 14:04:19	2017-01-20 06:04:47
R1-1701231	Correction for calibration assumptions for spatial consistency	NTT DOCOMO, INC.	agreed	2017-01-17 14:04:19	2017-01-20 06:04:47
R1-1701232	void	ETSI	withdrawn	2017-01-17 14:04:19	
R1-1701233	TR36.873_CR_Adding_3D-InH_Scenario	CMCC	revised	2017-01-17 14:04:19	2017-01-22 14:27:24
R1-1701234	void	ETSI	withdrawn	2017-01-17 14:04:19	
R1-1701235	void	ETSI	withdrawn	2017-01-17 14:04:19	
R1-1701236	void	ETSI	withdrawn	2017-01-17 14:04:19	
R1-1701237	void	ETSI	withdrawn	2017-01-17 14:04:20	
R1-1701238	void	ETSI	withdrawn	2017-01-17 14:04:20	
R1-1701239	void	ETSI	withdrawn	2017-01-17 14:04:20	
R1-1701240	void	ETSI	withdrawn	2017-01-17 14:04:20	
R1-1701241	void	ETSI	withdrawn	2017-01-17 14:04:20	
R1-1701242	void	ETSI	withdrawn	2017-01-17 14:04:20	
R1-1701243	void	ETSI	withdrawn	2017-01-17 14:04:20	
R1-1701244	void	ETSI	withdrawn	2017-01-17 14:04:20	
R1-1701245	void	ETSI	withdrawn	2017-01-17 14:04:20	
R1-1701246	void	ETSI	withdrawn	2017-01-17 14:04:21	
R1-1701247	void	ETSI	withdrawn	2017-01-17 14:04:21	
R1-1701248	void	ETSI	withdrawn	2017-01-17 14:04:21	
R1-1701249	void	ETSI	withdrawn	2017-01-17 14:04:21	
R1-1701250	Discussion on RACH procedure and resources	Cohere Technologies	available	2017-01-17 14:04:21	2017-01-27 10:22:48
R1-1701251	void	ETSI	withdrawn	2017-01-17 14:04:21	
R1-1701252	void	ETSI	withdrawn	2017-01-17 14:04:21	
R1-1701253	void	ETSI	withdrawn	2017-01-17 14:04:21	
R1-1701254	WF on Shortening of LDPC Codes	Ericsson, Qualcomm, LG, Intel	revised	2017-01-17 14:14:08	2017-01-18 14:10:22
R1-1701255	WF on Rate Matching for LDPC Codes	Ericsson, Qualcomm, Intel, LG	revised	2017-01-17 14:14:08	2017-01-18 14:10:22
R1-1701256	WF on LDPC Design Parameters	Ericsson, LG	revised	2017-01-17 14:14:08	2017-01-18 14:10:22
R1-1701257	WF on CRC Attachment	Ericsson, LG, Nokia, ASB	revised	2017-01-17 14:14:08	2017-01-18 14:10:22

R1-1701258	WF on Description of Polar Code for NR	Ericsson, AT&T, LG, Intel, Qualcomm, Nokia, ASB, ZTE, Samsung	noted	2017-01-17 14:14:08	2017-01-20 06:17:25
R1-1701259	WF on Max Code Size and Rate Matching for Polar Codes	Ericsson, Intel, AT&T, Qualcomm, MediaTek, Nokia, ASB, LG, InterDigital, Samsung	available	2017-01-17 14:14:08	2017-01-20 06:17:25
R1-1701260	WF on 2-step RACH	ZTE, ZTE microelectronics	revised	2017-01-17 22:00:00	2017-01-17 22:00:00
R1-1701261	WF on NR RACH Msg1 retransmission	Samsung	revised	2017-01-18 13:58:14	2017-01-18 14:10:22
R1-1701262	WF on Multiple RAR	Samsung	revised	2017-01-18 13:58:14	2017-01-18 14:10:22
R1-1701263	WF on RACH preamble format	Samsung	revised	2017-01-18 13:58:14	2017-01-18 14:10:22
R1-1701264	WF on LDPC Design for NR	Samsung	noted	2017-01-18 13:58:14	2017-01-18 14:10:22
R1-1701265	WF on Polar Code Design for NR	Samsung	withdrawn	2017-01-18 13:58:14	
R1-1701266	WF on NW Initiated Beam Switching	Intel	revised	2017-01-18 13:58:14	2017-01-18 14:10:22
R1-1701267	Correction for channel generation for multi-frequency simulations	Ericsson	revised	2017-01-18 13:58:14	2017-01-19 14:07:58
R1-1701268	WF on number of NR Cell IDs and NR-PSS sequences	Samsung, Intel, LG Electronics, NTT DOCOMO, InterDigital, ZTE, ZTE Microelectronics	noted	2017-01-17 22:00:00	2017-01-17 22:00:00
R1-1701269	WF on Circulant Weight for LDPC Codes	Qualcomm, Intel, Ericsson, LG	noted	2017-01-18 13:58:14	2017-01-18 14:10:22
R1-1701270	WF on NR-SS structure	NTT DOCOMO, ITL, Convida Wireless, ZTE, ZTE Microelectronics, InterDigital, Huawei, HiSilicon, Sony	noted	2017-01-17 22:00:00	2017-01-17 22:00:00
R1-1701271	WF on NR-SS subcarrier spacing	NTT DOCOMO, Qualcomm, LG Electronics, Samsung, Intel, InterDigital, Sony	noted	2017-01-17 22:00:00	2017-01-17 22:00:00
R1-1701272	WF on SS burst set composition	Samsung, Ericsson, ZTE, ZTE Microelectronics, Interdigital, Cohere	noted	2017-01-18 13:58:14	2017-01-19 14:07:58
R1-1701273	Evaluation of LDPC codes for eMBB data channels	NTT DOCOMO, INC.	available	2017-01-18 13:58:14	2017-01-18 14:10:22

R1-1701274	WF on RACH transmission in 4-step Random Access	ZTE, ZTE Microelectronics, Nokia, Alcatel-Lucent, Samsung, Huawei, HiSilicon	revised	2017-01-18 13:58:14	2017-01-18 14:10:22
R1-1701275	WF on 2-step RACH	ZTE, ZTE microelectronics, MediaTek	noted	2017-01-17 22:00:00	2017-01-17 22:00:00
R1-1701276	WF on UE assistant CSI reporting setting selection	AT&T, ZTE	noted	2017-01-18 13:58:14	2017-01-20 06:04:47
R1-1701277	WF of PRACH design	ZTE, ZTE Microelectronics, Samsung, Nokia, NTT DOCOMO, CATT, Ericsson, LGE	revised	2017-01-18 13:58:14	2017-01-19 14:07:58
R1-1701278	WF on beam recovery in multi-beam NR systems	Qualcomm, Nokia, ASB, Xinwei, Intel	available	2017-01-18 13:58:14	2017-01-19 14:07:58
R1-1701279	Way Forward on number of CWs for NR	ZTE, ZTE Microelectronics, ASTRI, AT&T, CATT, Xinwei	noted	2017-01-17 22:00:00	2017-01-17 22:00:00
R1-1701280	Way Forward on Beam Reporting for NR MIMO	ZTE, ZTE Microelectronics, ASTRI, Mediatek, Intel, Nokia, ASB	available	2017-01-18 13:58:14	2017-01-18 14:10:22
R1-1701281	WF on hybrid CSI	ZTE, ZTE Microelectronics, ASTRI, CATR, China Telecom, China Unicom, CMCC, InterDigital, NTT DOCOMO	noted	2017-01-18 13:58:14	2017-01-19 14:07:58
R1-1701282	WF on beam-related indication for CSI-RS measurement	ZTE, ZTE Microelectronics, ASTRI, Xinwei, vivo, Docomo	noted	2017-01-17 22:00:00	2017-01-17 22:00:00
R1-1701283	WF on QCL based on UE feedback	ZTE, ZTE Microelectronics	withdrawn	2017-01-18 13:58:14	
R1-1701284	WF on QCL on UL-DL ports	ZTE, ZTE Microelectronics, ASTRI, CMCC, Ericsson, Huawei, HiSilicon	noted	2017-01-18 13:58:14	2017-01-19 14:07:58

R1-1701285	WF on NR-SRS	Samsung, Nokia, ASB, InterDigital, NTT DOCOMO, KDDI	available	2017-01-18 13:58:14	2017-01-19 14:07:58
R1-1701286	WF on CRI reporting	Samsung, CATT, Ericsson, NTT DOCOMO	noted	2017-01-18 13:58:14	2017-01-19 14:07:58
R1-1701287	WF on evaluation assumptions for advanced receivers based on network coordination	Samsung, Huawei, Intel, ZTE, Orange	noted	2017-01-18 13:58:14	2017-01-20 06:04:47
R1-1701288	WF on LDPC base matrix	ZTE, ZTE Microelectronics, CATT, Huawei, HiSilicon, MediaTek	available	2017-01-18 13:58:14	2017-01-18 14:10:22
R1-1701289	WF on Parity Check Matrix Structure	Samsung	noted	2017-01-18 13:58:14	2017-01-18 14:10:22
R1-1701290	WF on the clarification of control resource set and control search space	Qualcomm Inc., Ericsson, ETRI	revised	2017-01-18 13:58:14	2017-01-18 14:10:22
R1-1701291	WF on Number of Codewords for NR	Samsung, KT Corporation, Ericsson	noted	2017-01-17 22:00:00	2017-01-17 22:00:00
R1-1701292	WF on CSI Framework for NR	Samsung, Ericsson, LG Electronics, NTT DOCOMO, ZTE, ZTE Microelectronics, KT Corporation, Huawei, HiSilicon, Intel Corporation	noted	2017-01-18 13:58:14	2017-01-19 14:07:58
R1-1701293	Multiplexing of PSS and SSS	Qualcomm, Docomo, Intel, Ericsson, CATT, Sony, MediaTEK, ZTE	noted	2017-01-18 13:58:14	2017-01-19 14:07:58
R1-1701294	WF on DL DM-RS	Huawei, HiSilicon, IITH, CEWIT, IITM, Tejas Networks, Ericsson, Nokia, NTT DOCOMO, Mitsubishi, Softbank, Fujitsu, Xinwei	noted	2017-01-17 22:00:00	2017-01-17 22:00:00
R1-1701295	WF on CSI-RS and Codebook Size for NR	Ericsson, Intel, Samsung, Nokia, ASB, CATT, Kathrein-Werke KG, NTT DOCOMO, AT&T, Verizon Wireless, Sprint, Deutsche Telekom, Xilinx, KT, Orange, Mitsubishi	available	2017-01-18 13:58:14	2017-01-18 14:10:22

R1-1701296	Way Forward on channel model for NR evaluation	Huawei, HiSilicon, CATR, CATT	available	2017-01-18 13:58:14	2017-01-18 14:10:22
R1-1701297	WF on scheduling-based approach for DL dynamic resource sharing between URLLC and eMBB	Huawei, HiSilicon, NTT DOCOMO, CATT, CATR, MediaTek	revised	2017-01-18 13:58:14	2017-01-18 14:10:22
R1-1701298	WF on NR-PDCCH design for URLLC	Huawei, HiSilicon, ZTE, CATR	revised	2017-01-18 13:58:14	2017-01-18 14:10:22
R1-1701299	WF on unified framework for beam management and CSI acquisition	LG Electronics, AT&T, CATT, Ericsson, NTT DOCOMO	noted	2017-01-18 13:58:14	2017-01-19 14:07:58
R1-1701300	WF on CSI-RS for beam management	Intel, Qualcomm, ZTE	noted	2017-01-17 22:00:00	2017-01-17 22:00:00
R1-1701301	WF on Channel Coding Design	Huawei, HiSilicon, CATT, CATR, Coherentlogix, Mediatek, ZTE, ZTE Microelectronics	available	2017-01-18 13:58:14	2017-01-20 06:04:47
R1-1701302	WF on Channel Coding for Very Small Control Information Blocks	Huawei, HiSilicon, ZTE, ZTE Microelectronics, Mediatek, CATT, CATR, Coherentlogix	noted	2017-01-18 13:58:14	2017-01-20 06:04:47
R1-1701303	void	ETSI	withdrawn	2017-01-18 13:58:14	
R1-1701304	WF on CSI-RS design principle	LG Electronics, Xinwei, Intel	noted	2017-01-17 22:00:00	2017-01-17 22:00:00
R1-1701305	WF on PT-RS	Huawei	revised	2017-01-18 13:58:14	2017-01-18 14:10:22
R1-1701306	WF on paging	Huawei	revised	2017-01-18 13:58:14	2017-01-19 14:07:58
R1-1701307	WF on SRS	CATT, National Instruments	noted	2017-01-17 22:00:00	2017-01-17 22:00:00
R1-1701308	WF on PT-RS	CATT	available	2017-01-18 13:58:14	2017-01-19 14:07:58
R1-1701309	WF on CW to layer mapping and RE mapping for data channels	Qualcomm	revised	2017-01-18 13:58:14	2017-01-18 14:10:22
R1-1701310	WF on retransmission for UL URLLC	ZTE, ZTE Microelectronics, NTT DOCOMO	noted	2017-01-18 13:58:14	2017-01-18 14:10:22
R1-1701311	WF on DL transmission scheme	Samsung, Intel, LG Electronics	noted	2017-01-17 22:00:00	2017-01-17 22:00:00
R1-1701312	WF on PRB bundling	Samsung, ZTE, ZTE Microelectronics	noted	2017-01-17 22:00:00	2017-01-17 22:00:00
R1-1701313	WF on Periodic/Semi-Persistent/Aperiodic CSI Reporting	NTT DOCOMO, Intel, LG Electronics, Mitsubishi, Sharp, Softbank	noted	2017-01-18 13:58:14	2017-01-18 14:10:22

R1-1701314	WF on NR-PBCH design	LG Electronics, Intel, Nokia, ASB, Samsung, NTT DOCOMO, InterDigital, Mediatek	noted	2017-01-18 13:58:14	2017-01-19 14:07:58
R1-1701315	WF on SRS sequence generation method	Intel, ZTE	noted	2017-01-18 13:58:14	2017-01-18 14:10:22
R1-1701316	WF on Beam Correspondence	NTT DOCOMO, Samsung, Mitsubishi Electric, MediaTek, InterDigital, Sharp	revised	2017-01-17 22:00:00	2017-01-17 22:00:00
R1-1701317	WF on UL beam management	MediaTek, LG, InterDigital, vivo, Xinwei, ZTE, ZTE Microelectronics, Intel, ITRI, Huawei, HiSilicon, CMCC, OPPO, Ericsson, DOCOMO	noted	2017-01-18 13:58:14	2017-01-18 14:10:22
R1-1701318	WF on resource configuration for UL grant-free transmission	Huawei, HiSilicon, CATR, CATT, Ericsson, Fujitsu, Spreadtrum	noted	2017-01-18 13:58:14	2017-01-18 14:10:22
R1-1701319	WF on consecutive transmission for URLLC	Huawei, HiSilicon, Ericsson, NTT Docomo, Spreadtrum, Intel	noted	2017-01-18 13:58:14	2017-01-18 14:10:22
R1-1701320	WF on beam indication	Samsung, Ericsson, KT	revised	2017-01-18 13:58:14	2017-01-18 14:10:22
R1-1701321	WF on beam reporting	Samsung, KT	noted	2017-01-18 13:58:14	2017-01-18 14:10:22
R1-1701322	Summary about off-line discussion about mini-slots	ZTE	revised	2017-01-17 22:00:00	2017-01-17 22:00:00
R1-1701323	WF on PRB bundling	Samsung, ZTE, ZTE Microelectronics	noted	2017-01-18 13:58:15	2017-01-19 14:07:58
R1-1701324	WF on Type II CSI Codebook	Ericsson, Samsung	noted	2017-01-18 13:58:15	2017-01-18 14:10:22
R1-1701325	WF on reciprocity based CSI acquisition	Huawei, HiSilicon, IITH, CEWIT, IITM, Tejas Networks, Sony, Fujitsu, Softbank, Interdigital, National Instruments	revised	2017-01-18 13:58:15	2017-01-18 14:10:22
R1-1701326	WF on QCL for NR	Huawei	revised	2017-01-18 13:58:15	2017-01-20 00:00:00
R1-1701327	WF on CSI-RS design	Huawei, HiSilicon	available	2017-01-18 13:58:15	2017-01-19 14:07:58
R1-1701328	WF on UL CSI acquisition	LG Electronics, Huawei, HiSilicon, InterDigital, KT Corporation, Samsung	noted	2017-01-18 13:58:15	2017-01-19 14:07:58

R1-1701329	WF on flexible duplexing evaluation	NTT DOCOMO, Huawei, HiSilicon, ZTE, ZTE Microelectronics, Ericsson, Intel, CATT, LG Electronics, Qualcomm	noted	2017-01-18 13:58:15	2017-01-19 14:07:58
R1-1701330	WF on multiple HARQ-ACK bits per TB	Samsung, NTT DOCOMO, Fraunhofer HHI, Lenovo, Nokia, Alcatel-Lucent Shanghai Bell, MediaTek, ZTE, ZTE Microelectronics	noted	2017-01-18 13:58:15	2017-01-18 14:10:22
R1-1701331	WF on Polar Codes Design	NTT DOCOMO, Ericsson, Qualcomm, Nokia, ASB, Intel	noted	2017-01-18 13:58:15	2017-01-20 06:17:25
R1-1701332	WF on frozen set selection of Polar Codes	NTT DOCOMO	revised	2017-01-18 13:58:15	2017-01-20 06:17:25
R1-1701333	WF on Number of Codewords for NR	Samsung, Ericsson, Intel Corporation, Qualcomm, Nokia, Alcatel-Lucent Shanghai Bell, CATT, KT Corporation, Verizon, Softbank Corp	noted	2017-01-18 13:58:15	2017-01-20 06:04:47
R1-1701334	Outcome of offline discussion on downlink control signalling	Ericsson	noted	2017-01-17 22:00:00	2017-01-17 22:00:00
R1-1701335	SR-triggered UL transmission	LG Electronics, Intel	available	2017-01-18 13:58:15	2017-01-18 14:10:22
R1-1701336	WF on coexistence between slot and mini-slot	LG Electronics, NTT DOCOMO, Panasonic	noted	2017-01-18 13:58:15	2017-01-19 14:07:58
R1-1701337	WF on coordinated transmission scheme	Huawei, HiSilicon, Samsung	revised	2017-01-18 13:58:15	2017-01-18 14:10:22
R1-1701338	WF on Type I Feedback	Huawei, HiSilicon	noted	2017-01-18 13:58:15	2017-01-18 14:10:22
R1-1701339	WF on resource mapping for one-symbol NR-PUCCH	LG Electronics	revised	2017-01-18 13:58:15	2017-01-18 14:10:22
R1-1701340	WF on long duration NR-PUCCH	LG Electronics, Intel, Panasonic	noted	2017-01-18 13:58:15	2017-01-18 14:10:22
R1-1701341	WF on HARQ timing for NR	LG Electronics	revised	2017-01-18 13:58:15	2017-01-18 14:10:22
R1-1701342	WF on evaluation assumption for network coordination	Huawei, HiSilicon, Samsung	noted	2017-01-18 13:58:15	2017-01-19 14:07:58
R1-1701343	Summary of off-line discussion Mini-slots	ZTE, ZTE Microlectronics	noted	2017-01-17 22:00:00	2017-01-17 22:00:00
R1-1701344	WF on DL RS for RRM measurement	Huawei, HiSilicon	revised	2017-01-18 13:58:15	2017-01-19 14:07:58

R1-1701345	WF on UL measurement for mobility	Huawei, HiSilicon, Qualcomm, Sony, Ericsson, Deutsche Telekom, China Unicom, Telefonica	noted	2017-01-18 13:58:15	2017-01-19 14:07:58
R1-1701346	WF on Study of wake up signal for NR	Qualcomm, CATT, Sony, Ericsson	revised	2017-01-18 13:58:15	2017-01-18 14:10:22
R1-1701347	WF on Max Code Size for Polar Codes	Ericsson, Intel, AT&T, Qualcomm, Samsung, Nokia, ASB, LG	noted	2017-01-18 13:58:15	2017-01-20 06:17:25
R1-1701348	Control channel coding scheme for small block length	LG Electronics	available	2017-01-18 13:58:15	2017-01-19 14:07:58
R1-1701349	WF on information and frozen bit Selection on NR Polar Codes	LG Electronics, Samsung, AT&T	available	2017-01-18 13:58:15	2017-01-20 06:17:25
R1-1701350	WF on PUCCH	NTT DOCOMO	revised	2017-01-18 13:58:15	2017-01-18 14:10:22
R1-1701351	WF on Beam Correspondence	NTT DOCOMO, Samsung, Mitsubishi Electric, MediaTek, Sharp, OPPO, MTI	noted	2017-01-18 13:58:15	2017-01-19 14:07:58
R1-1701352	WF on code book design for DL multi-panel MIMO	Huawei, HiSilicon	available	2017-01-18 13:58:15	2017-01-18 14:10:22
R1-1701353	WF on split symbol design for ULSB	Qualcomm, NTT DOCOMO	available	2017-01-18 13:58:15	2017-01-22 14:27:25
R1-1701354	WF on scheduling and HARQ-ACK feedback timing	NTT DOCOMO, INC., Nokia, Alcatel-Lucent Shanghai Bell, Panasonic, LG Electronics, Ericsson, Huawei, HiSilicon	noted	2017-01-18 13:58:15	2017-01-19 14:07:58
R1-1701355	[Draft] Response LS on UE capability aspects for LTE/NR tight interworking	Nokia	revised	2017-01-18 13:58:15	2017-01-19 14:07:58
R1-1701356	WF on timings for aperiodic CSI-RS and aperiodic CSI reporting	LG Electronics, Samsung, Ericsson, ZTE, ZTE Microelectronics	noted	2017-01-18 13:58:15	2017-01-19 14:07:58
R1-1701357	WF on extended CP	Huawei, HiSilicon, Nokia, ASB, CATT, Sony, Ericsson, LGE, Vodafone, Deutsche Telekom, Samsung, Intel, OPPO	noted	2017-01-18 13:58:15	2017-01-19 14:07:58
R1-1701358	WF on terminologies in RACH procedure	LG Electronics, Intel, Qualcomm, NTT DOCOMO	revised	2017-01-18 13:58:15	2017-01-19 14:07:58

R1-1701359	Way forward on Code Block subbands	Qualcomm Incorporated	noted	2017-01-18 13:58:15	2017-01-19 14:07:58
R1-1701360	Way forward on Limiting Wideband Options	Qualcomm Incorporated	noted	2017-01-18 13:58:15	2017-01-19 14:07:58
R1-1701361	WF on LTE-NR Coexistence Scenarios with UL Sharing	Huawei, HiSilicon, Vodafone, China Unicom, China Telecom, CATR, Orange	noted	2017-01-19 03:46:50	2017-01-19 14:07:58
R1-1701362	WF on LTE-NR FDM coexistence scenarios	Huawei, HiSilicon, Vodafone, China Unicom, Telefonica, Orange	noted	2017-01-19 03:46:50	2017-01-19 14:07:58
R1-1701363	WF on LTE-NR DL TDM coexistence mechanisms	Huawei, HiSilicon, China Unicom, AT&T, CATR, Orange	noted	2017-01-19 03:46:50	2017-01-19 14:07:58
R1-1701364	WF on CSI-RS Design	Ericsson	withdrawn	2017-01-19 03:46:50	
R1-1701365	WF on NR RACH Msg1 retransmission	Samsung, Nokia, ASB, ZTE, ZTE Microelectronics, NTT DOCOMO, Mitsubishi Electric, MediaTek	noted	2017-01-19 03:46:50	2017-01-19 14:07:58
R1-1701366	WF on Multiple RAR	Samsung, ZTE, ZTE Microelectronics, NTT DOCOMO	noted	2017-01-19 03:46:50	2017-01-19 14:07:58
R1-1701367	WF on NR-SS bandwidth	NTT DOCOMO, Samsung, InterDigital, AT&T, ZTE, ZTE Microelectronics	noted	2017-01-19 03:46:50	2017-01-19 14:07:58
R1-1701368	WF on RACH preamble format	Samsung, Qualcomm, ZTE, ZTE Microelectronics, NTT DOCOMO, Ericsson, DISH Network, Thales	revised	2017-01-19 03:46:50	2017-01-19 14:07:58
R1-1701369	Offline summary on cross-link interference mitigation for duplexing flexibility	Huawei, HiSilicon	noted	2017-01-19 03:46:50	2017-01-19 14:07:58
R1-1701370	WF on study of CLI measurements	AT&T, Mediatek, Ericsson	noted	2017-01-19 03:46:50	2017-01-19 14:07:58
R1-1701371	WF on interference measurement method	Nokia, ASB, Intel, InterDigital, ITL, KT, LG Electronics, Samsung	noted	2017-01-19 03:46:50	2017-01-19 14:07:58

R1-1701372	WF on NR-PBCH contents	Samsung, NTT DOCOMO, CATT, Convida Wireless, Sony, ITL, InterDigital	noted	2017-01-19 03:46:50	2017-01-19 14:07:58
R1-1701373	WF on NR SS Periodicity	AT&T, NTT DOCOMO	noted	2017-01-19 03:46:50	2017-01-19 14:07:58
R1-1701374	WF on RS for time/frequency tracking	Samsung, KT, Xinwei	revised	2017-01-19 03:46:50	2017-01-19 14:07:58
R1-1701375	WF on DMRS configuration	Samsung, CATT	available	2017-01-19 03:46:50	2017-01-19 14:07:58
R1-1701376	WF on Mobility	Samsung, NTT DOCOMO	noted	2017-01-19 03:46:50	2017-01-20 06:04:47
R1-1701377	WF on SS-block index indication	Huawei	revised	2017-01-19 03:46:50	2017-01-19 14:07:58
R1-1701378	WF on PRACH design	Huawei, HiSilicon, CATT	available	2017-01-19 03:46:50	2017-01-19 14:07:58
R1-1701379	WF on PT-RS	Huawei, HiSilicon, Ericsson, National Instruments, Nokia, Alcatel-Lucent Shanghai Bell, ETRI, Intel, NTT DOCOMO, Panasonic	noted	2017-01-19 03:46:50	2017-01-20 06:17:25
R1-1701380	WF on CW to layer mapping and RE mapping for data channels	Qualcomm, Ericsson, Intel, Interdigital	noted	2017-01-19 03:46:50	2017-01-19 14:07:58
R1-1701381	WF on beam-related indication for CSI-RS measurement	ZTE, ZTE Microelectronics, ASTRI, Xinwei, vivo, NTT DOCOMO, Ericsson, Samsung, Intel, Huawei, HiSilicon, LG Electronics	noted	2017-01-19 03:46:50	2017-01-19 14:07:58
R1-1701382	On short (1-symbol) PUCCH design	Ericsson	available	2017-01-19 03:46:50	2017-01-19 14:07:58
R1-1701383	WF on retransmission for UL URLLC	ZTE, ZTE Microelectronics	revised	2017-01-19 03:46:50	2017-01-19 14:07:58
R1-1701384	Chairman's notes of AI 5.1.5 on channel coding	Ad-Hoc chair (Nokia)	endorsed	2017-01-19 03:46:50	2017-01-22 14:27:25
R1-1701385	Chairman's notes of AI 5.1.7 on duplex and interference management	Ad-Hoc chair (Qualcomm)	endorsed	2017-01-19 03:46:50	2017-01-20 06:04:47
R1-1701386	Chairman's notes of AI 5.1.9 on NR-LTE coexistence	Ad-Hoc chair (Qualcomm)	revised	2017-01-19 03:46:50	2017-01-20 06:04:47
R1-1701387	Chairman's notes of AI 5.1.10 on channel model	Ad-Hoc chair (Nokia)	endorsed	2017-01-19 03:46:50	2017-01-22 14:27:25
R1-1701388	Chairman's notes of AI 5.1.11 on extended CP study for 60 kHz sabcarrier spacing	Ad-Hoc chair (Qualcomm)	endorsed	2017-01-19 03:46:50	2017-01-20 06:04:47
R1-1701389	WF on coexistence between NR and LTE	LG Electronics, Intel	noted	2017-01-19 03:46:50	2017-01-19 14:07:58
R1-1701390	WF on NR-LTE coexistence	CMCC, Softbank, CATT, Nokia, ASB	revised	2017-01-19 03:46:50	2017-01-19 14:07:58

R1-1701391	WF on the clarification of control resource set and control search space	Qualcomm, Ericsson, LGE, ETRI,CATT, ZTE, VIVO, Intel, NTT DoCoMo, MediaTek, Panasonic, Samsung	noted	2017-01-19 03:46:50	2017-01-19 14:07:58
R1-1701392	WF on LTE-NR coexistence	Samsung, KDDI	revised	2017-01-19 03:46:50	2017-01-19 14:07:58
R1-1701393	WF on DL RS for RRM measurement	Huawei, HiSilicon, Intel, ZTE, ATT, Qualcomm, Ericsson, MediaTek, LG, NTT DOCOMO	noted	2017-01-19 03:46:50	2017-01-20 06:04:47
R1-1701394	WF on SRS for UL beam management	LG Electronics, Intel, MediaTek	noted	2017-01-19 03:46:50	2017-01-19 14:07:58
R1-1701395	WF on RS for time/frequency tracking	Qualcomm Inc.	revised	2017-01-19 03:46:50	2017-01-19 14:07:58
R1-1701396	WF on NW Initiated Beam Switching	Intel	withdrawn	2017-01-19 03:46:50	
R1-1701397	WF on multi-panel based uplink MIMO transmission	Huawei, HiSilicon, Xinwei	noted	2017-01-19 03:46:50	2017-01-20 06:17:25
R1-1701398	WF on UL MIMO transmission	Huawei, HiSilicon, Intel	noted	2017-01-19 03:46:50	2017-01-20 06:04:47
R1-1701399	WF on UL CSI Acquisition	Huawei, HiSilicon	withdrawn	2017-01-19 03:46:50	
R1-1701400	WF on UL codebook design in NR	Huawei, HiSilicon, Samsung	noted	2017-01-19 03:46:50	2017-01-19 14:07:58
R1-1701401	WF on UL Power Control	Huawei, HiSilicon	withdrawn	2017-01-19 03:46:50	
R1-1701402	WF on CSI-RS design principle	LG Electronics, Ericsson	noted	2017-01-19 03:46:50	2017-01-19 14:07:58
R1-1701403	WF on codebook design for DL multi-panel MIMO	Huawei, HiSilicon, Intel	noted	2017-01-19 03:46:50	2017-01-19 14:07:58
R1-1701404	WF on scheduling-based approach for DL dynamic resource sharing between URLLC and eMBB	Huawei, HiSilicon, NTT DOCOMO, CATT, CATR, Ericsson, vivo, MediaTek, Panasonic, InterDigital , LGE, Nokia,AT&T, China Unicom, Sequans, OPPO	noted	2017-01-19 03:46:50	2017-01-19 14:07:58
R1-1701405	WF on NR-PDCCH design for URLLC	Huawei, HiSilicon, CATR, Sony, Samsung, Ericsson, Qualcomm, ZTE, ZTE Microelectronics	noted	2017-01-19 03:46:50	2017-01-19 14:07:58

R1-1701406	Correction for low and high frequency model harmonization	Ericsson, Samsung, NTT DOCOMO, Nokia, Intel, Telstra, Verizon Wireless, Deutsche Telekom, T-Mobile US	agreed	2017-01-19 03:46:50	2017-01-20 06:17:25
R1-1701407	CR to TR36.873 on rural channel model	Huawei, HiSilicon	agreed	2017-01-19 03:46:52	2017-01-20 06:04:47
R1-1701408	WF on NR SS Periodicity	AT&T, NTT DOCOMO	revised	2017-01-19 03:46:52	2017-01-19 14:07:58
R1-1701409	WF on Synchronization and Channel Raster	Qualcomm Inc.	revised	2017-01-19 03:46:52	2017-01-19 14:07:58
R1-1701410	Correction for scenario description	Ericsson, Fraunhofer HHI	agreed	2017-01-19 03:46:52	2017-01-20 06:17:25
R1-1701411	Correction for fast fading model	Ericsson	agreed	2017-01-19 03:46:53	2017-01-20 06:17:25
R1-1701412	TR38.900_CR_Ground_Reflection_Model	Fraunhofer HHI, ZTE, Ericsson	agreed	2017-01-19 03:46:54	2017-01-20 06:17:25
R1-1701413	TR38.900_CR_Normalize_Cluster_Powers	Fraunhofer HHI, Ericsson	agreed	2017-01-19 03:46:55	2017-01-20 06:17:25
R1-1701414	Correction for spatial consistency	Ericsson	agreed	2017-01-19 03:46:56	2017-01-20 06:17:25
R1-1701415	Correction for spatially-consistent UT mobility modelilng	Ericsson, Nokia, Fraunhofer HHI	postponed	2017-01-19 03:46:56	2017-01-19 14:07:58
R1-1701416	Correction for blockage model B and its calibration assumptions	Ericsson, Fraunhofer HHI	agreed	2017-01-19 03:46:57	2017-01-20 06:17:25
R1-1701417	Correction for correlation modeling for multi-frequency simulations	Ericsson, Fraunhofer HHI	agreed	2017-01-19 03:46:58	2017-01-20 06:17:25
R1-1701418	WF on PUCCH	NTT DOCOMO, INC., Mitsubishi, Panasonic, Qualcomm, Huawei, HiSilicon, Ericsson, Intel, OPPO, InterDigital, CATT, MediaTek, Samsung, LG Electronics, Motorola Mobility	noted	2017-01-19 03:46:59	2017-01-19 14:07:58
R1-1701419	WF on RACH transmission in 4-step Random Access	ZTE, ZTE Microelectronics, Nokia, Alcatel-Lucent Shanghai Bell, Samsung, Huawei, HiSilicon, Sony	noted	2017-01-19 03:46:59	2017-01-20 06:04:47

R1-1701420	WF on Transmission Schemes for DL control channel	LG Electronics, NTT DOCOMO, Samsung, Ericsson, Qualcomm, OPPO, MediaTek, Huawei, HiSilicon, CATT, Intel, ZTE, ZTE Microelectronics	noted	2017-01-19 03:46:59	2017-01-19 14:07:58
R1-1701421	WF on Study of wake up signal for NR	Qualcomm, CATT, Sony, Ericsson	noted	2017-01-19 03:46:59	2017-01-19 14:07:58
R1-1701422	TR 38.802 v1.1.0 Study on New Radio (NR) Access Technology - Physical Layer Aspects	NTT DOCOMO, INC.	agreed	2017-01-19 03:52:08	2017-01-20 06:04:47
R1-1701423	WF on NR-LTE coexistence	CMCC, Softbank, CATT, Nokia, ASB	noted	2017-01-19 03:52:09	2017-01-19 14:07:58
R1-1701424	WF on CSI-RS for beam management	Intel, Qualcomm, Ericsson, Nokia, Alcatel-Lucent Shanghai Bell, Verizon Wireless, CATT, NTT Docomo	revised	2017-01-19 03:52:09	2017-01-19 14:07:58
R1-1701425	CR for TR38.900 to update calibration results on additional features	Samsung	agreed	2017-01-19 03:52:09	2017-01-22 14:27:25
R1-1701426	TR36.873_CR_Scenarios	Fraunhofer HHI, Ericsson	agreed	2017-01-19 03:52:10	2017-01-20 06:14:34
R1-1701427	TR36.873_CR_Section_7.1	Fraunhofer HHI, Ericsson	agreed	2017-01-19 03:52:11	2017-01-20 06:14:34
R1-1701428	TR36.873_CR_Section_7.2	Fraunhofer HHI	agreed	2017-01-19 03:52:12	2017-01-20 06:14:34
R1-1701429	TR36.873_CR_Incorrect_Reference	Fraunhofer HHI, Ericsson	agreed	2017-01-19 03:52:12	2017-01-20 06:14:34
R1-1701430	TR36.873_CR_Align_LSP_Notation	Fraunhofer HHI, Ericsson	agreed	2017-01-19 03:52:13	2017-01-20 06:14:34
R1-1701431	TR36.873_CR_Notation_of_Cluster_Angular_Spreads	Fraunhofer HHI, Ericsson	agreed	2017-01-19 03:52:14	2017-01-20 06:14:34
R1-1701432	TR36.873_CR_Normalize_Cluster_Powers	Fraunhofer HHI, Ericsson	agreed	2017-01-19 03:52:15	2017-01-20 06:14:34
R1-1701433	TR36.873_CR_Incorrect_Reference_to_LSP_Table	Fraunhofer HHI, Ericsson	agreed	2017-01-19 03:52:16	2017-01-20 06:14:34
R1-1701434	Outcome of offline discussion on uplink control channel (Wednesday)	NTT DOCOMO	noted	2017-01-19 03:52:17	2017-01-19 14:07:58
R1-1701435	WF on PT-RS for DFTsOFDM	Mitsubishi Electric, CATT, InterDigital, Intel, Qualcomm	noted	2017-01-19 03:52:17	2017-01-20 06:14:34

R1-1701436	WF on DL transmission for URLLC	LG Electronics, Ericsson, Huawei, HiSilicon, Samsung, OPPO	noted	2017-01-19 03:52:17	2017-01-19 14:07:58
R1-1701437	WF on SRS transmission for NR	Samsung, Nokia, ASB, InterDigital, NTT DOCOMO, KDDI, Huawei, HiSilicon, Sony	noted	2017-01-19 03:52:17	2017-01-19 14:07:58
R1-1701438	Phase 1 and Phase 2 calibration results for above 6GHz	Qualcomm Incorporated	withdrawn	2017-01-19 03:52:17	
R1-1701439	WF on resource mapping for one-symbol NR-PUCCH	LG Electronics, Panasonic	noted	2017-01-19 03:52:17	2017-01-19 14:07:58
R1-1701440	WF on HARQ timing for NR	LG Electronics, NTT DOCOMO, Huawei	noted	2017-01-19 03:52:17	2017-01-19 14:07:58
R1-1701441	WF on paging	Huawei, HiSilicon, Samsung, CATT, Panasonic, NTT DOCOMO, Fujitsu, LG Electronics, MediaTek	agreed	2017-01-19 03:52:17	2017-01-20 06:14:34
R1-1701442	WF on the channel estimation for DL control channel	LG Electronics, Samsung, Qualcomm, ETRI	noted	2017-01-19 03:52:17	2017-01-19 14:07:58
R1-1701443	WF on HARQ process number	Huawei, HiSilicon, Nokia	noted	2017-01-19 03:52:17	2017-01-19 14:07:58
R1-1701444	WF on scheduling for slot and slot aggregation	Huawei, HiSilicon	noted	2017-01-19 03:52:17	2017-01-19 14:07:58
R1-1701445	WF on beam indication	Samsung, Ericsson, KT Corp., Verizon, NTT DOCOMO	revised	2017-01-19 03:52:17	2017-01-20 06:04:46
R1-1701446	TR36.814_CR_Align_LSP_Notation	Fraunhofer HHI, Ericsson	agreed	2017-01-19 03:52:17	2017-01-20 06:14:34
R1-1701447	TR36.814_CR_Incorrect_Reference_to_LSP_Table	Fraunhofer HHI, Ericsson	agreed	2017-01-19 03:52:18	2017-01-20 06:14:34
R1-1701448	TR36.814_CR_Normalize_Cluster_Powers	Fraunhofer HHI, Ericsson	agreed	2017-01-19 03:52:18	2017-01-20 06:14:34
R1-1701449	WF on QCL for NR	Huawei, HiSilicon, ZTE, ZTE Microelectronics	noted	2017-01-19 03:52:19	2017-01-19 14:07:58
R1-1701450	TR25.996_CR_Correction_of_Circular_Angle_Spread	Fraunhofer HHI, Ericsson	agreed	2017-01-19 03:52:19	2017-01-20 06:14:34
R1-1701451	TR25.996_CR_Correction_of_Channel_Coefficient_Indexes	Fraunhofer HHI	agreed	2017-01-19 03:52:20	2017-01-20 06:10:52
R1-1701452	TR36.814_CR_Correction_of_B-22	Fraunhofer HHI	agreed	2017-01-19 03:52:21	2017-01-20 06:10:52
R1-1701453	WF on uplink power control	Nokia	revised	2017-01-19 03:52:22	2017-01-21 00:00:00
R1-1701454	WF on LDPC Matrix	Qualcomm	noted	2017-01-19 03:52:22	2017-01-20 06:10:52

R1-1701455	WF on RS for time/frequency tracking	Qualcomm, Samsung, MediaTek	noted	2017-01-19 03:52:22	2017-01-19 14:07:58
R1-1701456	Summary of offline discussion on multiplexing of eMBB and URLLC in DL	Samsung, ZTE, Qualcomm, NTT Docomo, Sony, Oppo, Sequans, Sharp	noted	2017-01-19 03:52:22	2017-01-19 14:07:58
R1-1701457	WF on nonlinear precoding	Mitsubishi Electric, Huawei, HiSilicon, InterDigital, NTT DOCOMO, IITH, CeWiT, IITM, Tejas Networks, AT&T	noted	2017-01-19 03:52:22	2017-01-20 06:10:51
R1-1701458	WF on PRACH preamble numerology	ZTE, ZTE Microelectronics, Samsung, Nokia, ASB, NTT DOCOMO, CATT, Ericsson, LGE, Huawei, HiSilicon, MediaTek, Qualcomm, Sony, Intel, Sharp, Fujitsu	noted	2017-01-19 03:52:22	2017-01-20 06:04:46
R1-1701459	WF on retransmission for UL URLLC	ZTE, ZTE Microelectronics, NTT Docomo, Sony, CATT, Qualcomm, CEWiT, IITH, IITM, Tejas Networks	revised	2017-01-19 03:52:22	2017-01-19 14:07:58
R1-1701460	WF on LDPC lift size	ZTE, ZTE Microelectronics, Qualcomm	available	2017-01-19 14:00:48	2017-01-20 06:04:46
R1-1701461	WF on observation of DL DM-RS evaluation	Huawei, HiSilicon, MediaTek Inc., Mitsubishi Electric, vivo, CATT, Xinwei, Ericsson, AT&T, CMCC	noted	2017-01-19 14:00:48	2017-01-20 06:04:46
R1-1701462	WF on terminologies in 4-step RACH procedure	LG Electronics ,Qualcomm, NTT DOCOMO, Samsung, Motorola Mobility, CATT	noted	2017-01-19 14:00:48	2017-01-20 06:04:46
R1-1701463	WF on LDPC Design for NR	Samsung, Nokia, ASB	noted	2017-01-19 14:00:48	2017-01-20 06:04:46

R1-1701464	WF on Shortening of LDPC Codes	Ericsson, Qualcomm, LG, Intel, Nokia, ASB, Samsung	noted	2017-01-20 05:57:45	2017-01-20 06:04:46
R1-1701465	WF on Rate Matching for LDPC Codes	Ericsson, Qualcomm, Intel, LG, Samsung, ZTE, MediaTek, Nokia, ASB, InterDigital	noted	2017-01-20 05:57:45	2017-01-20 06:04:46
R1-1701466	WF on LDPC Design Parameters	Ericsson, LG	noted	2017-01-20 05:57:45	2017-01-20 06:04:46
R1-1701467	WF on CRC Attachment	Ericsson, LG, Nokia, ASB	noted	2017-01-20 05:57:45	2017-01-20 06:04:46
R1-1701468	WF on SCL List Size for Polar Codes	Ericsson, Nokia, ASB, LG, Samsung	noted	2017-01-20 05:57:46	2017-01-20 06:04:46
R1-1701469	WF on LDPC comparisons	MediaTek, Huawei HiSilicon, CATT, CATR, ZTE, ITRI	noted	2017-01-20 05:57:46	2017-01-20 06:04:46
R1-1701470	High performance LDPC design features	MediaTek Inc.	available	2017-01-20 05:57:46	2017-01-20 06:04:46
R1-1701471	WF on coding scheme for small block length	LG Electronics, AT&T, Ericsson, Nokia, ASB	available	2017-01-20 05:57:46	2017-01-20 06:04:46
R1-1701472	WF on RACH association	ZTE, ZTE Microelectronics	available	2017-01-20 05:57:46	2017-01-22 14:27:25
R1-1701473	Compact LDPC design for eMBB	ZTE, ZTE Microelectronics	available	2017-01-20 05:57:46	2017-01-20 06:04:46
R1-1701474	WF on evaluation methodology of Polar Code for NR	LG Electronics, Samsung, Ericsson	noted	2017-01-20 05:57:47	2017-01-20 06:04:46
R1-1701475	Correction for channel generation for multi-frequency simulations	Ericsson, Fraunhofer HHI	revised	2017-01-20 05:57:47	2017-01-20 06:04:46
R1-1701476	WF on QCL assumptions for NR	Huawei, HiSilicon, ZTE, ZTE Microelectronics, vivo, Sony, AT&T	noted	2017-01-20 05:57:48	2017-01-20 06:04:46
R1-1701477	[Draft] Response LS on UE capability aspects for LTE/NR tight interworking	Nokia	revised	2017-01-20 05:57:48	2017-01-20 06:04:46
R1-1701478	WF on 2-Stage DCI for NR	Qualcomm, Huawei, HiSilicon, National Instrument, Vivo, ZTE, Sony, MediaTek	noted	2017-01-20 05:57:48	2017-01-20 06:04:46
R1-1701479	[Draft] Response LS on UE capability aspects for LTE/NR tight interworking	Nokia	revised	2017-01-20 05:57:48	2017-01-20 06:04:46
R1-1701480	WF on DL beam management framework	LG Electronics, AT&T, CATT, Ericsson, NTT DOCOMO	noted	2017-01-20 05:57:48	2017-01-20 06:04:46
R1-1701481	WF on Beam Recovery in multi-beam NR systems	Qualcomm, Nokia, ASB, Xinwei, Intel, Interdigital	noted	2017-01-20 05:57:49	2017-01-20 06:04:46

R1-1701482	WF on pi/2 BPSK Modulation with frequency domain shaping	IITH, CEWiT, IITM, Tejas Networks, ATT, NTT DoCoMo, KDDI, Qualcomm, Deutsche Telekom, Samsung, INL, Panasonic, MediaTek, Straightpathcommunications, NI, IAESI, Interdigital, Sony, Kyocera, Intel	noted	2017-01-20 05:57:49	2017-01-20 06:04:46
R1-1701483	Performance Results for COMP Coherent JT Performance with THP (Cloud RAN)	IITH, IITM, CEWIT, Tejas Networks	available	2017-01-20 05:57:49	2017-01-20 06:04:46
R1-1701484	WF on CSI-RS for beam management	Intel, Qualcomm, Ericsson, Nokia, Alcatel-Lucent Shanghai Bell, Verizon Wireless, CATT, MTK, NTT Docomo, CMCC, ZTE, ZTE Microelectronics, KT	revised	2017-01-20 05:57:49	2017-01-20 06:04:46
R1-1701485	WF on short-duration PUCCH	LG Electronics, NTT DOCOMO, Qualcomm	noted	2017-01-20 05:57:49	2017-01-20 06:04:46
R1-1701486	WF on preamble format definition for PRACH	NTT DOCOMO, Ericsson, CATT, Qualcomm, Samsung, Intel, ZTE, ZTE Microelectronics, Sony, Huawei, HiSilicon, Sharp, Nokia, ASB, LG Electronics, DISH Network	noted	2017-01-20 05:57:49	2017-01-20 06:04:46
R1-1701487	Response LS on UE capability aspects for LTE/NR tight interworking	RAN1, Nokia	approved	2017-01-20 05:57:50	2017-01-20 06:04:46
R1-1701488	WF on frozen set selection of Polar Codes	NTT DOCOMO, InterDigital, MediaTek, Qualcomm, ZTE, ZTE Microelectronics	available	2017-01-20 05:57:50	2017-01-20 06:04:46
R1-1701489	Draft CR to TR36.873 on indoor hotspot channel model	CMCC	withdrawn	2017-01-20 05:57:50	2017-01-21 00:00:00
R1-1701490	Summary of email discussion [87-30] on NR-MIMO calibration	ZTE, ZTE Microelectronics	revised	2017-01-20 05:57:50	2017-01-20 06:04:46

R1-1701491	WF on Resource Allocation	Huawei, HiSilicon, OPPO, Nokia, Panasonic, NTT DoCoMo, InterDigital, Fujitsu	noted	2017-01-20 05:57:50	2017-01-20 06:04:46
R1-1701492	WF on SS-block index indication	Huawei	revised	2017-01-20 05:57:50	2017-01-20 06:04:46
R1-1701493	WF on RACH preamble format	Samsung, Qualcomm, ZTE, ZTE Microelectronics, NTT DOCOMO, Ericsson, DISH Network, Thales, MediaTek, CATT, Huawei	noted	2017-01-20 05:57:51	2017-01-20 06:04:46
R1-1701494	SR-triggered UL transmission for URLLC	LG Electronics, Intel, OPPO, Lenovo	revised	2017-01-20 05:57:51	2017-01-20 06:04:46
R1-1701495	LS on Paging Requirements	RAN1, Huawei	approved	2017-01-20 05:57:51	2017-01-20 06:04:46
R1-1701496	WF on short duration one symbol uplink design	IITH, CEWiT, IITM, Tejas Networks, Qualcomm,INL	revised	2017-01-20 05:57:51	2017-01-20 06:04:46
R1-1701497	Draft LS on NR Mobility	Huawei, Intel	revised	2017-01-20 05:57:51	2017-01-20 06:04:46
R1-1701498	Summary of offline discussion on group common PDCCH	Ericsson	noted	2017-01-20 05:57:51	2017-01-20 06:04:46
R1-1701499	WF on Type II Codebook	Samsung, Ericsson, Huawei, HiSilicon	noted	2017-01-20 05:57:52	2017-01-20 06:04:45
R1-1701500	WF on NR SS Periodicity	AT&T, NTT DOCOMO, Samsung, Sierra Wireless	agreed	2017-01-20 05:57:52	2017-01-20 06:04:45
R1-1701501	LS on NR Mobility	RAN1, Huawei, Intel	approved	2017-01-20 05:57:52	2017-01-20 06:04:45
R1-1701502	WF on Simulation Assumptions for NR-PBCH	LG Electronics, NTT DOCOMO, Ericsson, Samsung, InterDigital, ZTE, ZTE Microelectronics, Intel	noted	2017-01-20 05:57:52	2017-01-20 06:04:45
R1-1701503	WF on group-based beam reporting	ZTE, ZTE Microelectronics, Ericsson, Intel, MediaTek, Nokia, ASB, Samsung	noted	2017-01-20 05:57:52	2017-01-20 06:04:45
R1-1701504	WF on beam management on control and data channels	ZTE, ZTE Microelectronics, ASTRI, Intel	noted	2017-01-20 05:57:52	2017-01-20 06:04:45

R1-1701505	WF on retransmission for UL URLLC	ZTE, ZTE Microelectronics, NTT Docomo,Huawei, Hisilicon,Intel,CATT , Nokia,ASB, Sony, CEWiT, IITH, IITM, Tejas Networks, Interdigital	revised	2017-01-20 05:57:53	2017-01-22 14:27:25
R1-1701506	WF on beam indication	Samsung, Ericsson, KT Corp., Verizon, NTT DOCOMO, AT&T, LGE	noted	2017-01-20 05:57:53	2017-01-20 06:04:45
R1-1701507	Correction for channel generation for multi-frequency simulations	Ericsson, Fraunhofer HHI	postponed	2017-01-20 05:57:53	2017-01-22 14:27:25
R1-1701508	WF on NR-PDCCH Blocking Probability for URLLC	InterDigital, NTT DOCOMO, Intel	noted	2017-01-20 05:57:53	2017-01-22 14:27:25
R1-1701509	WF on RS for time/frequency tracking	Samsung, Qualcomm, Ericsson, MediaTek, Intel, Xinwei, KT	noted	2017-01-20 05:57:53	2017-01-20 06:04:45
R1-1701510	WF on evaluation methodology & channel models	Telecom Italia, Deutsche Telekom, Orange, Ericsson, Nokia	noted	2017-01-20 05:57:54	2017-01-20 06:04:45
R1-1701511	WF on coordinated transmission scheme	Huawei, HiSilicon, Samsung, CATT, LGE, AT&T	noted	2017-01-20 05:57:54	2017-01-20 06:04:45
R1-1701512	WF on LTE-NR Coexistence in UL	Samsung, KDDI, AT&T, DT, Softbank, Verizon, Nokia, ASB, Ericsson, LGE	noted	2017-01-20 05:57:54	2017-01-22 14:27:25
R1-1701513	WF on uplink power control	Nokia, ASB, Huawei, Intel, KDDI, NTT DOCOMO, Samsung, SoftBank	noted	2017-01-20 05:57:54	2017-01-20 06:04:45
R1-1701514	WF on evaluation assumptions on beam management	ZTE, ZTE Microelectronics, Nokia, ASB	noted	2017-01-20 05:57:54	2017-01-22 14:27:25
R1-1701515	WF on Synchronization and Channel Raster	Qualcomm, CATT, Samsung, Sierra Wireless	noted	2017-01-20 05:57:54	2017-01-20 06:04:45

R1-1701516	WF on MIMO calibration	NTT DOCOMO, ZTE, ZTE Microelectronics, LG Electronics, Samsung, Xinwei, Spreadtrum, ETRI	noted	2017-01-20 05:57:55	2017-01-22 14:27:25
R1-1701517	Summary of email discussion [87-30] on NR-MIMO calibration	ZTE, ZTE Microelectronics	agreed	2017-01-20 05:57:55	2017-01-20 06:04:45
R1-1701518	LS on PRACH preambles for on demand SI requests	RAN2, BlackBerry	treated	2017-01-20 05:57:55	2017-01-20 06:04:45
R1-1701519	Response LS on minimum system information	RAN2, LG Electronics	treated	2017-01-20 05:57:55	2017-01-20 06:04:45
R1-1701520	WF on Mobility	Samsung	noted	2017-01-20 05:57:55	2017-01-20 06:04:45
R1-1701521	Summary of offline discussion on group common PDCCH-part 2	Ericsson	noted	2017-01-20 05:57:55	2017-01-22 14:19:35
R1-1701522	WF for NR Modulation	MediaTek, IITH, CEWiT, IITM, Tejas Networks, NTU, Samsung, AT&T, Xiaomi	noted	2017-01-20 05:57:56	2017-01-22 14:19:35
R1-1701523	WF on PUCCH resource indication for NR	LG Electronics, Qualcomm, NTT DOCOMO, Samsung, Ericsson, Panasonic	noted	2017-01-22 14:16:27	2017-01-22 14:19:35
R1-1701524	WF on Scheduling request for URLLC UL transmissions	Idaho National Laboratory, Qualcomm	noted	2017-01-22 14:16:27	2017-01-22 14:19:35
R1-1701525	WF on DC handling	Panasonic, Intel, Huawei, HiSilicon	noted	2017-01-22 14:16:27	2017-01-22 14:19:35
R1-1701526	NR MIMO Phase 1 and Phase 2 calibration results	ZTE, ZTE Microelectronics	agreed	2017-01-22 14:16:27	2017-01-22 14:19:35
R1-1701527	WF on LTE-NR DL TDM Coexistence Mechanisms	Huawei, HiSilicon, AT&T, LG Electronics	noted	2017-01-22 14:16:27	2017-01-22 14:19:35
R1-1701528	Way forward on Wideband Carrier Support	Qualcomm Incorporated	noted	2017-01-22 14:16:27	2017-01-22 14:19:35
R1-1701529	WF on CSI-RS for beam management	Intel, Qualcomm, Ericsson, Nokia, Alcatel-Lucent Shanghai Bell, Verizon Wireless, CATT, MTK, NTT Docomo, CMCC, ZTE, ZTE Microelectronics, KT	revised	2017-01-22 14:16:27	2017-01-22 14:19:35

R1-1701530	WF on SS-block index indication	Huawei, HiSilicon, NTT DOCOMO, ZTE, ZTE Microelectronics, Sierra Wireless, Samsung, CATT, InterDigital, Nokia, ASB, Intel, Ericsson	agreed	2017-01-22 14:16:27	2017-01-22 14:19:35
R1-1701531	WF on reciprocity based CSI acquisition	Huawei, HiSilicon, Fujitsu, IITH, CEWIT, IITM, Tejas Networks, Softbank, Xinwei	noted	2017-01-22 14:16:27	2017-01-22 14:19:35
R1-1701532	WF on CSI-RS for beam management	Intel, Qualcomm, Ericsson, Nokia, Alcatel-Lucent Shanghai Bell, Samsung, Verizon Wireless, CATT, MTK, NTT Docomo, CMCC, ZTE, ZTE Microelectronics, KT, LG, vivo	noted	2017-01-21 00:00:00	2017-01-21 00:00:00
R1-1701533	Action plans for RAN1#88	NTT DOCOMO	noted	2017-01-22 14:16:27	2017-01-22 14:19:35
R1-1701534	WF on Enhanced Modulation Schemes	Sony, Samsung, InterDigital	revised	2017-01-22 14:16:27	2017-01-22 14:19:35
R1-1701535	TR36.873_CR_Adding_3D-InH_Scenario	CMCC	agreed	2017-01-21 00:00:00	2017-01-22 14:19:35
R1-1701536	Way Forward on CSI-RS for Beam Management	Intel, Qualcomm, Ericsson, Nokia, Alcatel-Lucent Shanghai Bell, Samsung, Verizon Wireless, CATT, MTK, NTT Docomo, CMCC, ZTE, ZTE Microelectronics, KT, LG, vivo	noted	2017-01-22 14:16:27	2017-01-22 14:19:35
R1-1701537	DRAFT LS on pi/2 BPSK with spectrum shaping for DFT-S-OFDM uplink	IITH, Nokia	revised	2017-01-22 14:16:27	2017-01-22 14:19:35
R1-1701538	[Draft] Reply LS on PRACH preambles for on demand SI requests	Ericsson	revised	2017-01-21 00:00:00	2017-01-21 00:00:00
R1-1701539	SR-triggered UL transmission for URLLC	LG Electronics, Intel, OPPO, Lenovo, Ericsson, NTT Docomo	revised	2017-01-22 14:16:27	2017-01-22 14:19:35

R1-1701540	Chairman's notes of AI 5.1.9 on NR-LTE coexistence	Ad-Hoc chair (Qualcomm)	endorsed	2017-01-22 14:16:27	2017-01-22 14:19:35
R1-1701541	Reply LS on PRACH preambles for on demand SI requests	RAN1, Ericsson	approved	2017-01-21 00:00:00	2017-01-21 00:00:00
R1-1701542	WF on PUCCH in one symbol short duration low PAPR design	IITH, CEWiT, IITM, Tejas Networks, Huawei, Qualcomm, Interdigital	noted	2017-01-22 14:16:27	2017-01-22 14:19:35
R1-1701543	WF on retransmission for UL URLLC	ZTE	noted	2017-01-22 14:16:27	2017-01-22 14:19:35
R1-1701544	WF on extended CP	Huawei, HiSilicon, Nokia, ASB, NTT DOCOMO, Ericsson, LGE, Vodafone, Deutsche Telekom, Samsung, Intel, OPPO, AT&T, China Unicom, CATT, Sony, vivo, InterDigital, Mediatek, Verizon	noted	2017-01-22 14:16:27	2017-01-22 14:19:35
R1-1701545	DRAFT LS on pi/2 BPSK with spectrum shaping for DFT-S-OFDM uplink	IITH, Nokia	revised	2017-01-22 14:16:27	2017-01-22 14:19:35
R1-1701546	WF on framework for DL beam mangement	LG Electronics, Ericsson, NTT DOCOMO	noted	2017-01-22 14:16:27	2017-01-22 14:19:35
R1-1701547	LS on pi/2 BPSK with spectrum shaping for DFT-S-OFDM uplink	RAN1, IITH, Nokia	approved	2017-01-22 14:16:27	2017-01-22 14:19:35
R1-1701548	SR-triggered UL transmission for URLLC	LG Electronics, Intel, OPPO, Lenovo, Ericsson, NTT Docomo, CATT, Nokia, ASB, Qualcomm	noted	2017-01-22 14:16:27	2017-01-22 14:19:35
R1-1701549	WF on Enhanced Modulation Schemes	Sony, Samsung, InterDigital	noted	2017-01-22 14:16:27	2017-01-22 14:19:35