**3GPP TSG-RAN WG4 Meeting #94-e R4-20xxxxx**

**Electronic Meeting, Feb.24th – Mar.6th 2020**

**Agenda item:** 8.17.2.2

**Source:** Moderator (Nokia, Nokia Shanghai Bell)

**Title:** Email discussion summary for RAN4#94e\_#94\_NR\_HST\_Demod\_BS

**Document for:** Information

# Introduction

*Briefly introduce background, the scope of this email discussion and provide some guidelines for email discussion if necessary.*

*List of candidate target of email discussion for 1st round and 2nd round*

* 1st round: TBA
* 2nd round: TBA

## Background and scope

Following the assessment of the situation with the 2019 coronavirus spread, the RAN TSG and WG leadership (in close co-ordination with the SA and CT leadership) has made the decision that all 2020/Q1 RAN WG meetings (scheduled for February) and RAN#87 (scheduled for March) will be converted to E-meetings.

This T-doc will be used to guide the email discussion for the topic of Rel-16 NR HST BS demodulation requirements (AI 8.17.2.2), with the email thread identifier(s) “RAN4#94e\_#94\_NR\_HST\_Demod\_BS”.

The scope of this email discussion are Rel-16 NR HST BS demodulation requirements, and in particular the agenda items:

8.17.2.2 BS demodulation requirements (38.104)

8.17.2.2.1 PUSCH requirements

8.17.2.2.2 PRACH requirements

8.17.2.2.3 UL timing adjustment requirements

The first iteration of this email discussion summary document identifies key open issues, summarizes proposals, recommends topics/questions to be handled via email discussions, and proposes way forwards wherever adequate.
Later iterations of this T-doc will summarize the 1st and 2nd round discussions of the various open issues and will recommend CRs/TP status updates.

List of candidate targets of email discussion for 1st round and 2nd round

* 1st round:
	+ Collect company views on the issues and options listed in this summary.
	+ Collect company views and proposed corrections on the submitted CRs.
	+ Align on open fundamental directions for HST requirements, e.g.
		- Whether to split requirements for 350 kph and 500 kph.
		- Inclusion of 1T1R in HST PUSCH.
	+ Agree on the many undisputed test parameters.
* 2nd round:
	+ Finish spill-over from 1st round.
	+ Discuss and find suitable compromises to agree on the remaining test parameters.
	+ Finish the CRs.

## Email discussion guidelines

In addition to following the RAN4#94 E-meeting Arrangements and Guidelines V1.2” of which some important passages are reproduced below, we would request the companies participating in RAN4#94e\_#94\_NR\_HST\_Demod\_BS, to follow the additional guidelines outlined here:

* Deadline for 1st round email discussion is **Wednesday 5pm UTC Feb. 26**.
* Deadline for 2nd round email discussion is **Thursday 5pm UTC Mar. 5**.
* Emails sent and company views uploaded after the deadline will not be taken into account for the summary of the respective round.
* The preferred method of commenting is to add/update your company’s view directly in this email summary document (use change marks if appropriate) and upload it to the RAN4#94e\_#94\_NR\_HST\_Demod\_BS draft folder. This is based on the Chair’s emails on this topic; reproduced further below.
	+ Draft folder: ftp://www.3gpp.org/tsg\_ran/WG4\_Radio/TSGR4\_94\_e/Inbox/Drafts/%2394\_NR\_HST\_Demod\_BS
	+ It is expected delegates will download the newest version (including other companies’ versions) of the summary document, insert comments and upload it back.
	To ensure the comments are captured timely and correctly, the delegate is encouraged to:
		- Rename the file by adding your company name.
		- Send an email on the reflector informing that comments are made with the correct file name.
		- Please account for possibly updated base document versions, before uploading your updates.
	+ Moderators are encouraged to merge all comments once a day and at the end of phase 1/2.
		- This new revision should then be used for any new commenting.
		- The moderator may ask for 1-2 hours of no new contents to perform merging, if the reflector is particularly busy.
		- In case of strong desynchronization, the moderator might provide an additional new revision outside the one a day cycle. Please check before uploading.
	+ Company views can be updated, e.g., based on comments from other companies
		- The revised comments should be easy to identify, for example, by marking them as “after seeing comments from …/ or intermediate proposal, our position/comment now is …”, while the initial comments remain unchanged in the template file.
	+ Comments only received by email will merged into the summary document by the moderator on a best effort basis.
* In case a discussion outside of updating your company’s view is necessary, please use the email thread identifier (RAN4#94e\_#94\_NR\_HST\_Demod\_BS) and clearly mark the subtopic either in the subject (not aligned with chair guidance) or in the beginning of the email text.
	+ Please do not forget to update your company view in this T-doc, if you make comments on a specific issue per email.
* If no company shows their concern on a particular issue until the deadline, the related contents will be considered stable.

In the shared draft of the “RAN4#94 E-meeting Arrangements and Guidelines V1.1”, available on the reflector and ultimately uploaded as [R4-2000001], the RAN4 Chair and Vicechairs have given the following guidance and the email discussion procedures and timeline:

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| * **Week before the E-meeting (Feb. 17 - 21)**
	+ Monday (Feb. 17): email discussion moderators will be announced by session chairs (aligned template will be provided and used)
	+ Tuesday – Friday (Feb. 18-21): moderators prepare summary materials for email discussion
		- Moderators shall identify key open issues, summarize proposals and recommend topics/questions to be handled via email discussions
* **E-meeting (Feb. 24 – Mar. 6)**
	+ Stage 0: Session chairs announce the set of email threads (no later than Monday 8am UTC, Feb. 24)
	+ Stage 1: Moderators trigger email discussion (Monday Feb. 24)
	+ Stage 2: Companies provide comments for the 1st round (Feb. 24 – Wednesday 5pm UTC Feb. 26)
	+ Stage 3: Moderators summarize the status and possible proposals, recommending what decisions can be made for 1st round. A formal t-doc will be used (Thursday 5pm UTC, Feb. 27)
	+ Stage 4: After receiving the summary from moderators, session chair may approve documents, make agreements or assign new CRs, WFs, LSs, etc. Then, session chair announces 2nd round discussion with tdoc status update (no later than Monday 8am UTC, March 2)
	+ Stage 5: Companies provide comments for 2nd round and moderators provide second round summary (Monday Mar. 2 – Thursday 5pm UTC Mar. 5)
		- Note: Formal version of stable tdocs shall be uploaded to the Inbox (except Cat A CRs) before Stage 6
	+ Stage 6: Session Chair announces conclusions (no later than 5pm UTC, March 6)
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Furthermore, useful notes/tips on the email discussion were provided:

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| * Delegates are strongly encouraged to provide comments/concerns asap
	+ Silence within a reasonable timeframe means no objection
* It is strongly encouraged that each company/delegate consolidate their comments/views and send them out in one email for each email thread
* Each email thread needs to use a clear and consistent thread title for easy tracking (the title for each thread is to be announced)
	+ - * E.g., if not done appropriately, after a while an email thread may become something like:
				+ RE: xxxx
				+ RE: RE: xxxx
				+ 回复:RE: xxxx
				+ [External] RE: xxxx
				+ Etc.

which makes it very hard to track. PLEASE fix it to RE: xxxx!  |

Please be also advised to follow the requests by MCC on the email reflector on the logistics of this e-meeting:

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| * It is important to refrain from sending attachments [on the reflector] because they slow down the delivery of emails and thereby, they have an adverse impact on the already ongoing e-meetings. Draft documents can be shared by creating subfolders to Inbox/Drafts folder.
* there is now a facility on RAN4#94-e Inbox and Inbox/Drafts folders on the public server to allow you to upload your documents using a web browser\*.
	+ Open your browser and navigate to RAN4#94-e Inbox folder,
	+ <https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_94_e/Inbox>
	+ or Inbox/Drafts folder,
	+ <https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_94_e/Inbox/Drafts>
	+ Click the green button to log in using your EOL account.
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As well as the guidelines given by the chair on how the commenting process is expected to take place (previous guidelines are aligned with chair guidance):

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| After the summary is uploaded to the ftp site by the moderator, what is the procedure to send comments? Should one download the document, insert comments and upload the file back to the ftp site? Or will the summary be included in one e-mail in which companies will include their comments? [Steven] As each moderator will provide their initial summary in the shared template file that resides in the corresponding thread folder under ftp://3gpp.org/tsg\_ran/WG4\_Radio/TSGR4\_94\_e/Inbox/Drafts/, it is expected delegates will download the document, insert comments and upload it back. To ensure the comments are captured timely, the delegate is encouraged to do:The file name is renamed by adding your company nameSend an email on the reflector informing that comments are made with the correct file nameAlso, if the file or e-mail thread is updated at the same time by multiple companies, what would the procedure be? Should the moderator merge all comments right away or only at the end of phase 1/2?[Steven] As said above, when making a comment, please rename the file to facilitate identification. Moderators are encouraged to merge all comments once a day and at the end of phase 1/2.And another thing, is it possible to revise the comments? Based on what some companies comments, it is possible that more people would agree to some “intermediate” proposal or the comments might change based on some clarification question.[Steven] Yes. I also hope the revised comments can be easily identified, such as “after seeing comments from …/ or intermediate proposal, our position/comment now is …”, while the initial comments remain unchanged in the template file. In this way, other delegates will be able to track the whole discussion. |

and

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| Perhaps it is useful to share the thinking from RAN4 leadership first:1. This e-meeting, with its many email threads, is an uncharted territory for all the delegates, moderators, session chairs, and MCC. As such, there will be new issues/problems, despite the fact that we are trying to provide many guidelines to properly structure and guide the process. And frankly speaking, in many cases, there is no perfect solution. Rather, it is a choice after weighing the pros and cons of different options.
2. We do want to leave some flexibilities to moderators, because 1) moderators are the active delegates in their topic areas 2) different threads have different scopes and thus may require different ways of handling
3. When making comments, please do so as soon as possible and consolidate them as much as possible
4. Be nice and be patient, knowing email discussions will have delays and cause misunderstanding
5. When facing uncertainty or new issues, please ask moderators, session chairs and MCC, and we will help.

Next, please find my answers to your questions:1. If all the companies comment on their own document, how do we reply/comment on other companies’ comments? Do we copy/paste their comments on my own document, and add comments below it?[Steven] when you provide a comment, always try to use the latest version of the summary document from moderator. For comments on comments, make it clear that you are responding to which comment.2. When we want to add more comments/reply after the first version of document with comment is uploaded, do we use a new template file and add the additional comment, or we append the additional comments on the first version and upload? Do you have guidelines for naming different versions with additional comments?[Steven] See above. Always work on the latest version of the summary document from moderator. And rename the file for easy identification, with some suffix such as “\_QC\_0214” (0224 meaning Feb. 24)3. For moderator, after merging the comments each day, do we upload the merged comments to ftp? If yes, after moderator uploaded the merged document, should delegates comment on the new merged document, or still use the original template? [Steven] We encourage moderators to merge the comments and upload the summary once a day to the ftp server.  |

# Topic #1: General BS demodulation requirements (8.17.2.2)

*Main technical topic overview. The structure can be done based on sub-agenda basis.*

This section contains T-docs with corresponding proposals and observations submitted to the agenda item “8.17.2.2 BS demodulation requirements (38.104)”, which could not be exclusively matched to any of the lower level agenda items.

## Companies’ contributions summary

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| **T-doc number** | **Company** | **Proposals / Observations** |
| *R4-20xxxxx* | *Company A* | *Proposal 1:**Observation 1:* |
| R4-2000613 | CATT | N/A |
| R4-2001689 | Nokia, Nokia Shanghai Bell | Applicability to base station typesProposal 8: RAN4 to capture “these requirements shall only be applied to Wide Area Base Stations [insert reference to corresponding manufacturer declaration]” in the test specifications. The requirement specification [TS 38.104], does not need to make this distinction.Requirements for 350 kph and 500 kphProposal 9: RAN4 to consider splitting requirements and tests for 350kph and 500kph.Proposal 10: RAN4 to consider letting BS declare support for 350kph or 500kph, and testing conformance with the declared Proposal 11: Assuming the 350kph FRCs and configurations are a true subset of the 500kph FRCs and configurations, passing 500kph also covers the 350kph conformance. If this assumption does not hold, both cases need to be tested independently. |

## Open issues summary

*Before e-Meeting, moderators shall summarize list of open issues, candidate options and possible WF (if applicable) based on companies’ contributions.*

### Sub-topic 1-1: High speed BS demodulation requirement applicability with respect to BS types

*Sub-topic description:*

This sub-topic deals with the open issue of whether or not to limit the high speed BS demodulation requirements to certain BS types. The topic initially came to light during email discussions on CRs to introduce HST PUSCH UL TA requirements, where a restriction of requirements was observed in the LTE specification, but a lack of discussion on this issue for NR was recognized.

In TS 36.104 V16.4.0, the sections

* 8.2.2 (PUSCH >) Requirements for UL timing adjustment
* 8.2.3 (PUSCH >) Requirements for high speed train
* 8.4.2.1 (PRACH detection requirements >) Minimum requirements

Carry statements of “[t]his requirement shall not be applied to Local Area BS and Home BS.”

In TS 38.104 V16.2.0, the defined BS classes in NR are captured as

* For BS type 1-O and 2-O, BS classes are defined as “Wide Area Base Stations”, “Medium Range Base Stations”, and “Local Area Base Stations”.
* For BS type 1-C and 1-H, BS classes are defined as “Wide Area Base Stations”, “Medium Range Base Stations”, and “Local Area Base Stations”.

*Open issues and candidate options before e-meeting:*

**Issue 1-1-1: Limit the applicability of high speed demodulation requirements with respect to BS types**

* Proposals
	+ Option 1 (Nokia, ): Requirements shall only be applied to Wide Area Base Stations.
	+ Option 2 (): Do not limit the applicability to wide are base stations.
* Recommended WF
	+ Follow the LTE approach and limit requirements for PUSCH UL timing adjustment, requirements for PUSCH high speed train, and requirements for PRACH in high speed scenarios to only Wide Area Base Stations.

### Sub-topic 1-2: High speed BS demodulation requirement applicability with respect to speed

*Sub-topic description:*

This sub-topic deals with the open issue of whether or not to split high speed BS demodulation requirements in general along the 350kph and 500kph lines, and allow declaration, testing, etc. along those sub-groupings.

This topic initially came to light during email discussions on CRs to introduce HST PUSCH UL requirements.

Note that this topic is also discussed in the “PUSCH requirements” section, with the distinction that the discussion here covers PUSCH, UL TA, and PRACH in general, while the other topic covers PUSCH exclusively.

*Open issues and candidate options before e-meeting:*

**Issue 1-2-1: Organisation of high speed train requirement sections in specifications**

* Proposals
	+ Option 1 (Nokia, ): Split requirements and tests for 350 kph and 500 kph in separate sections.
	+ Option 2 (): Do not make a section difference between 350 kph and 500 kph.
* Recommended WF
	+ Comments need to be collected during 1st round of online meeting.

**Issue 1-2-2: High speed support declaration**

* Proposals
	+ Option 1 (Nokia, ): Allow BS to declare support for 350kph or 500kph and to test requirements accordingly.
* Recommended WF
	+ Comments need to be collected during 1st round of online meeting.

**Issue 1-2-3: High speed implicit test pass**

* Proposals
	+ Option 1 (Nokia, ): Assuming the 350kph FRCs and configurations are a true subset of the 500kph FRCs and configurations, passing 500kph also covers the 350kph conformance. If this assumption does not hold, both cases need to be tested independently.
	+ Option 2 (): Do not allow for implicitly passed high speed tests.
* Recommended WF
	+ Comments need to be collected during 1st round of online meeting.

**Issue 1-2-4: High speed support declaration interplay with previous applicability rules and test coverage**

* Agreements in RAN4#92-bis (WF R4-1912729)
* PRACH format
	+ For 350km/h velocity, use PRACH format 0
	+ For 500km/h velocity, use PRACH format A2/B4/C2
		- FFS if PRACH format 0 shall be used
* Agreements in RAN4#93 (WF R4-1915914)
* PRACH format
	+ For 500km/h velocity, use PRACH format A2/B4/C2
	+ For 500km/h velocity, no extra requirements for PRACH format 0
* Condition
	+ This issue only arises, if BS declaration of support for 350 kph and 500 kph is agreed to be introduced (Issue 1-2-2) and applied to PRACH requirements.
* Proposals
	+ Option 1 (CMCC, ): Decide, if a BS needs to pass short PRACH sequence test, given the BS declares to only support 350 kph.
	It was agreed that PRACH format A2/B4/C2 are used for 500km/h. Considering that BS can declare supported speed of either 350km/h or 500km/h and the applicability rule for different speed is under discussion, do we need to introduce short sequence format for 350km/h?
* Recommended WF
	+ Comments need to be collected during 1st round of online meeting.

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| *XXX* | *Sub topic 1-1-1:* *Sub topic 1-2-1:**….**Others:* |
|  |  |

### CRs/TPs comments collection

*Major close-to-finalize WIs and Rel-15 maintenance, comments collections can be arranged for TPs and CRs. For Rel-16 on-going WIs, suggest to focus on open issues discussion on 1st round.*

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| --- | --- |
| **CR/TP number** | **Comments collection** |
| No CRs | N/A |
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## Summary for 1st round

### Open issues

*Moderator tries to summarize discussion status for 1st round, list all the identified open issues and tentative agreements or candidate options and suggestion for 2nd round i.e. WF assignment.*

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|  | **Status summary**  |
| **Sub-topic#1** | *Tentative agreements:**Candidate options:**Recommendations for 2nd round:* |

*Recommendations on WF/LS assignment*

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| --- | --- | --- |
|  | **WF/LS t-doc Title**  | **Assigned Company,****WF or LS lead** |
| #1 |  |  |

### CRs/TPs

*Moderator tries to summarize discussion status for 1st round and provides recommendation on CRs/TPs Status update*

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| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation**  |
| XXX | *Based on 1st round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

## Discussion on 2nd round (if applicable)

## Summary on 2nd round (if applicable)

*Moderator tries to summarize discussion status for 2nd round and provided recommendation on CRs/TPs/WFs/LSs Status update suggestion*

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| **CR/TP/LS/WF number** | **T-doc Status update recommendation**  |
| XXX | *Based on 2nd round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

# Topic #2: PUSCH requirements (8.17.2.2.1)

*Main technical topic overview. The structure can be done based on sub-agenda basis.*

This section contains T-docs with corresponding proposals and observations submitted to the agenda item “8.17.2.2.1 PUSCH requirements”, and PUSCH requirement relevant observations and proposals submitted to other agenda items.

## Companies’ contributions summary

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| **T-doc number** | **Company** | **Proposals / Observations** |
| *R4-20xxxxx* | *Company A* | *Proposal 1:**Observation 1:* |
| R4-2000306 | Samsung | Antenna configurationProposal 1: Only define HST requirement with 1x2 antenna configuration for tunnel scenario.Test parametersProposal 2: The Slots in which PUSCH is transmitted is proposed as follow

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| Slots in which PUSCH is transmitted | For FDD :slot #0 and #8 in radio frames for which SFN mod 4 = 0slot #6 in radio frames for which SFN mod 4 = 1slot #4 in radio frames for which SFN mod 4 = 2slot #2 in radio frames for which SFN mod 4 = 3For TDD in 15KHz SCS:slot #4 in each radio framesFor TDD in 30KHz SCSslot #8 and slot#10 in radio frames  |

PUSCH mapping type AObservation 1: L0=3 with 1+1+ 1 DMRS configuration has better compared with L0=2 with 1+1+1 DMRS configuration with large Doppler value.Proposal 3: Define the HST requirement with PUSCH mapping type A under L0=3.MCSProposal 4: HST requirement with tunnel scenario with MCS 2 and MCS 16 can be defined. |
| R4-2000404 | Ericsson | Observation 1: From the simulation results, we showed that it is feasible to achieve reasonable PUSCH demodulation performance at 350 km/h with both MCS = 2 and MCS = 16 for both open space and tunnel scenarios. |
| R4-2000405 | Ericsson | Observation 1: From the simulation results, we showed that it is feasible to achieve reasonable PUSCH demodulation performance at 500 km/h with both MCS = 2 and MCS = 16 for both open space and tunnel scenarios. |
| R4-2000608 | CATT | Front loaded DMRS start symbolProposal 1: The performance difference between l0=2 and l0=3 is minor, and the performance gain of l0=2 relative to l0=3 is within the range of 0~0.5dB. |
| R4-2000609 | CATT | Antenna configurationProposal 1: To introduce both 1x1 and 1x2 antenna configuration for the tunnel scenario.MCSProposal 2: Both MCS2 and MCS16 should be supported in the tunnel scenario with 500km/h. |
| R4-2000610 | CATT | N/A |
| R4-2000633 | CMCC | N/A |
| R4-2000807 | ZTE Wistron Telecom AB | N/A |
| R4-2001195 | NTT DOCOMO, INC. | Antenna configurationProposal 1: Introduce conducted PUSCH requirements with 1x1 antenna configuration for HST.ApplicabilityProposal 2: Study performance difference between 350km/h and 500km/h HST test, and then whether BS supporting 500km/h HST can skip 350km/h HST test. |
| R4-2001458 | Huawei, HiSilicon | l0 for PUSCH mapping type AObservation 1: There is almost no performance difference between l0=2 and 3 for PUSCH mapping type A.Proposal 1: Define one set of performance requirements for l0 = 2 and 3.Antenna configurationProposal 2: Do not consider antenna configuration 1x1 for tunnel scenario.MCSObservation 2: MCS 16 has a good performance in tunnel scenario for 500 km/h.Proposal 3: Define MCS 16 in tunnel scenario for 500 km/h. |
| R4-2001459 | Huawei, HiSilicon | N/A |
| R4-2001687 | Nokia, Nokia Shanghai Bell | N/A |
| R4-2001689 | Nokia, Nokia Shanghai Bell | PUSCH tunnel scenario 1T1RObservation 1: 1T1R antenna configurations use single polarization for transmission and reception, which poses challenges for polarization alignment between TE and DUT in a test environment.Proposal 1: RAN4 to introduce 1T1R requirements and to use the same test setup for 1T1R as already specified TS 38.141-2, with a test procedure that includes polarization alignment.PUSCH 500kph MCSObservation 2: Both MCS 2 and MCS 16 are feasible and have SNR values in practically relevant ranges.Proposal 2: RAN4 to consider MCS 16 as a feasible requirement FRC for 500kph PUSCH.PUSCH l0 value simulation alignmentObservation 3: Choosing l0=2 and l0=3 result in identical SNR requirements for 350 kph PUSCH.Proposal 3: RAN4 to consider allowing to freely choose either l0=2 or l0=3 to align simulation results and deliver performance requirement input for HST PUSCH.Email discussion on TDD/FDD/radio frame patternsProposal 4: RAN4 to consider reusing TDD/FDD/radio frame patterns from non-HST performance requirements in the HST PUSCH requirements. |
| R4-2001184 | Ericsson | [CR] Introducting of conformance tests for 350km/h HST |
| R4-2001185 | Ericsson | [CR] Introduction of HST 350km/h FRCs and channel model |
| R4-2001690 | Nokia, Nokia Shanghai Bell | [CR] CR for 38.104: HST PUSCH demodulation requirements introduction |
| R4-2001691 | Nokia, Nokia Shanghai Bell | [CR] CR for 38.104: HST PUSCH demodulation Annex including both FRC and channel model |
| R4-2001802 | NTT DOCOMO, INC. | [CR] CR for TS 38.141-1: Introduction of NR PUSCH performance requirements for HST |
| R4-2001803 | NTT DOCOMO, INC. | [CR] CR for TS 38.141-1: Introduction of NR PUSCH performance Annex including both FRC and channel model for HST |

## Open issues summary

*Before e-Meeting, moderators shall summarize list of open issues, candidate options and possible WF (if applicable) based on companies’ contributions.*

### Sub-topic 2-1: Antenna Configuration

*Sub-topic description:*

This sub-topic deals with open issues related to the antenna configuration.

*Open issues and candidate options before e-meeting:*

**Issue 2-1-1: Introduce 1T1R requirements for the tunnel scenario**

* Proposals
	+ Option 1 (CATT, DCM, Nokia, ): Introduce 1T1R requirements for the tunnel scenario
	+ Option 2 (Samsung, Huawei, ): Do not introduce 1T1R requirements for the tunnel scenario
* Recommended WF
	+ Requires further discussion. Please start discussion already in 1st round.

**Issue 2-1-2: 1T1R requirement configuration**

* Condition
	+ Agreements to this issue can only be made in case 1T1R introduction is agreed in Issue 2-1-1.
* Proposals
	+ Option 1 (Nokia, ): Re-use the 1T2R requirement configuration.
* Recommended WF
	+ Wait for progress on Issue 2-1-1.

**Issue 2-1-3: 1T1R test setup and procedure**

* Condition
	+ Agreements to this issue can only be made in case 1T1R introduction is agreed in Issue 2-1-1.
* Proposals
	+ Option 1 (Nokia, ): Same test setup for 1T1R as already specified TS 38.141-2, with a test procedure that includes polarization alignment.
* Recommended WF
	+ Wait for progress on Issue 2-1-1.

### Sub-topic 2-2: Test parameters for testing PUSCH

*Sub-topic description:*

Some test parameter details for testing PUSCH are still undecided. This sub-topic collects all relevant proposals.

*Open issues and candidate options before e-meeting:*

**Issue 2-2-1: Slot allocation for PUSCH transmission in radio frames**

* Agreements in RAN4#93 (WF R4-1915886)
* TDD configuration
	+ Reuse the existing TDD configurations for 15 kHz SCS and 30 kHz SCS as baseline, i.e.
		- 15 kHz SCS: 3D1S1U, S=10D:2G:2U
		- 30 kHz SCS: 7D1S2U, S=6D:4G:4U
* Proposals
	+ Option 1 (Samsung, ):

For FDD :

slot #0 and #8 in radio frames for which SFN mod 4 = 0

slot #6 in radio frames for which SFN mod 4 = 1

slot #4 in radio frames for which SFN mod 4 = 2

slot #2 in radio frames for which SFN mod 4 = 3

For TDD in 15KHz SCS:

slot #4 in each radio frames

For TDD in 30KHz SCS

slot #8 and slot#10 in radio frames

* + Option 2 (Nokia, ): Reuse TDD/FDD/radio frame patterns from non-HST performance requirements in the HST PUSCH requirements.

For FDD:

All slots.

For TDD in 15KHz SCS:

Slot #4 and slot #9 in each radio frame

For TDD in 30KHz SCS

Slot #8, slot #9, slot #18, and slot #19 in each radio frame

* Recommended WF
	+ Collect views from further companies.

**Issue 2-2-2: L0 for PUSCH mapping type A for both 350 kph and 500 kph**

* Agreements in RAN4#92bis (WF R4-1912809)
* Provide the simulation results for 350km/h and 500km/h and evaluate the following configurations and make decision:
	+ Option 1: *l0* = 3
	+ Option 2: *l0* = 2
* Same value for both 350km/h and 500km/h can be considered
* Agreements in RAN4#93 (WF R4-1915886)
* l0 for PUSCH mapping type A
	+ *l0* = 2 (For simulation alignment)
		- If no performance different between *l0* = 2 and *l0* = 3, define performance requirements based on *l0* = 2
		- *l0* value for testing is based on BS declaration
* Proposals
	+ Option 1 (Samsung, ): Define the HST requirement with PUSCH mapping type A under L0=3.
	+ Option 2 (Huawei, Nokia, ): Allow to freely choose either l0=2 or l0=3 to align simulation results and deliver performance requirements.
	+ Option 3 (CATT, ): The performance difference between l0=2 and l0=3 is minor, and the performance gain of l0=2 relative to l0=3 is within the range of 0~0.5dB. Follow the previous agreement for the case of no performance difference, i.e., l0=2.
* Recommended WF
	+ Suggestion: Make distinction between 350 kph and 500 kph. For 350 kph, choose l0=2. For 500 kph, allow to freely choose either l0=2 or l0=3 to align simulation results and deliver performance requirements.

**Issue 2-2-3: Addition of MCS 16 in 500kph tunnel scenario**

* Proposals
	+ Option 1 (Samsung, Nokia, CATT, Huawei): Both MCS 2 and MCS 16
* Recommended WF
	+ Include MCS 16 in 500 kph tunnel scenario.

### Sub-topic 2-3: Applicability rules for PUSCH high speed train requirements

*Sub-topic description*

During email discussions the question arose, if passing the tests for 500 kph should implicitly count as having passed the tests for 350 kph. This section treats the implicit test passing proposals for PUSCH requirements.

Note that topic #1 is also treating this question for the general case (not PUSCH only as below).

*Open issues and candidate options before e-meeting:*

**Issue 2-3-1: PUSCH HST 350kph test omission**

* Proposals
	+ Option 1 (DCM, ): First study performance difference between 350km/h and 500km/h HST test, and then whether BS supporting 500km/h HST can skip 350km/h HST test.
* Recommended WF
	+ In case the general discussion in topic 1 does not answer Issue 2-3-1, request studies of interested companies for RAN4#94-bis.

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | Sub topic 2-1: Sub topic 2-2:….Others: |

### CRs/TPs comments collection

*Major close to finalize WIs and Rel-15 maintenance, comments collections can be arranged for TPs and CRs. For Rel-16 on-going WIs, suggest to focus on open issues discussion on 1st round.*

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| XXX | Company A |
| Company B |
|  |
| R4-2001184 |  |
|  |
|  |
| R4-2001185 |  |
|  |
|  |
| R4-2001690 |  |
|  |
|  |
| R4-2001691 |  |
|  |
|  |
| R4-2001802 |  |
|  |
|  |
| R4-2001803 |  |
|  |
|  |

## Summary for 1st round

### Open issues

*Moderator tries to summarize discussion status for 1st round, list all the identified open issues and tentative agreements or candidate options and suggestion for 2nd round i.e. WF assignment.*

|  |  |
| --- | --- |
|  | **Status summary**  |
| **Sub-topic#1** | *Tentative agreements:**Candidate options:**Recommendations for 2nd round:* |

*Suggestion on WF/LS assignment*

|  |  |  |
| --- | --- | --- |
|  | **WF/LS t-doc Title**  | **Assigned Company,****WF or LS lead** |
| #1 |  |  |

### CRs/TPs

*Moderator tries to summarize discussion status for 1st round and provided recommendation on CRs/TPs Status update suggestion*

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation**  |
| XXX | *Based on 1st round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

## Discussion on 2nd round (if applicable)

## Summary on 2nd round (if applicable)

*Moderator tries to summarize discussion status for 2nd round and provided recommendation on CRs/TPs/WFs/LSs Status update suggestion*

|  |  |
| --- | --- |
| **CR/TP/LS/WF number** | **T-doc Status update recommendation**  |
| XXX | *Based on 2nd round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

# Topic #3: PRACH requirements (8.17.2.2.2)

*Main technical topic overview. The structure can be done based on sub-agenda basis.*

This section contains T-docs with corresponding proposals and observations submitted to the agenda item “8.17.2.2.2 PRACH requirements”, and PRACH requirement relevant observations and proposals submitted to other agenda items.

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| *R4-20xxxxx* | *Company A* | *Proposal 1:**Observation 1:* |
| R4-2000307 | Samsung | N/A |
| R4-2000407 | Ericsson | N/A |
| R4-2000408 | Ericsson | N/A |
| R4-2000611 | CATT | N/A |
| R4-2000612 | CATT | N/A |
| R4-2000809 | ZTE Wistron Telecom AB | N/A |
| R4-2001471 | Huawei, HiSilicon | N/A |
| R4-2001472 | Huawei, HiSilicon | N/A |
| R4-2001688 | Nokia, Nokia Shanghai Bell | Proposal 1: RAN4 to include TDL-C-100 fading channel requirements with frequency offset of 400Hz for all agreed PRACH preamble formats. |
| R4-2001473 | Huawei, HiSilicon | [CR] CR for TS 38.104: Introduction of PRACH demodulation requirements for NR HST |
| R4-2001474 | Huawei, HiSilicon | [CR] CR for TS 38.141-1: Introduction of PRACH performance requirements for NR HST |
| R4-2001475 | Huawei, HiSilicon | [CR] CR for TS 38.141-2: Introduction of PRACH performance requirements for NR HST |

## Open issues summary

*Before e-Meeting, moderators shall summarize list of open issues, candidate options and possible WF (if applicable) based on companies’ contributions.*

### Sub-topic 3-1: TDLC300-100 propagation condition

*Sub-topic description:*

The results collection template lists the TDLC300-100 propagation condition as FFS for sort PRACH formats. This topic is to clarify the status of the propagation condition.

*Open issues and candidate options before e-meeting:*

**Issue 3-1-1: Introduce requirements for TDLC300-100 propagation conditions for short preamble formats**

* Agreements in RAN4#92-bis (WF R4-1912729)
* Channel model
	+ AWGN
	+ TDL-C fading channel, Frequency offset is 400Hz
* Proposals
	+ Option 1 (Nokia, ): Include TDL-C-100 fading channel requirements with frequency offset of 400Hz for all agreed PRACH preamble formats.
	+ Option 2 (): Do not introduce TDL-C-100 fading channel requirements for short preamble formats.
* Recommended WF
	+ Include TDL-C-100 fading channel requirements with frequency offset of 400Hz for all agreed PRACH preamble formats.

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | Sub topic 1-1: Sub topic 1-2:….Others: |

### CRs/TPs comments collection

*Major close-to-finalize WIs and Rel-15 maintenance, comments collections can be arranged for TPs and CRs. For Rel-16 on-going WIs, suggest to focus on open issues discussion on 1st round.*

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| XXX | Company A |
| Company B |
|  |
| R4-2001473 |  |
|  |
|  |
| R4-2001474 |  |
|  |
|  |
| R4-2001475 |  |
|  |
|  |

## Summary for 1st round

### Open issues

*Moderator tries to summarize discussion status for 1st round, list all the identified open issues and tentative agreements or candidate options and suggestion for 2nd round i.e. WF assignment.*

|  |  |
| --- | --- |
|  | **Status summary**  |
| **Sub-topic#1** | *Tentative agreements:**Candidate options:**Recommendations for 2nd round:* |

*Recommendations on WF/LS assignment*

|  |  |  |
| --- | --- | --- |
|  | **WF/LS t-doc Title**  | **Assigned Company,****WF or LS lead** |
| #1 |  |  |

### CRs/TPs

*Moderator tries to summarize discussion status for 1st round and provides recommendation on CRs/TPs Status update*

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation**  |
| XXX | *Based on 1st round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

## Discussion on 2nd round (if applicable)

## Summary on 2nd round (if applicable)

*Moderator tries to summarize discussion status for 2nd round and provided recommendation on CRs/TPs/WFs/LSs Status update suggestion*

|  |  |
| --- | --- |
| **CR/TP/LS/WF number** | **T-doc Status update recommendation**  |
| XXX | *Based on 2nd round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

# Topic #4: UL timing adjustment requirements (8.17.2.2.3)

*Main technical topic overview. The structure can be done based on sub-agenda basis.*

This section contains T-docs with corresponding proposals and observations submitted to the agenda item “8.17.2.2.3 UL timing adjustment requirements”, as well as, UL timing adjustment requirement relevant observations and proposals submitted to other agenda items.

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| *R4-20xxxxx* | *Company A* | *Proposal 1:**Observation 1:* |
| R4-2000308 | Samsung | SRS configurationProposal 1: SRS bandwidth configuration is proposed asC\_SRS = 11, B\_SRS =0, for 40RBC\_SRS = 21, B\_SRS =0, for 80RBProposal 2: SRS transmission comb is proposed asK\_TC: 2Proposal 3: SRS transmission periodicity is proposed asTSRS =10.SRS slot configurationProposal 4: Keep the same SRS parameters specified in 38.104/141-1/141-2 for requirements and testing.Moving propagation conditionsProposal 5: The timing difference between moving UE and stationary UE should be scaled with15KHz SCS: Δτ - (TA -31)x16\*64Tc30KHz SCS: Δτ - (TA -31)x16\*32Tc |
| R4-2000406 | Ericsson | Observation 1: Under scenario Y, comparable performance can be achieved with both PUSCH mapping type A and mapping type B.Observation 2: It is unclear why PUSCH mapping type B was introduced for UL timing adjustment under HST condition while PUSCH mapping type B has not be considered for HST PUSCH demodulation performance. With PUSCH mapping type B, (1+1+1) DM-RS symbols and 14 OFDM symbols may be suitable for UL timing adjustment where UE is travelling at 500 km/h. However, it should be noted that with the same PUSCH mapping type B configuration, it would not be able to achieve satisfactory demodulation performance with a basic receiver, as the maximum unambiguous sampling frequency = 1400 Hz and 2800 Hz for SCS = 15 kHz and SCS = 30 kHz, respectively.Proposal 1: Remove PUSCH mapping type B assumptions and requirements for UL timing adjustment to align them to PUSCH HST demodulation requirements. |
| R4-2000808 | ZTE Wistron Telecom AB | N/A |
| R4-2001460 | Huawei, HiSilicon | SRS transmissionObservation 1: There is inconsistence in TS 36.104 and TS 36.141 for SRS configuration, and TS 36.141 needs to be corrected.Observation 2: Adjustment of TA value is not frequently, transmitting SRS signal one slot per radio frame is sufficient in current model.Proposal 1: Transmit SRS (optional) for uplink timing advance requirement in:– FDD • Slot #1 in radio frames– TDD• The last symbol in the special slot– 15kHz SCS: last symbol in slot #3 in radio frames– 30kHz SCS: last symbol in slot #7 in radio framesOther parametersProposal 2: Adopt parameters in Table 2.2-1 for UL timing adjustment.Table 2.2-1 Parameters needed to be determinedParameter ValueDMRS type type1symbols length 14 for both PUSCH type A and Bstart symbol index 0 for both PUSCH type A and Bresource allocation type type 1SRS bandwidth configuration BSRS=0, CSRS=11 for 40RBsBSRS=0, CSRS=21 for 80RBsSRS transmission comb 2 |
| R4-2001687 | Nokia, Nokia Shanghai Bell | N/A |
| R4-2001689 | Nokia, Nokia Shanghai Bell | Previous observations about UL TA testingObservation 4: In LTE UL TA performance requirements, there is one stationary UE that is not configured to have a timing error and does not receive TA commands from the BS. Furthermore, there is a moving UE whose timing error follows the chosen scenarios and receives TA commands via an error-free side link. The TPUT is only measured for the moving UE.Observation 5: The Doppler shift of the moving UE is not considered for the high-speed scenarios in LTE UL TA.UL TA and Doppler shiftProposal 5: RAN4 to not consider Doppler shift in UL TA scenarios with 350 kph and 500 kph UE speed.UL TA choice of KPIObservation 6: Synthetic UL TA implementation errors are not detected with 70% TPUT requirements. A value of >90% is required.Proposal 6: RAN4 to consider changing the test metric to SNR@95% of maximum throughput for the moving UE.UL TA SRS placementProposal 7: RAN4 to consider placing the SRS in the second to last symbol to avoid transient period issues. |
| R4-2000805 | ZTE Wistron Telecom AB | [CR] CR for 38.104: introduction of UL timing adjustment |
| R4-2000806 | ZTE Wistron Telecom AB | [CR] CR for 38.104: Appendix for UL timing adjustment |

## Open issues summary

*Before e-Meeting, moderators shall summarize list of open issues, candidate options and possible WF (if applicable) based on companies’ contributions.*

### Sub-topic 4-1: SRS configuration

*Sub-topic description:*

This sub-topic deals with open issues related to SRS configuration details.

The following agreements from previous meetings are of relevance to this sub-topic:

Agreements in RAN4#93 (WF R4-1915886):

* Allocated RBs for SRS
	+ 10 MHz CBW / 15 kHz SCS: 40 contiguously allocated RBs starting from RPB index 0
	+ 40 MHz CBW / 30 KHz SCS: 80 contiguously allocated RBs starting from PRB index 0
* SRS transmission (optional)
	+ FDD
		- Slot #1 in radio frames
	+ TDD
		- The last symbol in the special slot (Further check is needed)
			* 15kHz SCS: last symbol in slot #3 in radio frames
			* 30kHz SCS: last symbol in slot #7 in radio frames

*Open issues and candidate options before e-meeting:*

**Issue 4-1-1: SRS bandwidth configuration TBA**

* Proposals
	+ Option 1: (Samsung, Huawei, ): C\_SRS = 11, B\_SRS =0, for 40RB and C\_SRS = 21, B\_SRS =0, for 80RB.
* Recommended WF
	+ Choose C\_SRS = 11, B\_SRS =0, for 40RB and C\_SRS = 21, B\_SRS =0, for 80RB.

**Issue 4-1-2: SRS transmission comb**

* Proposals
	+ Option 1 (Samsung, Huawei, ): KTC=2.
* Recommended WF
	+ Choose KTC=2.

**Issue 4-1-3: SRS transmission periodicity**

* Proposals
	+ Option 1 (Samsung, ): TSRS =10.
* Recommended WF
	+ Collect companies’ inputs in 1st round.

**Issue 4-1-4: SRS slot configuration differences between TS 38.104 and TS 38.141**

* Proposals
	+ Option 1 (Samsung, ): Same SRS slot configuration specified in 38.104/141-1/141-2 for requirements and testing.
	+ Option 2 (): Follow current LTE specifications and have different SRS transmission slot configurations.
* Recommended WF
	+ Use same SRS slot configuration for both requirements and test.

**Issue 4-1-5: SRS transmit slot configuration**

* Proposals
	+ Option 1 (Huawei, ): As previously captured in WF as FFS

– FDD

• Slot #1 in radio frames

– TDD

• 15kHz SCS: Slot #3 in radio frames

• 30kHz SCS: Slot #7 in radio frames

* Recommended WF
	+ Collect companies’ input

**Issue 4-1-6: SRS symbol placement within slot for TDD**

* Proposals
	+ Option 1 (Huawei, ): The last symbol in the special slot.
	+ Option 2 (Nokia, ): Second to last symbol in the special slot.
* Recommended WF
	+ Collect companies’ input.

**Issue 4-1-7: SRS symbol placement within slot for FDD**

* Proposals
	+ Option 1 (Nokia, ): Second to last symbol in chosen SRS slot.
	+ Option 2 (): Last symbol in chosen SRS slot.
	+ Option 3 (): Follow agreement from SRS placement within slot for TDD.
* Recommended WF
	+ Chose option 3.

### Sub-topic 4-2: Moving propagation conditions

*Sub-topic description:*

This sub-topic deals with previously undiscussed open issues related to propagation condition details.

*Open issues and candidate options before e-meeting:*

**Issue 4-2-1: Timing difference between moving UE and stationary UE scaling by TA command**

* Proposals
	+ Option 1 (Samsung, ):

15KHz SCS: Δτ - (TA -31)x16\*64Tc
30KHz SCS: Δτ - (TA -31)x16\*32Tc

* + Other options not precluded.
* Recommended WF
	+ Chose option 1.

**Issue 4-2-2: Applying Doppler shift into account**

* Proposals
	+ Option 1 (Nokia, ): Do not consider Doppler shift in UL TA scenarios with 350 kph and 500 kph UE speed (as in LTE).
	+ Option 2 (): Apply Doppler shift to the moving UE. FFS on value.
* Recommended WF
	+ Do not consider Doppler shift in UL TA scenarios with 350 kph and 500 kph UE speed.

### Sub-topic 4-3: Test metric

*Sub-topic description:*

This sub-topic deals with previously undiscussed open issues related to the test metric.

*Open issues and candidate options before e-meeting:*

**Issue 4-3-1: Test metric**

* Agreements in RAN4#93 (WF R4-1915886)
* Test metric
	+ Reuse LTE test metric
		- Maximum throughput for an FRC equals to the payload size\* the number of uplink subframes per second in which PUSCH is transmitted
		- SNR@70% of maximum throughput for the moving UE
* Proposals
	+ Option 1 (): Keep previous agreement.
	+ Option 2 (Nokia, ): Use SNR@95% of maximum throughput for the moving UE.
* Recommended WF
	+ Collect companies’ opinions.

### Sub-topic 4-4: UL TA PUSCH configuration

*Sub-topic description:*

This sub-topic deals with open issues related to UL TA PUSCH configuration details.

The following agreements from previous meetings are of relevance to this sub-topic:

Agreements in RAN4#93 (WF R4-1915886):

* PUSCH mapping type
	+ Type A and Type B
	+ *l0* = 2

*Open issues and candidate options before e-meeting:*

**Issue 4-4-1: UL TA PUSCH mapping type B**

* Proposals
	+ Option 1 (Ericsson, ): Remove PUSCH mapping type B assumptions and requirements.
	+ Option 2 (): Keep previous agreement
* Recommended WF
	+ Collect companies’ input.

**Issue 4-4-2: UL TA PUSCH time domain resource allocation**

* Proposals
	+ Option 1 (Huawei, ): start=0, length=14, type 1.
* Moderator remark:
	+ No other companies explicitly disclosed these parameters in their simulation delivery T-docs.
* Recommended WF
	+ Choose option 1: start=0, length=14, type 1.

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | Sub topic 1-1: Sub topic 1-2:….Others: |

### CRs/TPs comments collection

*Major close-to-finalize WIs and Rel-15 maintenance, comments collections can be arranged for TPs and CRs. For Rel-16 on-going WIs, suggest to focus on open issues discussion on 1st round.*

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| XXX | Company A |
| Company B |
|  |
| R4-2000805 |  |
|  |
|  |
| R4-2000806 |  |
|  |
|  |

## Summary for 1st round

### Open issues

*Moderator tries to summarize discussion status for 1st round, list all the identified open issues and tentative agreements or candidate options and suggestion for 2nd round i.e. WF assignment.*

|  |  |
| --- | --- |
|  | **Status summary**  |
| **Sub-topic#1** | *Tentative agreements:**Candidate options:**Recommendations for 2nd round:* |

*Recommendations on WF/LS assignment*

|  |  |  |
| --- | --- | --- |
|  | **WF/LS t-doc Title**  | **Assigned Company,****WF or LS lead** |
| #1 |  |  |

### CRs/TPs

*Moderator tries to summarize discussion status for 1st round and provides recommendation on CRs/TPs Status update*

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation**  |
| XXX | *Based on 1st round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

## Discussion on 2nd round (if applicable)

## Summary on 2nd round (if applicable)

*Moderator tries to summarize discussion status for 2nd round and provided recommendation on CRs/TPs/WFs/LSs Status update suggestion*

|  |  |
| --- | --- |
| **CR/TP/LS/WF number** | **T-doc Status update recommendation**  |
| XXX | *Based on 2nd round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |