**3GPP TSG-RAN WG4 Meeting #94-e draftR4-2002523**

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

**Agenda item:** 8.17.2

**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.

## Additional Email discussion guidelines for round 2

Before the discussions and revisions of round 2 start to fully take off, please let me suggest the next steps and logistics of the NR\_HST\_Demod\_BS round 2 discussions:

1) Please check R4-2002385 and comment on the tentative agreements.

In the absence of comments, all tentative agreements will be captured in the WF, to become approved agreements at the end of the week.

WF drafts will be provided during the second week.

2) Please check R4-2002385 and comment on open issues and proposed way forwards.

To comment on a specific issue in the sections X.5, please use this email thread and unmistakably cite the issue number.

For example:

“”

Issue X.5.2 The final HST PUSCH configuration

Thanks to company A’s further technical clarification, we can now follow the line of reasoning.

The proposed WF can be used as a tentative agreement.

“

3) Capture your comments in section X.5 (Discussion on 2nd round).

If you care to have your email comments captured verbatim in the summary document of round 2, please do the following:

Add your comments (in chronological order) under the respective issue in sections 5.X of the latest version of

“revisedR4-2002385 RAN4#94e\_#94\_NR\_HST\_Demod\_BS Rev1, cpyB, Nok.docx”

Change its name by

Counting up the revision.

Appending your company name

Deleting all but the last two company name.

And re-upload.

For example:

revisedR4-2002385 RAN4#94e\_#94\_NR\_HST\_Demod\_BS Rev0, cpyA, cpyB.docx

revisedR4-2002385 RAN4#94e\_#94\_NR\_HST\_Demod\_BS Rev1, cpyB, cpyC.docx

...

revisedR4-2002385 RAN4#94e\_#94\_NR\_HST\_Demod\_BS Rev394, cpyY, cpyU.docx

The two company names will allow the Moderator to diagnose and fix overlapping uploads. Still please be careful to check for new versions before uploading.

Companies are themselves responsible to fully capture their email comments in the T-doc, the moderator will summarize the email discussion to the best of their abilities in sections X.6 (Summary on 2nd round), after the deadline.

Reminders:

* Deadline for 2nd round email discussion is **Thursday 5pm PST Mar. 5**.
* Draft folder: <ftp://www.3gpp.org/tsg_ran/WG4_Radio/TSGR4_94_e/Inbox/Drafts/%2394_NR_HST_Demod_BS>

## 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~~ PST Feb. 26**.
* Deadline for 2nd round email discussion is **Thursday 5pm ~~UTC~~ PST 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:

|  |
| --- |
| * **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) |

Furthermore, useful notes/tips on the email discussion were provided:

|  |
| --- |
| * 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:

|  |
| --- |
| * 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. |

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):

|  |
| --- |
| 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 name Send an email on the reflector informing that comments are made with the correct file name  Also, 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

|  |
| --- |
| 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

|  |  |  |
| --- | --- | --- |
| **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 types  Proposal 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 kph  Proposal 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, Samsung, Huawei, ZTE, ): PUSCH HST, PRACH HST, PUSCH UL TA requirements shall only be applied to Wide Area Base Stations.
  + Option 2 (): Do not limit the applicability to wide are base stations.
  + Option 3 (DoCoMo, Intel, Ericsson, ): PUSCH HST, PRACH HST, PUSCH UL TA requirements shall only be applied to Wide Area Base Stations and Medium Range BS.
* 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 and Medium Range 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, Ericsson, Huawei, ): Split requirements and tests for 350 kph and 500 kph in separate sections.
  + Option 2 (Samsung, ZTE, ): Do not make a section difference between 350 kph and 500 kph.
  + Option 3 (Samsung, DoCoMo, ): Follow LTE approach, separate requirement table within the same section for HST.  
    [Moderator question: The current CRs for PUSCH HST introduce new sub-sections for HST, which seems aligned with the LTE approach for those sections. Are those CRs challenged by this option?]
  + Option 4 (CMCC, ): Requirements for 350km/h and 500km/h need to be split, but separate section or separate tables is both acceptable.
* 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, Samsung, Ericsson, Huawei, ZTE, DoCoMo, Intel): Allow BS to declare support for 350kph or 500kph and to test requirements accordingly.

Moderator: It seems that the wording of option 1 was interpreted in differing ways. Please use option 2 and 3 to further differentiate.

* + Option 2: Allow BS to declare support for either 350kph, or 500kph, or both, and to test requirements accordingly.
  + Option 3: Allow BS to declare support for either 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, Ericsson, ZTE, Intel, ): 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 3 (Samsung, ): No implicit test passing. Test cases pertaining to declared speed need to be passed.
  + Option 4 (Huawei, ): 350km/h and 500km/h should have the same test configurations except the Max Doppler shift, in such configuration, BS only needs to pass either 350km/h or 500km/h related requirements as per BS declaration.
  + Option 5 (DoCoMo): Clarify by study whether passing 500kph also covers passing the 350kph conformance applies or not from a technical perspective.
* 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
  + (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?
  + Option 2 (Nokia, Huawei, ZTE, ): A BS declaring to only support 350 kph does not need to test short sequences. A BS declaring to support only support 500 kph does not need to test long sequences.
  + Option 3 (Samsung, ): No application rule for PRACH, If BS declares 500km/h, it should use PRACH format A2/B4/C2 to test. As for which format is used to test, it can be declared with BS.
  + Option 4 (Ericsson, ): Use separate sections for long format and short format HST PRACH, then BS can choose any one of them according to its declaration no matter it supports 500km/h or not.
  + Option 5 (CMCC, ): Define requirements with short format for 350km/h. Test apply based on declaration of supported PRACH formats.
  + Option 6 (DoCoMo, ): Any PRACH formats can be used for HST (350km/h and 500km/h) from 0/A2/B4/C2. According to the declaration on supported PRACH formats and supported velocity (350 or 500km/h), required tests will be selected
* 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:* |
| Nokia, Nokia Shanghai Bell | 1-1-1: Agree with WF. Limit to macro BS. HST does only make sense for macro.  1-2-1: Remain with previous proposal as captured in option 1. Will allow BS vendors to easily certify products that are optimised for certain use cases (350 or 500 kph max trains).  1-2-2: Remain with previous proposal as captured in option 1. Will allow BS vendors to easily certify products that are optimised for certain use cases (350 or 500 kph max trains).  1-2-3: Remain with previous proposal as captured in option 1. For example, a BS declaring support for 500kph would still need to test the long sequences at 350kph, making sure that higher speed does not mean lack of lower speed features.  1-2-4: In alignment with Issue 1-2-3 (“no true subset”), it is our opinion that a BS declaring to only support 350 kph does not need to test short sequences. No such requirements need to be introduced. |
| Samsung | Sub topic 1-1:  Issue 1-1-1: Limit the applicability of high speed demodulation requirements with respect to BS types  Prefer option 1: Requirements shall only be applied to Wide Area Base Stations  Follow LTE approach, the 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:  Issue 1-2-1: Organisation of high speed train requirement sections in specifications  Prefer option 2: Do not make a section difference between 350 kph and 500 kph  Follow LTE approach, separate requirement table within the same section for HST is preferred.  Issue 1-2-2: High speed support declaration  Prefer option 1  Issue 1-2-3: High speed implicit test pass  Prefer option 2: The test case can be declared with BS, no implicit test [Moderator: The reasoning given here for choosing option 2 is not in line with my intention when writing option 2. I have created option 3 to capture your comment. Please check if this is acceptable.]  Issue 1-2-4: High speed support declaration interplay with previous applicability rules and test coverage  Prefer no application rule for PRACH, If BS declares 500km/h, it should use PRACH format A2/B4/C2 to test. As for which format is used to test, it can be declared with BS. |
| Ericsson | Issue 1-1-1: We prefer option 3.  Issue 1-2-1: We support option 1  Issue 1-2-2: We support option 1  Issue 1-2-3: We generally support option 1; in any for these issues about 350/500 though apart from splitting the sections it is not critical to agree this meeting as we only introduce 350km/h for now.  Issue 1-2-4: We suggest using a separate section for requirements of HST PRACH because different BS declarations may need different requirements. Taking HST PRACH as an example, if we use separate sections for long format and short format, then BS can choose any one of them according to its declaration no matter it supports 500km/h or not.  We also suggest meeting to think about the two BS declarations on speed or PRACH (or both). Since mandatory combine speed and PRACH might meet difficulties in the future, for example long format would not implement.   * Declare on speed  |  |  |  |  | | --- | --- | --- | --- | | Speed capability | A  350 | B  500 | C  350/500 | | Test long 350 | √ |  |  | | Test short 500 |  | √ | √ |  * Declare on PRACH  |  |  |  |  | | --- | --- | --- | --- | | Format capability | A  long | B  short | C  Long and short | | Test long 350 | √ |  | √ | | Test short 500 |  | √ | √ | |
| Huawei, HiSilicon | Issue 1-1-1: We prefer Option 1. Requirements shall only be applied to Wide Area Base Stations.  Issue 1-2-1: Option 1 is fine for us. Actually splitting the requirements and tests for 350 kph and 500 kph in separate sections or separate tables both are ok for us..  Issue 1-2-2: We view is that BS just needs to pass either 350km/h or 500km/h related requirements as per BS declaration. UE passing 500km/h requirements does not need to additionally pass the 350km/h requirements.  Issue 1-2-3: As per the comments from Nokia, Samsung and Ericsson, we think that company has different understanding for Option 1 and Option 2, we need to make the option more clear. Our understanding about Option 1: 350km/h and 500km/h should have the same test configurations except the Max Doppler shift, in such configuration, BS only needs to pass either 350km/h or 500km/h related requirements as per BS declaration.  Issue 1-2-4: We should respect the agreement reached before, i.e.:   * For 350km/h velocity, use PRACH format 0 * For 500km/h velocity, use PRACH format A2/B4/C2   + For 500km/h velocity, no extra requirements for PRACH format 0   It clear that no extra performance requirements for format 0 for 500km/h.  For BS declared to support 350km/h only, it only needs to pass the requirements for PRACH format 0. For BS declared to support 500km/h, it only needs to pass the requirements for PRACH format A2/B4/C2, RAN4 cannot constrain BS supporting 500km/h with short sequence to additionally support long sequence format 0 just to support lower speed 350km/h. |
| CMCC | Issue 1-2-1: key point is to split the requirements for 350km/h and 500km/h, as for in the separate section or in the separate table, we do not have strong opinion.  Issue 1-2-4: we prefer to define requirements with short format for 350km/h.  If BS declares it only supports 350km/h，which PRACH requirement tests shall apply can be based on its declaration on which PRACH formats (short and/or long format) are supported. |
| ZTE | Issue 1-1-1: The recommended WF is OK for us.  Issue 1-2-1: For the sake of readability, it would be more convenient to keep them in the same section, since the same table format could be applied for 350km/h and 500 km/h .  Issue 1-2-2: Ok with option 1  Issue 1-2-3: If BS just declares support of only one velocity, either 350km/h or 500km/h, then the tests just follow its declaration without any issue. The issue comes from the case when BS declares to support both of the velocities, then we need to check one by one if each test item meets the condition of option 1. Make decisions after checking.  Issue 1-2-4: Just follow the declaration, no need to introduce short sequence for the lower velocity. |
| NTT DOCOMO | Issue 1-1-1: We prefer Option2 and propose the same applicability on BS class as LTE.  According to TS36.104, HST requirements (PUSCH HST, PRACH restricted set type A/B, PUSCH UL TA ) can be applied to Wide Area BS and Medium Range BS.  This requirement shall not be applied to Local Area BS and Home BS.  Therefore, we propose that "Requirements shall only be applied to Wide Area Base Stations and Medium Range Base Stations".  Issue 1-2-1: We prefer to follow LTE approach. (i.e., Option 3)  Issue 1-2-2: We are OK with Option 1, but test applicability rule needs to be discussed in Issue 1-2-3 and Issue 2-3-1 when 500km/h support is declared.  Issue 1-2-3: At first, we need to clarify whether this assumption (passing 500kph also covers the 350kph conformance) can be applied or not. [Moderator: I have understood this comment to mean clarification from a technical point of view. Please check if option 5 is capturing your proposal correctly.]  Issue 1-2-4: BS vendor can declare which PRACH formats are supported. Any PRACH formats can be used for HST (350km/h and 500km/h) from 0/A2/B4/C2. According to the declaration on supported PRACH formats and supported velocity (350 or 500km/h), required tests will be selected. |
| Intel | **Issue 1-1-1: Limit the applicability of high speed demodulation requirements with respect to BS types**  In general case we agree with option 1 to limit requirement applicability to some BS types. Same time we would like to ask companies provide details why we should exclude Medium range BS which can be applicable for tunnel environment based on BS type description and already agreed deployment parameters for tunnel scenario.  **Issue 1-2-2: High speed support declaration**  Support option 1.  **Issue 1-2-3: High speed implicit test pass**  Agree with option 1. Performance degradation will not be observed for same scenario and configuration if only max Doppler frequency is changed. This approach will reduce overall test time. Same time for test cases with different configuration implicit test pass should not be applicable. |

### 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** |
| No CRs | N/A |
|  |
|  |

## 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:* |
| Sub-topic 1-1 High speed BS demodulation requirement applicability with respect to BS types | *Tentative agreements:*  None  *Candidate options:*   * Limit the applicability of high-speed demodulation requirements with respect to BS types   + Option 1: PUSCH HST, PRACH HST, PUSCH UL TA requirements shall only be applied to Wide Area Base Stations.   + Option 2: PUSCH HST, PRACH HST, PUSCH UL TA requirements shall only be applied to Wide Area Base Stations and Medium Range Base Stations.   *Recommendations for 2nd round:*  BS type should be further discussed by email during round 2. Quick alignment is expected. Proposed WF: Option 2. |
| Sub-topic 1-2 High speed BS demodulation requirement applicability with respect to speed | *Tentative agreements:*  None  *Candidate options:*   * Organisation of high-speed train requirement sections (HST PUSCH, HST PRACH) in specifications   + Option 1: Split requirements and tests for 350 kph and 500 kph in separate sections, that are separate from non-HST sections.   + Option 2: Separate requirement tables, for 350 kph and 500 kph, within the same HST section, which is different from the non-HST section.   + Option 3: Separate requirement tables, for 350 kph and 500 kph, within the current non-HST section.   + Option 3: Option 1 for HST PUSCH and Option 2 for HST PRACH.   + Option 4: Option 1 for HST PUSCH and Option 3 for HST PRACH. * High speed support declaration (HST PUSCH, HST PRACH, PUSCH UL TA)   + Option 1: Allow BS to declare support for either 350kph, or 500kph, or both, and to test requirements accordingly.   + Option 2: Allow BS to declare support for either 350kph, or 500kph, and to test requirements accordingly. * High speed implicit test pass   + Option 1: 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 3: No implicit test passing. Test cases pertaining to declared speed need to be passed.   + Option 4: 350km/h and 500km/h should have the same test configurations except the Max Doppler shift, in such configuration, BS only needs to pass either 350km/h or 500km/h related requirements as per BS declaration.   + Option 5: Clarify by study whether passing 500kph also covers passing the 350kph conformance applies or not from a technical perspective. * High speed support declaration interaction with previous applicability rules and test coverage.   + Background: 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?   + Option 1: A BS declaring to only support 350 kph does not need to test short sequences. A BS declaring to only support 500 kph does not need to test long sequences.   + Option 2: Use separate sections for long format and short format HST PRACH, then BS can choose any one of them according to its declaration no matter it supports 500km/h or not.   + Option 3: Any PRACH formats can be used for HST (350km/h and 500km/h) from 0/A2/B4/C2. According to the declaration on supported PRACH formats and supported velocity (350 or 500km/h), required tests will be selected. Define additional requirements with short format for 350km/h.   *Recommendations for 2nd round:*  The topic “High speed implicit test pass” is of lower priority and discussion should be deferred to next meeting or if time permits at the end. Companies are encouraged to study the impact on performance requirements of the different options.  All other candidate options should be further discussed by email during round 2.   * High speed support declaration (HST PUSCH, HST PRACH, PUSCH UL TA) Is expected to be quickly aligned.  Proposed WF: option 2. * High speed support declaration interaction with previous applicability rules and test coverage. Is of high priority, since it impacts simulation delivery for next meeting. * Organisation of high-speed train requirement sections (HST PUSCH, HST PRACH) in specifications. Is of highest priority, since it impacts CR writing for this meeting. |
| Sub-topic 1-3 (NEW) Relationship between TDD and FDD requirements | *Tentative agreements:*  None  *Candidate options:*   * (New) Relationship between TDD and FDD requirements   + Option 1: Same requirements applicable for FDD and TDD; only one case simulated for result delivery. Parameter tables show SRS mapping for FDD and TDD separately.   + Option 2: Both FDD and TDD simulated. Decision of same requirements or different requirements applicable for FDD and TDD taken after simulation. Parameter tables show SRS mapping for FDD and TDD separately.   *Recommendations for 2nd round:*  Second round to clarify the relationship between TDD and FDD requirements and simulations. |

*Recommendations on WF/LS assignment*

|  |  |  |
| --- | --- | --- |
|  | **WF/LS t-doc Title** | **Assigned Company,**  **WF or LS lead** |
| #1 | WF on Rel-16 NR HST BS demodulation requirements | Nokia, Nokia Shanghai Bell |

### 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”* |
|  | N/A |

## Discussion on 2nd round (if applicable)

**Issue 1.5.1 Limit the applicability of high-speed demodulation requirements with respect to BS types**

* Option 1: PUSCH HST, PRACH HST, PUSCH UL TA requirements shall only be applied to Wide Area Base Stations.
* Option 2 (all commenting companies): PUSCH HST, PRACH HST, PUSCH UL TA requirements shall only be applied to Wide Area Base Stations and Medium Range Base Stations.

Tentative Agreement: PUSCH HST, PRACH HST, PUSCH UL TA requirements shall only be applied to Wide Area Base Stations and Medium Range Base Stations.

Comments: *[Chronological order]*

*[Company A:]*

*[Company B:]*

*[Moderator:]*

*[Company B:]*

Moderator: Option 2 seems like an agreeable way forward.

Nokia: Agree with option 2. Wide area and medium range BSs are used for trains.

NTT DOCOMO: We agree with Option 2 since this is the same approach as LTE.

Ericsson: Agree with option 2.

Huawei: Agree with Option 2.

Samsung: we are fine with option 2, following LTE approach

ZTE: Agree with option 2.

Moderator: Provided tentative agreement, as per above consensus.CMCC: Option2

**Issue 1.5.2 Organisation of high-speed train requirement sections (HST PUSCH, HST PRACH) in specifications**

* Option 1 (Nokia, Ericsson): Split requirements and tests for 350 kph and 500 kph in separate sections, that are separate from non-HST sections.
* Option 2 (Ericsson): Separate requirement tables, for 350 kph and 500 kph, within the same HST section, which is different from the non-HST section.
* Option 3: Separate requirement tables, for 350 kph and 500 kph, within the current non-HST section.
* Option 4: Option 1 for HST PUSCH and Option 2 for HST PRACH.
* Option 5: Option 1 for HST PUSCH and Option 3 for HST PRACH.
* Option 6 (DoCoMo, ZTE, Samsung):   
   HST PUSCH:   
   Current section for non-HST (no change)  
   New section for HST  
   One new table for 350 and 500kph  
   HST PRACH  
   Current section for non-HST  
   New table long format restricted set type A (currently 350kph only)  
   New table long format restricted set type B (currently 350kph only)  
   Re-use tables short format and add high speed requirements (currently 500kph only).
* Option 7 (Huawei): Option 2 for HST PUSCH and Option 3 for HST PRACH.  
  I.e., Split requirements and tests for HST PUSCH in separate section from non-HST, then create separate tables for HST PUSCH for 350kph and 500kph under such HST section. Option 3 for HST PRACH.

Proposed WF:

HST PUSCH:   
 Current section for non-HST   
 No change  
 New section for HST  
 One new table for 350 and 500kph  
 HST PRACH  
 Current section for non-HST  
 New table long format restricted set type A (currently 350kph only)  
 New table long format restricted set type B (currently 350kph only)  
 New tables (per SCS) short format high speed requirements (currently 500kph only).

Comments: *[Chronological order]*

Nokia: We see it most useful to split requirements and tests for 350 kph and 500 kph in separate sections. Where the 350kph section is also distinct from the non-HST sections. This allows for easy inclusion of 500kph requirements in the next months and understandable applicability rules.  
This is proposed for both HST PUSCH and HST PRACH. LTE had diverging methods for PUSCH and PRACH (and no distinction between 350 and 500). This bad example should not be followed in NR.

NTT DOCOMO: Basically, we prefer the same approach as LTE. For PUSCH, HST section should be separated from non-HST section, and the requirements for 500km/h should be into the same table as for 350km/h. For PRACH long format, we can add new tables for restricted set type A and B in the same section as non-HST PRACH. For PRACH short format, we can add new test cases for HST into the same tables as non-HST PRACH short format since new BB implementation for HST is not needed for HST PRACH short format support.

Ericsson: We also think that separate sections would be clearer for readers and higher compatibility for future potential requirements introduction. So we prefer separate sections for 350km/h and 500km/h for both PUSCH and PRACH, and also compromised to accept different tables for 350km/h and 500km/h but the tables should be distinct from non-HST sections.

Huawei: At least, we think that separate sections or tables should be created for HST that is different from non-HST section. Considering there are so many tables defined for PUSCH non-HST performance requirements, insert one table for PUSCH HST among those table sea, it is hard to quickly find the requirements for HST, so we prefer to create separate section for HST PUSCH, then separate tables for 350kph and 500kph under such separate section. Compared to HST PUSCH, there are few tables, 3 tables, for PRACH, if separate section is created, except the requirements, all other sub-sections will be duplicated, and maybe it is so necessary to create separate section for HST PRACH from non-HST PRACH, i.e. we propose:

* Option 6: Split requirements and tests for HST PUSCH in separate section from non-HST, then create separate tables for HST PUSCH for 350kph and 500kph under such HST section. Option 3 for HST PRACH.

Samsung: Prefer option 2, Similar with NTT DOCOMO. My understanding both 350Khz and 500Khz, are belong to HST scenario, only different is the maximum Doppler. For other test parameters, there are same, I do not think it is necessary to separate two requirement with different section,, such as title, , PUSCH with HST under 350km.h and PUSCH with HST under 500km/h. In LTE, we also the requirement of 350km/h and 500km/h for HST, the requirement is within the same table. Therefore, we prefer to follow LTE approach. Considering it is easy to maintain the spec, separate requirements table is prefer. With test for 350km and 500km, the test application rule can added.

Regarding HST PRACH, separate requirement tables. Similar with LTE, to define high speed mode with restricted set type A and high speed mode with restricted type B for short sequence , while for long sequence format, add new row in previous table is fine.

[Moderator: I assume short and long sequence got mixed up in the last paragraph? I interpreted as:  
Similar with LTE, to define high speed mode with restricted set type A and high speed mode with restricted type B for **long** sequence , while for **short** sequence format, add new row in previous table is fine.]

ZTE: It is straightforward that HST and non-HST should be in different sections, even for the sake of readability in addition to their different requirements by nature. And 350km/h and 500km/h are just a matter of different velocities within HST section, where both cases can share the same tables for PUSCH. And for PRACH, separate tables for different preamble formats within the same sub-section are suitable.

Moderator: Added a compromise proposal as possible WF. It builds on Option 6 (DCM, ZTE, Samsung), but has separate high speed tables in PRACH, as requested by HW and Eri.  
The moderator used the old agreement that long PRACH only has 350kph requirements and short PRACH only has 500kph requirements. This is proposed to be changed in this meeting and agreement would cause reconsideration here on splitting (or not) the tables into 350/500.

**Issue 1.5.3 High speed support declaration (HST PUSCH, HST PRACH, PUSCH UL TA)**

* Option 1 (Nokia, Ericsson, ZTE): Allow BS to declare support for either 350kph, or 500kph, or both, and to test requirements accordingly.
* Option 2a : Allow BS to declare support for either 350kph, or 500kph, and to test requirements separately.

Moderator remark: The edit by Huawei to change “separately” to “accordingly” was rejected, as it would have made Option2a and Option2b identical and concerns options not supported by Huawei.

* Option 2b (Samsung, DoCoMo): Allow BS to declare support for either 350kph, or 500kph, and to test requirements accordingly. 500kph declaration requires to test both 350kph and 500kph.
* Option 3 (DoCoMo): Additionally, allow BS to declare support for either restricted set A, or restricted set B, or both, and to test requirements accordingly.
* Option 4: (Huawei)
  + HST PUSCH:
    - BS only need to test requirements defined for 350kph with BS declaration supporting of 350kph
    - BS only need to test requirements defined for 500kph with BS declaration supporting of 500kph,if a BS passing requirements for 500kph means BS can also pass requirements for 350kph
  + HST PRACH:
    - BS only need to test requirements defined for 350kph with long sequence with BS declaration supporting of 350kph
    - BS only need to test requirements defined for 500kph with short sequence with BS declaration supporting of 500kph

Agreement:

Proposed WF: Proponents of option 2a/b, please recheck issue 1.5.5 and then restate preferences.

Comments: *[Chronological order]*

Moderator: Option 1 seems like an agreeable way forward.

Nokia: Agree with option 1. It captures our understanding of the possibilities to declare.

NTT DOCOMO: For HST PUSCH and PUSCH UL TA, we agree with Option 1. For PRACH long format, should allow BS to declare support for either no restricted set, or restricted set type A, or restricted set type B, or both. For PRACH short format, we need no new declarations and can reuse existing declarations.

Ericsson: We agree with option 1.

Huawei: We prefer Option 2. i.e. Allow BS to declare support for either 350kph, or 500kph, and to test requirements accordingly. It is almost no difference on BS processing procedure between 350km/h and 500km/h but supporting of 500km/h is a higher requirements on Doppler comparing to that of 350km/h. BS declaring support 500km/h means BS support both 500km/h and 350km/h.

Nokia: CMCC has provided an example in Issue 1.5.5, where the “350kph is a true subset of 500kph requirements” understanding of Huawei’s comment is violated.   
In the presented way, declaring 500kph would force implementation of restricted set long PRACH formats, even though 500kph requirements are only defined for short formats.

Samsung: My understanding if BS can support 500kph, then both 350km/h and 500km/h should be support. For test with BS declared supported 500km/h, this BS only need to test 500km/h, does not need to test both 350km/h and 500km/h. Similar approach for LTE Rel-16 is used. Then, if my understanding correctly, option 2 is preferred

Nokia: Same comment as for Huawei above. The “350kph is a true subset of 500kph requirements” understanding is not correct as exemplified by CMCC in Issue 1.5.5.  
Copying the LTE approach does not have the same result in NR.

ZTE: Agree with option 1.

NTT DOCOMO: Comparing between Option 2a and 2b, we prefer Option 2b for PUSCH HST. For PRACH, we don’t need declaration on supported velocity.

Huawei: For Option 1, we try to understand the declaration of “both”, it is very confusing, a BS supporting 500kph should declare to support 500kph or both? “both” means that BS needs to test performance requirements for both 350kph and 500kph? If company has common understanding, we think that Option 1 and Option 2a try to express the same meaning? Also PRACH is discussed in Issue 1.5.5 and the options are clear, why is it discussed in Issue 1.5.3 again?

- Option 2b: from our understanding that BS declared to support either 350kph, or 500kph should not be mandated to test both 350kph and 500kph.

- It is used to declare the supported HST velocity, what is the relationship of Option 3 with HST velocity. A BS supporting 500kph and short PRACH sequence should not be mandated to support either restricted set A or restricted set B or both to support 350kph. As if it means that BS is mandate to declare either restricted set A, or restricted set B, or both.

- It is better to discuss this for HST PUSCH and HST PRACH separately. Maybe we can delay discussion for PUSCH UL TA considering only scenario will be introduced.

**Issue 1.5.4 High speed implicit test pass**

* Option 1: 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 3: No implicit test passing. Test cases pertaining to declared speed need to be passed.
* Option 4 (Huawei, Samsung): 350km/h and 500km/h should have the same test configurations except the Max Doppler shift, in such configuration, BS only needs to pass either 350km/h or 500km/h related requirements as per BS declaration.
* Option 5: Clarify by study whether passing 500kph also covers passing the 350kph conformance applies or not from a technical perspective.

Proposed WF: Discuss in next meeting.

Comments: *[Chronological order]*

[Moderator comment: The topic “High speed implicit test pass” is of lower priority and discussion should be deferred to next meeting or if time permits at the end. Companies are encouraged to study the impact on performance requirements of the different options.]

NTT DOCOMO: We would like to follow moderator suggestion. We can discuss this issue in next meeting.

Ericsson: We also agree with moderator’s suggestion.

Huawei: We prefer Option 4. Same views as Issue 1.5.3. It is almost no difference on BS processing procedure between 350km/h and 500km/h but supporting of 500km/h is a higher requirements on Doppler comparing to that of 350km/h. It means that passing 500kph also covers passing the 350kph conformance applies.

Samsung: Samsung prefer option 4

ZTE: It is also fine with us to follow the moderator’s suggeston.

Huawei: Our preference on Option 4 is applicable for HST PUSCH only.

**Issue 1.5.5 High speed support declaration interaction with previous applicability rules and test coverage.**

* Background: 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?
* Option 1 (Nokia, Huawei, Samsung, ZTE): A BS declaring to only support 350 kph does not need to test short sequences. A BS declaring to only support 500 kph does not need to test long sequences.
* Option 2: Use separate sections for long format and short format HST PRACH, then BS can choose any one of them according to its declaration no matter it supports 500km/h or not.
* Option 3 (DoCoMo): Any PRACH formats can be used for HST (350km/h and 500km/h) from 0/A2/B4/C2. According to the declaration on supported PRACH formats and supported velocity (350 or 500km/h), required tests will be selected.  
  ~~Define additional requirements with short format for 350km/h.~~
* Option 4 (CMCC): A BS declaring to only support 350 kph does not need to test short sequences. A BS declaring to support 500 kph needs to test short and long sequences.

Proposed WF: A BS declaring to only support 350 kph does not need to test short sequences. A BS declaring to only support 500 kph does not need to test long sequences (option 1.)

Comments: *[Chronological order]*

Nokia: We should not go back on previous agreements at this point, i.e., 350 kph remains to only be tested with long PRACH sequences, and 500 kph remains to only be tested with short PRACH sequences.  
Following our understanding of what is declarable to be supported (350, 500, 300&500) and PRACH formats (e.g., 141-2; D.103; PRACH format and SCS; format: 0, A1, A2, A3, B4, C0, C2), it is our opinion and understanding that:  
 a) A BS that wants to support 500kph, needs to support at least one of the short formats that have requirements for 500 kph.  
 b) Long sequences are not tested in 500kph compliance, albeit the understanding from the last meeting still holds (PRACH format 0 with 2334Hz also shows UE with 500km/h at 1.9GHz can be supported).

NTT DOCOMO: In our understanding, if a BS supports 15kHz SCS and 500km/h, the BS shall comply HST requirement with 1740Hz maximum Doppler shift. It means that there is a use case to use PRACH format 0 with restricted set type B, which supports up to 2334Hz frequency shift. If Option 1 is adopted, BS cannot declare to support 15kHz SCS and 500km/h for PUSCH and PRACH format 0 with restricted set type B. In addition, a BS supporting 500km/h and 15kHz SCS but not 500km/h and 30kHz SCS does not have to support PRACH short sequence, can support PRACH long sequence. Such BS can support PRACH format 0 with restricted set type B.

In order to avoid such limitation, we prefer Option 3. Otherwise, we could not use format 0 for 500km/h scenario.

Nokia: It was agreed in R4-1915871 that “no extra requirements for PRACH format 0” are introduced for 500km/h:

PRACH format

* For 500km/h velocity, use PRACH format A2/B4/C2
* For 500km/h velocity, no extra requirements for PRACH format 0
  + Common understanding: PRACH format 0 with 2334Hz also shows UE with 500km/h at 1.9GHz can be supported

We should not go back on our previous agreements.  
Furthermore, not having a format 0 requirement for 500km/h does not mean that it cannot be used.  
Also we have specifically captured the common understanding in the last meeting, that testing format 0 at 350kph and high center frequency, is exactly the same as format 0 at 500kph with lower catern frequency.

Huawei: We prefer Option 1. We have the similar view as Nokia: keep the previous agreement, i.e. 350 kph remains to only be tested with long PRACH sequences, and 500 kph remains to only be tested with short PRACH sequences. E.g. the short PRACH sequence can be used to support both 350kph and 500kph, a BS supporting short PRACH sequence should not be mandated to support long PRACH sequence just to support 350kph.

Nokia: Please reconsider what the agreement to option 1 here means for issue 1.5.3.

Samsung: We prefer option1, meanwhile, no additional requirements with short format for 350km/h

Nokia: Please reconsider what the agreement to option 1 here means for issue 1.5.3.

ZTE: We prefer to make things simple by treating 350km/h and 500km/h as two independent declarations, instead of coupling them somehow. That means, if BS declares to support 350km/h, then the BS needs to pass 350km/h related tests, and so does for 500km/h declaration. Of course, if both of them are declared, it means both tests should be passed, but there is no connection between 350km/h declaration and 500km/h tests, or the other way around.

CMCC: We would like to clarify our consideration. For 350km/h, in addition to format 0, it is suggested to define requirements for short format with frequency error based on 350km/h. For 500km/h, we are OK to define requirements only for short format. It is our understanding:

* If BS declares it only supports 350km/h, which PRACH requirement tests shall apply can be based on its declaration on which PRACH formats (short and/or long format) are supported.
* If BS declares it supports 500km/h which PRACH requirement tests shall apply can be based on its declaration on which PRACH formats (short format) are supported.

NTT DOCOMO: Regarding proposed WF, we would like to understand the correct intention. Is it allowed to use PRACH short format for 350km/h velocity and PRACH long format for 500km/h velocity (cases highlighted in yellow). We believe these cases can be allowed (NOTE: a BS can support only 15kHz SCS). Therefore, PUSCH and PRACH declarations need to be separated.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| PUSCH SCS | Velocity | Maximum Doppler shift for PUSCH HST | PRACH format | Restricted set type | Maximum frequency offset for PRACH | Applicability |
| 15kHz | 350km/h | 1340Hz | Short | - | 3334Hz | Yes |
| Long | A | 1340Hz | Yes |
| B | 1944Hz | Yes |
| 500km/h | 1740Hz | Short | - | 3334Hz | Yes |
| Long | A | 1340Hz | No |
| B | 1944Hz | Yes |
| 30kHz | 350km/h | 2334Hz | Short | - | 3334Hz | Yes |
| Long | A | 1340Hz | No |
| B | 1944Hz | No |
| 500km/h | 3334Hz | Short | - | 3334Hz | Yes |
| Long | A | 1340Hz | No |
| B | 1944Hz | No |

Moderator: What does DCM mean by “allowed”? In option 1 it is not required to test those cases to achieve compliance with specification.   
In the table above, 350kph is equated to a maximum Doppler of 3334Hz for PRACH. Please check that this is in line with previous agreements.

NTT DOCOMO: To moderator. We know the previous agreement. First of all, we did not propose to define additional requirements with short format for 350km/h since the same short format requirement can be applied for 350km/h and 500km/h (Note: I remove the sentence from Option 3).

We couldn’t understand why you need to declare “supported velocity” for PRACH requirements, so we have a question for clarification:

Which PRACH requirements will be applied for a BS declaring to support only 15kHz SCS, 350km/h HST, PRACH short format? In our understanding, PRACH requirement for short format will be applied in this case. However, according to Option 1, a BS declaring to only support 350 km/h does not need to test short sequences. We couldn’t understand why we don’t need to test PRACH short format for 350km/h scenario. (PRACH long format for 500km/h scenario is the same discussion). PRACH format to be tested should be selected according to supported PRACH format declaration.

**Issue 1.5.6 (New) Relationship between TDD and FDD requirements**

* Option 1 (Nokia, Huawei, Samsung, ZTE): Same requirements applicable for FDD and TDD; only one case simulated for result delivery.  
  Parameter tables show SRS mapping for FDD and TDD separately.
* Option 2: Both FDD and TDD simulated. Decision of same requirements or different requirements applicable for FDD and TDD taken after simulation.  
  Parameter tables show SRS mapping for FDD and TDD separately.
* Option 3 (Ericsson, Huawei, ZTE): FFS for next meeting.

Proposed WF: FFS for next meeting.

Comments: *[Chronological order]*

Nokia: It might be possible to agree to option 1 directly in this meeting, to match the agreements from R15 non-HST minimum performance requirements. We would also be fine with “FFS until next meeting”.

Ericsson: We need more check about this, so prefer “FFS until next meeting”.

Huawei: The only difference between Option 1 and Option 2 is to simulate one case or all cases, from the experience for R15 normal PUSCH performance requirements, one set of requirements are defined for both FDD and TDD. We do not think that there are any difference between HST PUSCH and non-HST PUSCH. If company has concern to follow the normal PUSCH methodology to use the same requirements for FDD and TDD, further evaluations can be conducted. We are fine to make decision based on the evaluations from companies for next meeting.

Samsung: Option 1. Same requirements applicable for FDD and TDD. Follow the LTE and NR approach. With targeting SNR point with 70% TP, there is no different

ZTE: Option 1 seems agreeable, but we are also ok to leave it to next meeting.

## 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”* |
| R4-2002405 | Agreeable. WF on Rel-16 NR HST BS demodulation requirements |
| R4-2002417 | Not available. Mark as “not pursued”. Title: Summary of ideal and impairment results for NR HST demodulation requirements |

# 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

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| *R4-20xxxxx* | *Company A* | *Proposal 1:*  *Observation 1:* |
| R4-2000306 | Samsung | Antenna configuration  Proposal 1: Only define HST requirement with 1x2 antenna configuration for tunnel scenario.  Test parameters  Proposal 2: The Slots in which PUSCH is transmitted is proposed as follow   |  |  | | --- | --- | | Slots in which PUSCH is transmitted | 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 |   PUSCH mapping type A  Observation 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.  MCS  Proposal 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 symbol  Proposal 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 configuration  Proposal 1: To introduce both 1x1 and 1x2 antenna configuration for the tunnel scenario.  MCS  Proposal 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 configuration  Proposal 1: Introduce conducted PUSCH requirements with 1x1 antenna configuration for HST.  Applicability  Proposal 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 A  Observation 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 configuration  Proposal 2: Do not consider antenna configuration 1x1 for tunnel scenario.  MCS  Observation 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 1T1R  Observation 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 MCS  Observation 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 alignment  Observation 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 patterns  Proposal 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
  + Option 3 (Ericsson, ): Introduce 1T1R requirements for the tunnel scenario, and limit tests to not cover OTA.
  + Option 4 (ZTE, ): The condition to introduce 1T1R requirements for tunnel scenario is that there are operators having such deployments, otherwise, we don’t see the point.
* 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, Ericsson, ZTE, DoCoMo, ): Re-use the 1T2R requirement configuration.
  + Option 2 (Samsung, ): No 1T1R requirement.
* 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, ZTE, DoCoMo ): Same test setup for 1T1R as already specified TS 38.141-2, with a test procedure that includes polarization alignment.
  + Option 2 (Ericsson, Samsung, ): No OTA testing, hence no polarization alignment required.
* 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, Huawei, ):

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#18 in radio frames

* + Option 2 (Nokia, Ericsson, ZTE, ): 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

* + Option 3 (Ericsson, ): Only capture to use TDD pattern according to the previous agreement.
* 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, Huawei, ): Define the HST requirement with PUSCH mapping type A under L0=3.
  + Option 2 (Huawei, Nokia, Ericsson, ZTE, ): Allow to freely choose either l0=2 or l0=3 to align simulation results and deliver performance requirements.
  + Option 3 (CATT, ZTE, ): 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.
  + Option 4 (Nokia, ): 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.
* Recommended WF

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

* Proposals
  + Option 1 (Samsung, Nokia, CATT, Huawei, Ericsson, ZTE, DoCoMo, ): 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.
  + Option 2 (Ericsson, ZTE, ): No need to discuss in this meeting.
* Recommended WF
  + 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. Companies are encourages to discuss this in the next meeting.

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| CATT | Issue 2-1-1: 1x1 antenna configuration has the deployment scenario in practical tunnel scenario proposed by operator. If only 2Rx requirement will be defined, 1Rx performance cannot be guaranteed. For the conducted test for 1x1 antenna configuration, the SNR value of demodulation can be acceptable based on the simulation results.  Issue 2-2-2: We support option 2 based on our simulation results.  Issue 2-2-3: The performance difference for MCS16 is minor between the tunnel and open space scenarios. So MCS16 should be also supported in the tunnel scenario with 500km/h.  Sub topic 2-1:  Sub topic 2-2:  ….  Others: |
| Nokia, Nokia Shanghai Bell | 2-1-1: Remain with previous proposal as captured in option 1. 1T1R is an operator requested use case and technical implementation is straightforward; only OTA test setup needs to be minorly adapted and could also be foregone completely.  2-1-2: Wait for progress on Issue 2-1-1.  2-1-3: Wait for progress on Issue 2-1-1.  2-2-1: Remain with previous proposal as captured in option 2. Reduces testing time and allows to see the impact of optimisations that require more frequent PUSCH slots.  Update 2020-02-26 on 2-2-1: Not necessary to achieve alignment this meeting, since simulations are not bound by test effort and can use any of the proposed options. But we agree with Ericsson in asking, why this only a testing effort issue in HST. For normal mode PUSCH, the conformance testing was fine with the chosen TDD patterns.  @Ericsson: It is our understanding that a BS needs to be tested in both FDD and TDD operation mode (if declared to support both).  2-2-2: Agree with WF. 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. Most companies agree that l0=2 and l0=3 has negligible performance difference, thus this freedom has no practical implications. |
| Samsung | Sub topic 2-1:  Issue 2-1-1: Introduce 1T1R requirements for the tunnel scenario  Prefer option 2: No 1T1R requirements for the tunnel scenario  In LTE, the 1x1 antenna configuration for tunnel scenario is chosen with the realistic operation, reusing the deployment for W-CDMA BS. In LTE Rel-8, the typical antenna configuration is uniform linear antenna array (ULA ) structure with one polarization, due to the number of antenna is limited to 4, the antenna size is acceptable.  In terms of testing, LTE can support conducted test, it is easy to connect with one antenna (polarization) for testing. While for NR, excepting for conducted test for BS type 1-C, OTA testing is supported for BS type 1-O. In case of OTA testing, the different polarization of test antennas may result in performance different with certain isolation  As indicated in eAAS spec, only 2RX BS performance requirements apply when OTA AAS BS supports and is tested with dual polarization. Dual polarization antenna structure should be the typical deployment in NR and also in LTE with considering antenna size and polarization diversity.  With considering the test effort and realistic operation, we prefer to only define the HST requirement with 1x2 antenna configuration for tunnel scenario  Issue 2-1-2: 1T1R requirement configuration  Prefer : No 1T1R requirements for the tunnel scenario  Issue 2-1-3: 1T1R test setup and procedure  Prefer : No 1T1R requirements for the tunnel scenario  Sub topic 2-2:  Issue 2-2-1: Slot allocation for PUSCH transmission in radio frames  Prefer option 1: For TDD with 30KHz, our proposal should be typo with slot#8 and slot#10. It should be slot#8 and slot#18 in one radio frame based on our contribution.  The subframes in which PUSCH is transmitted is related with HARQ process, which can allow a maximum of 4 transmissions. In FDD, the feedback delay is 8ms, and 10ms in TDD with UL-DL configuration 2.  For FDD, the uplink with considering 8 HARQ process, slot 0, slot 8 ,slot 16, slot 24, slot 32 are available for UL  For TDD, current TDD configuration pattern is DDDSUDDDSU for 15KHz SCS and 7D1S2U for 30KHz, considering the 10 HARQ process, slot #5 is available for UL in one radio frame with 15KHz SCS, and slot #8 and slot#18 are available for UL with in each radio frame with 30KHz.  To reduce the test effort, it is not necessary to transmit PUSCH in every available UL slots. Follow the LTE approach.  Ericsson: Wouldn’t the same configuration be applied to other test cases (i.e. normal PUSCH test cases and HST test cases)? Why Samsung need to make a distinction for UL TA?  Issue 2-2-2: L0 for PUSCH mapping type A for both 350 kph and 500 kph  Prefer option 1: Define the HST requirement with PUSCH mapping type A under L0=3  Based on our results, under 1740Hz Frequency offset with 15KHz SCS, L0=3 is better than L0=2. The performance gain is obvious with 1740Hz compare with 3334Hz Frequency offset, since this value is close to frequency estimation range of DMRS tracking ability 1750Hz under 15KHz. DMRS configuration with l0=3 can verify the extremity condition for HST.  Meanwhile, in terms of implementation, with l0=3, it can reduce the delay for process delay with half slot updated Doppler estimation. Also, with l0=3, DMRS 3, 7 and 11 with equal symbol interval can be used for frequency offset estimation with average operation. The estimation performance can be improved with improved accuracy of frequency offset estimation.  In term of both performance and implementation process delay, we do see the benefit of l0=3.  Issue 2-2-3: Addition of MCS 16 in 500kph tunnel scenario  Prefer option 1: MCS2 and MCS16 are feasible for HST with tunnel scenario with 500Km/h |
| Ericsson | Issue 2-1-1: We’re OK for conducted 1T1R requirements if operators see it as important. We do not see the need for OTA (see issue 2-1-3).  Issue 2-1-2: Agree with option 1.  Issue 2-1-3: We don’t think we need OTA requirement for 1T1R. Such a BS would not be an AAS.  Issue 2-2-1: We are OK with TDD pattern in option 2. Should we only consider TDD pattern according to the previous agreement? And for all Rel-15 requirement, only TDD pattern are specified and FDD is considered as the same performance as TDD. If we introduce FDD pattern, do we need to test the same scenario for twice?  Issue 2-2-2: We prefer option 2 since there is no difference between l0=2 and 3, and l0=2 is for all other requirements.  Issue 2-2-3: We are also OK with option1.  Issue 2-3-1: We don’t need to discuss it in this meeting. |
| Huawei, HiSilicon | Issue 2-1-1: We prefer Option 2. RAN 4 has defined 1x2 antenna configuration as it is more practical and popular deployment mode. Since there is only 'single' tap which is belongs to AWGN model, two receive antennas receive same signals, and it is expected that the performance of antenna configuration 1x2 is about 3dB better than that of antenna configuration 1x1. That is to say, performance of antenna configuration 1x1 can be inferred from that of antenna configuration 1x2. So it is enough to define antenna configuration 1x2 and no need to consider antenna configuration 1x1 for tunnel scenario. Also as pointed by company for the dual polarization issue, it is not feasible to test 1x1 OTA test.  Issue 2-2-1: We prefer Option 1. Only test 1 HARQ process of all to reduce test complexity. It is no needed to transmit PUSCH in all available slots.  Issue 2-2-2: We prefer Option 2. Based on our simulation results, there is almost no performance difference between l0=2 and 3 for PUSCH mapping type A, also other companies have the similar observations. In the real testing, it is up to BS choice to use l0=2 or l0=3 for testing, no any limitation should be specified in the specification to use l0=2 or l0=3.  Nokia: We understand the text/reasoning to be clearly in favour of option 2. Is the additional preference for option 1 and accident, or a conscious decision?  To Nokia: We prefer Option 2.  [Moderator note: Comment received after 5pm PST] |
| ZTE | Issue 2-1-1: The condition to introduce 1T1R requirements for tunnel scenario is that there are operators having such deployments, otherwise, we don’t see the point.  Issue 2-1-2: If 1T1R agreed to be introduced, option 1 is ok.  Issue 2-1-3: If 1T1R agreed to be introduced, option 1 is ok.  Issue 2-2-1: We are ok with option 2.  Issue 2-2-2: No significant performance difference observed, so either 2 or 3 is fine.  Issue 2-2-3: Ok with the WF.  Issue 2-3-1: As discussed in previous Topic, more study is needed. |
| NTT DOCOMO | [Moderator: Due to a merging issue on my side, DCM was not able to see the ZTE comments above. Please check, please treat the above ZTE comments as new for DCM.]  Issue 2-1-1: We prefer Option 1 since 1Rx is practical in LTE as well as NR, especially for conducted (i.e., BS type 1-C). In addition, 1T1R requirement is defined for eAAS performance requirements and there are no testability issues for BS type 1-O.  Issue 2-1-2: We support Option 1.  Issue 2-1-3: We support Option 1  Issue 2-2-3: We prefer Option 1.  Issue 2-3-1: PUSCH HST 350kph test omission [Moderator: Comment seems to be missing.] |

### 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 | Ericsson: Scenario name in propagation condition is not aligned with R4-2001691 which is CR for Annex. We think the name used in R4-2001691 is fine. |
| MCC: "CR" in the CR no. should be removed in the Cover sheet. |
|  |
| R4-2001691 | MCC: "CR" in the CR no. should be removed in the Cover sheet. |
|  |
|  |
| 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:* |
| Sub-topic 2-1 Antenna Configuration | *Tentative agreements:*  None  *Candidate options:*   * Introduce 1T1R requirements for the tunnel scenario   + Option 1: Introduce 1T1R requirements for the tunnel scenario.   + Option 2: Do not introduce 1T1R requirements for the tunnel scenario.   + Option 3: Introduce 1T1R requirements for the tunnel scenario, and limit tests to not cover OTA.   + Option 4: The condition to introduce 1T1R requirements for tunnel scenario is that there are operators having such deployments, otherwise, we don’t see the point. * If 1T1R requirement is introduced: 1T1R requirement configuration   + Option 1: Re-use the 1T2R requirement configuration. * If 1T1R requirement is introduced with OTA testing: 1T1R requirement configuration   + Option 1: Same test setup for 1T1R as typically specified in TS 38.141-2, with a test procedure that includes polarization alignment.   *Recommendations for 2nd round:*  Introduction of 1T1R requirements should be further discussed by email during round 2, however failure to agree does neither impact other issues nor impede 1T2R requirement introduction in specification. |
| Sub-topic 2-2 Test parameters for testing PUSCH | *Tentative agreements:*   * Addition of MCS 16 in 500kph tunnel scenario   + Include MCS 16 in 500 kph tunnel scenario.   *Candidate options:*   * Slot allocation for PUSCH transmission in radio frames   + Option 1:   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#18 in radio frames   * + Option 2: 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   * + Option 3: Only capture to use TDD pattern according to the previous WF agreement. * L0 for PUSCH mapping type A for both 350 kph and 500 kph   + Option 1: Define the HST requirement with PUSCH mapping type A under l0=3.   + Option 2: Allow to freely choose either l0=2 or l0=3 to align simulation results and deliver performance requirements.   + Option 3: Define the HST requirement with PUSCH mapping type A under l0=2.   *Recommendations for 2nd round:*  The following issues should be further discussed by email during round 2:   * Slot allocation for PUSCH transmission in radio frames * L0 for PUSCH mapping type A for both 350 kph and 500 kph   The slot allocation is non-critical, since it has no impact on simulation result delivery.  The topic of l0 is blocking simulation delivery for companies that see performance differences between l0=2 and l0=3 and should be discussed with high priority. |
| Sub-topic 2-3 Applicability rules for PUSCH high speed train requirements | *Tentative agreements:*   * PUSCH HST 350kph test omission   + 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. Companies are encouraged to discuss this in the next meeting.   *Recommendations for 2nd round:*  Regard tentative agreements as stable. |

*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”* |
| R4-2001184 | To be revised In case changes from Round 2 issue 1.5.2 need to be captured. |
| R4-2001185 | To be revised In case changes from Round 2 issue 1.5.2 need to be captured. |
| R4-2001690 | To be revised |
| R4-2001691 | To be revised |
| R4-2001802 | To be revised In case changes from Round 2 issue 1.5.2 need to be captured. |
| R4-2001803 | To be revised In case changes from Round 2 issue 1.5.2 need to be captured. |

## Discussion on 2nd round (if applicable)

**Issue 2.5.1 Introduce 1T1R requirements for the tunnel scenario**

* Option 1 (Nokia, DoCoMo, ZTE): Introduce 1T1R requirements for the tunnel scenario.
* Option 2 (Huawei, Samsung): Do not introduce 1T1R requirements for the tunnel scenario.
* Option 3 (Nokia, DoCoMo, ZTE): Introduce 1T1R requirements for the tunnel scenario, and limit tests to not cover OTA.
* Option 4: The condition to introduce 1T1R requirements for tunnel scenario is that there are operators having such deployments, otherwise, we don’t see the point.

Proposed WF: FFS for next meeting.   
Operators that want to deploy NR in 1T1R configuration are encouraged to make themselves known.

Comments: *[Chronological order]*

Nokia: 1T1R is an operator requested use case and technical implementation is straightforward; only OTA test setup needs to be minorly adapted and could also be foregone completely. We can agree with options 1, 3, and 4. Albeit DCM has already announcing in R4-93 that they have such deployments, so options 1 and 4 are the same in our opinion.

NTT DOCOMO: We agree with Option 1, 3. Regarding Option 4, we have such deployment.

Ericsson: We still agree with Option 3 that 1T1R test should not cove OTA.

Huawei: We prefer Option 2. RAN 4 has defined 1x2 antenna configuration as it is more practical and popular deployment mode. Since there is only 'single' tap which is belongs to AWGN model, two receive antennas receive same signals, and it is expected that the performance of antenna configuration 1x2 is about 3dB better than that of antenna configuration 1x1. That is to say, performance of antenna configuration 1x1 can be inferred from that of antenna configuration 1x2. So it is enough to define antenna configuration 1x2 and no need to consider antenna configuration 1x1 for tunnel scenario. Also as pointed by company for the dual polarization issue, it is not feasible to test 1x1 OTA test.

Nokia: It is our understanding that in 2T, the same signal is transmitted over two different polarizations.   
As the polarization have generally different large-scale propagation conditions, and in general any two spatially disoriented antennas have different small-scale propagation conditions, the performance cannot accurately be interpolated with +3dB.   
Furthermore, polarization alignment and management in the RU will cause demodulation performance differences, hence the request to specifically create requirements.

Samsung: option 2. 1T1R requirements is reusing from WCDMA, only can support one polarization, In LTE early release, 2Rx and 4Rx is also one polarization structure

For OTA test, based on eAAS spec, in case of BS support dual polarization,

Only 2RX BS performance requirements apply when OTA AAS BS supports and is tested with dual polarization

Dual polarization antenna structure should be the typical deployment in NR, even in LTE, with considering the test

effort and realistic operation, no to introduce 1T1R requirements for tunnel scenario.

ZTE: Option 4 seems just a condition of option 1 and 3, not the same bullet level as the other 3 options. .If operators confirms this condition, option 1 and 3 are ok to us.

**Issue 2.5.2 If 1T1R requirement is introduced: 1T1R requirement configuration**

* Option 1: Re-use the 1T2R requirement configuration.

Proposed WF: FFS for next meeting, after finishing issue 2.5.1.

Comments: *[Chronological order]*

[Moderator remark: To be discussed conditional on decision on Issue 2.5.1]

NTT DOCOMO: We agree with Option 1.

Ericsson: We agree with Option 1.

Samsung: Not to introduce 1T1R requirement

ZTE: Option 1 is agreeable to us.

**Issue 2.5.3 If 1T1R requirement is introduced with OTA testing only: 1T1R requirement configuration**

* Option 1: Same test setup for 1T1R as typically specified in TS 38.141-2, with a test procedure that includes polarization alignment.

Proposed WF: FFS for next meeting, after finishing issue 2.5.1.

Comments: *[Chronological order]*

[Moderator remark: To be discussed conditional on decision on Issue 2.5.1]

NTT DOCOMO: If OTA test is applicable, we agree with Option 1.

Ericsson: We don’t think 1T1R should not to be introduced to OTA test.

Samsung: not introduce 1T1R requirement.

ZTE: If OTA testing only agreed, Option 1 is fine.

**Issue 2.5.4 Slot allocation for PUSCH transmission in radio frames**

* 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#18 in radio frames

* Option 2 (Nokia, Ericsson for TDD, ZTE for TDD): 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

* Option 3 (Nokia, Ericsson, Huawei, ZTE): Only capture to use TDD pattern according to the previous WF agreement.

Proposed WF: Only capture to use TDD pattern according to the previous WF agreement.  
Companies can use Option 1 or Option 2 for simulation evaluations, and only capture the TDD patterns in the specification for final performance requirements definition if no big performance difference observed

Comments: *[Chronological order]*

Nokia: Not necessary to achieve alignment this meeting, since simulations are not bound by test effort and can use any of the proposed options.  
But we agree with Ericsson’s question from round 1: Why this only a testing effort issue in HST. For normal mode PUSCH, the conformance testing effort agreeable to everyone with the chosen TDD patterns? We don’t see how the pattern causes a different testing load in HST than in non-HST.  
Hence we see no technical reason to chose anything but option 2 or 3.

Ericsson: Basically, we accept TDD pattern in Option 2 and we might not need send PUSCH in all slot in FDD. We suggest only TDD pattern is captured in this meeting and FDD pattern can be decided until next meeting.

Huawei: From the evaluations conducted for R15 PUSCH normal performance requirements, only TDD patterns are specified. Also as per the discussion for the details of HARQ timing for R15 BS conformance testing happened in another thread #89, all companies agree that no performance difference for different HARQ timing and TDD patterns. So companies can use Option 1 or Option 2 for simulation evaluations, and only capture the TDD patterns in the specification for final performance requirements definition if no big performance difference observed.

Samsung: As mentioned, the slot allocation is to indicate the PUSCH transmission, based on the agreed TDD pattern.

15 KHz, 3D1S1U

30 KHz, 7D1S2U

The motivation in LTE is to reduce the test effort, no to transmission PUSCH frequently for high speed scenario. The transmission slot is related with HARQ process. For FDD, the HARQ process is 8 and TDD with 3D1S1U and 7D1S2U is 10. My suggestion is to follow the LTE approach, since there is no impact on the performance requirement.

ZTE: We share the same view as Ericsson.

Moderator: Proposed a WF that follows Huawei’s company view. It seems to be compatible with the wishes of all companies that chose option 3 and does not preclude the usage of option 1 for any company that preferred this choice.

**Issue 2.5.5 L0 for PUSCH mapping type A for both 350 kph and 500 kph**

* Option 1 (Samsung): Define the HST requirement with PUSCH mapping type A under l0=3.
* Option 2 (Nokia, DoCoMo, Ericsson, Huawei, ZTE): Allow to freely choose either l0=2 or l0=3 to align simulation results and deliver performance requirements.
* Option 3: Define the HST requirement with PUSCH mapping type A under l0=2.

Proposed WF: Allow to freely choose either l0=2 or l0=3 to align simulation results and deliver performance requirements (option 2).

Comments: *[Chronological order]*

Moderator: Option 2 seems like an agreeable way forward.

Nokia: Most companies agree that l0=2 and l0=3 has negligible performance difference, thus giving freedom to choose has no practical implications. The FRCs stay the same. And companies that see a performance difference can chose their best implementation. Opption 2 seems like an agreeable way forward.

NTT DOCOMO: We agree with Option 2 since the performance difference is negligible between l0=2 and l0=3.

Ericsson: We are OK with Option 2.

Huawei: Option 2 is acceptable for us. i.e. Allow to freely choose either l0=2 or l0=3 to align simulation results and deliver performance requirements for PUSCH mapping type A for both 350 kph and 500 kph since there is almost no difference between l0=2 or l0=3 as per most companies’ simulation results.

Samsung: Prefer to option 1, considering the implementation and benefit with extreme high Doppler scenario. We are not OK to option 3.

Option 2 means we only define one requirement and one test. And FRC and test parameters should include l0=2 or lo=3?

Moderator: Yes, only one requirement and test.  
The current draft of the HST PUSCH CR captures this as:

NOTE 1: *DM-RS configuration type* = 1 with *DM-RS duration = single-symbol DM-RS* and the number of DM-RS CDM groups without data is 2, *Additional DM-RS position = pos2*, and *l0*= [2 or 3] for PUSCH mapping type A, as per table 6.4.1.1.3-3 of TS 38.211 [5].

Presumably, the square brackets would be removed in case of acceptance of the proposed WF.

ZTE: Ok with option 2.

**Issue 2.5.6 CRs**

* R4-2001184 Introducting of conformance tests for 350km/h HST (Ericsson)

Comments: *[Chronological order]*

* R4-2001185 Introduction of HST 350km/h FRCs and channel model. (Ericsson)

Comments: *[Chronological order]*

* R4-2001690 CR for 38.104: HST PUSCH demodulation requirements introduction (Nokia)

Comments: *[Chronological order]*

Nokia: We will provide an updated version with fixes for “Scenario name in propagation condition is not aligned with R4-2001691 which is CR for Annex” and MCC corrections.

* R4-2001691 CR for 38.104: HST PUSCH demodulation Annex including both FRC and channel model (Nokia)

Comments: *[Chronological order]*

Nokia: We will provide an updated version with MCC corrections.

Samsung: For FRC table, we should avoid to use the different terminology with other FRC tables

To align with other FRC table, Data bearing CP-OFDM Symbols per slot (Note 1) should be changed as CP-OFDM Symbols per slot (Note 1), My understanding we have already achieved consensus with “CP-OFDM Symbols per slot (Note 1)” means the symbols for data transmission, excluding the number of DMRS symbol (3), not matter the additional DMRS position is 2 or 3.Regarding the sentence “However, the same Doppler shift requirement shall be applied regardless of the frequency of operation of the basestation and thus for lower frequencies, the supported speed is higher. My suggestion we can refer LTE approach to add a note under the Table G.3-1. Meanwhile, to be honest, the last sentence “for lower frequencies, the supported speed is higher”, I wonder whether it is needed to capture in spec, since it is straight forward if all the company on the same page.

Table B.3-2: Parameters for high speed train conditions for UE velocity up to 500 km/h

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Value | | | |
| Scenario 1-LTE500a | Scenario 3-LTE500a | Scenario 1-LTE500b | Scenario 3-LTE500b |
|  | 1000 m | 300 m | 1000 m | 300 m |
|  | 50 m | 2 m | 50 m | 2 m |
|  | 500 km/h | 500 km/h | 500 km/h | 500 km/h |
|  | 1944 Hz | 1944 Hz | 1750 Hz | 1750 Hz |

NOTE 1: Parameters for HST conditions in table B.3-1 including fd and Doppler shift trajectories presented on figures B.3-1 and B.3-2 were derived from Band1 and are applied for performance verification in all frequency bands.

NOTE 2: Parameters for scenario 1-LTE500a and scenario 3-LTE500a in table B.3-2 including fd and Doppler shift trajectories presented on figures B.3-3 and B.3-4 were derived from Band1 and are applied for performance verification in all frequency bands.

NOTE 3: Parameters for scenario 1-LTE500b and scenario 3-LTE500b in table B.3-2 including fd and Doppler shift trajectories presented on figures B.3-5 and B.3-6 were derived from Band3 and are applied for performance verification in all frequency bands.

* R4-2001802 CR for TS 38.141-1: Introduction of NR PUSCH performance requirements for HST (DoCoMo)

Comments: *[Chronological order]*

* R4-2001803 CR for TS 38.141-1: Introduction of NR PUSCH performance Annex including both FRC and channel model for HST (DoCoMo)

Comments: *[Chronological order]*

Samsung: same comment with R4-2001691

## 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”* |
| R4-2002415 | Agreeable Title: Introducting of conformance tests for 350km/h HST |
| R4-2002416 | Agreeable Title: Introduction of HST 350km/h FRCs and channel model |
| R4-2002406 | Agreeable. Title: CR for 38.104: HST PUSCH demodulation requirements introduction It should be formally agreed in the next meeting, if the requirement specification (TS38.104) also needs to list the two options for the first DM-RS position = {pos2 or pos3}. |
| R4-2002407 | Agreeable. Title: CR for 38.104: HST PUSCH demodulation Annex including both FRC and channel model |
| R4-2002408 | Agreeable. Title CR for TS 38.141-1: Introduction of NR PUSCH performance requirements for HST |
| R4-2002409 | Withdraw and non-revised version R4-2001803 is agreeable. Title: CR for TS 38.141-1:  Introduction of NR PUSCH performance Annex including both FRC and channel model for HST |

# 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 TDLC300-100 fading channel with frequency off of 400Hz requirements with frequency offset of 400Hz for all agreed PRACH preamble formats.
  + Option 2 (Samsung, ZTE, DoCoMo): Do not introduce TDLC300-100 fading channel with frequency off of 400Hz requirements for short preamble formats. They are already defined in “normal mode” PRACH.
* Recommended WF
  + Do not introduce TDLC300-100 fading channel with frequency off of 400Hz requirements for short preamble formats, as they are already defined in “normal mode” PRACH. Remove the cases from the simulation result summary template.

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | Sub topic 1-1:  Sub topic 1-2:  ….  Others: |
| Nokia, Nokia Shanghai Bell | 3-1-1: Agree with WF: Include TDL-C-100 fading channel requirements with frequency offset of 400Hz for all agreed PRACH preamble formats. |
| Samsung | Sub topic 3-1:  Issue 3-1-1: Introduce requirements for TDLC300-100 propagation conditions for short preamble formats  Prefer option2 : Do not introduce TDL-C-100 fading channel requirements for short preamble formats  Follow the previous WF. For short format with TDL-C100 400Hz requirement is already defined with same preamble test parameters. |
| Huawei | We prefer Option 2. No need to introduce additional TDLC100-400 related performance requirements. |
| CMCC | Issue 3-1-1: we have one question for clarification. Since the description of this issue is for short preamble format. We are wondering the issue on TDLC300-100 only exists for shot preamble format? Or both long format and short format need to consider it? |
| ZTE | We think it is not necessary. |
| NTT DOCOMO | Issue 3-1-1: There are PRACH short formant requirements for TDLC300-100 with 400Hz frequency offset in the existing specification. In our understanding, the existing PRACH requirements will be applied for BSs that support HST. |

### 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 | Nokia, Nokia Shanghai Bell:  C1: Cover sheet: The reason for change implies that both 300 and 500kph are introduced, but only 350 is introduced.  >>Huawei: The intention of this CR is to introduce requirements for 350km/h since requirements for 500km/h are still a little bit far from alignment, i.e., fading channel is undetermined. The description of 500km/h has been removed.  Nokia: OK.  C2: We would prefer to align with the structure of the other HST requirement section, i.e., to have and new PRACH section "for high speed train".  >>Huawei: Since NR BS has no HST part before, this CR reuse the template from section 8.4.2 in 36.104, in which the HST requirement had been added into the original section rather than having a new section "for high speed train".  >> NTT DOCOMO: We prefer Huawei’s approach. BS vendor can declare supported PRACH formats and supported HST velocity independently, so we don’t need to separate sections.  Nokia (for both DCM and HW): We agree that LTE had done it this way. However, LTE was inconsistent between the different HST requirements/sections. We should take the opportunity in NR to fix this. There are ongoing discussions on how to declare HST and PRACH support. It seems sensible to align with the outcomes. Maybe Huawei can send updated drafts of the CRs around before the second round. Though I don’t see the harm in directly going for separate sections. Especially thinking about the future introduction of 500kph.  C3: It is not explicitly mentioned that HST related PRACH requirements/tests are optional. The "only valid" text is ambiguous.  >>Huawei: We suggest to remove the word "only"  Nokia: We would prefer to take the same solution/sentence as in HST PUSCH and UL TA, which explicitly declares the HST tests as optional.  C4: The terminology of “High speed Mode” is new to NR. It is neither used in RAN1, nor RAN2, nor any other RAN4 specification. Can we call just call it “restricted set”?  >>Huawei: We reused the terminology of "High speed Mode" from section 8.4.2 in 36.104. If we agree to add HST part into section 8.4.2.2, then this terminology is useful for distinguishing from tables of Normal Mode. But if we finally agree to have a new section, i.e., 8.4.2.3, then we can remove the terminology of "High speed Mode" and call it "restricted set" instead.  Nokia: I was also not happy to find the terminology “normal mode” in our non-HST PRACH sections already. We should be careful in using LTE concepts in NR, especially if neither RAN1 nor RAN2 have used the terminology. NR is different from LTE and should support high speeds “out of the box”… well theoretically at least.  C5: Some headings use upper and lower case letters inconsistently, e.g., “PRACH missed detection requirements for **H**igh speed **M**ode restricted set type A, 1.25 kHz SCS”.  >>Huawei: We will double check the wording.  C6: Why is the msg1-FrequencyStart parameter missing for HST? This would still need to be defined for consistent testing in fading environments.  >>Huawei: The description for msg1-FrequencyStart parameter has been added.  >>Huawei: For all the comments, thanks a lot for Nokia’s careful review. |
| Ericsson: We suggest use separate section for different HST PRACH formats to suit for different BS declarations. Such as an BS supports 350km/h can choose the PRACH requirement according to its declarations.  >>Huawei: Since this CR intents to only bring requirements for 350km/h and format 0 is the only format that has been agreed to use, we think table 8.4.2.2.2-4 and 8.4.2.2-5 are clear enough. If requirements for 500km/h is also agreed to be introduced into this CR well then separate sections for different formats are very much needed.  >>Huawei: For all the comments, thanks a lot for Ericsson’s careful review.  Ericsson: We think it would be more troubles when we want to introduce 500km/h. It would be better to set requirements separately.  [Moderator remark: Following comment was added after 5pm PST deadline]  For revised CR, there might be some minor change   * There are still “high speed mode” in the text part. * Some upper case letters should be lower case letters, e.g., “for High speed train”, “and The test” |
|  |
| R4-2001474 | Nokia, Nokia Shanghai Bell:  Same comments as for R4-2001473. |
| Ericsson: Same comments as R4-2001473.  [Moderator remark: Following comment was added after 5pm PST deadline, also TS21.801 5.2.1C forbids re-use of voided elements.]  Why the table A.6-2 are left to be ‘void’? Can change table A.6-3 to A.6-2 in CR? |
|  |
| R4-2001475 | Nokia, Nokia Shanghai Bell:  Same comments as for R4-2001473. |
| Ericsson: Same comments as R4-2001473.  [Moderator remark: Following comment was added after 5pm PST deadline]  Why the table A.6-2 are left to be ‘void’? Can change table A.6-3 to A.6-2 in CR? |
|  |

## 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:* |
| Sub-topic 3-1 TDLC300-100 propagation condition | *Tentative agreements:*   * TDLC300-100 propagation conditions for short preamble formats and long preamble formats   + Do not introduce TDLC300-100 fading channel with frequency offset of 400Hz requirements for short preamble formats and long preamble formats, as they are already defined in “normal mode” PRACH. Remove the cases from the simulation result summary template.   *Recommendations for 2nd round:*  Regard tentative agreements as stable. |

*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”* |
| R4-2001473 | To be revised |
| R4-2001474 | To be revised |
| R4-2001475 | To be revised |

## Discussion on 2nd round (if applicable)

[Moderator comment: No candidate options.   
Please check that the tentative agreement is still acceptable. The observation was extended to short and long preambles.]

**Issue 3.5.1 CRs**

* R4-2001473, CR for TS 38.104: Introduction of PRACH demodulation requirements for NR HST (Huawei)

Proposed WF: Capture the proposed WF from issue 1.5.2 and please check if latest specification was used. Samsung pointed out that [] in normal mode were already removed in latest version.

Comments: *[Chronological order]*

Nokia: Thank you for the updates shared on the reflector. All of Nokia’s comments (except one) have been addressed.  
We still think that PRACH should be organised as PUSCH and have a separate HST section.  
The current specification state is as follows:  
 x. PUSCH non-HST  
 x. PUSCH HST (with only 350kph inside for now)  
 x. PRACH non-HST/HST  
However, we will only insist on this split, if other companies have the same request.  
Can companies with the same request please comment?

NTT DOCOMO: As commented in **Issue 1.5.2,** we agree with the current structure**.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Another comment is that for long format, it is possible to introduce the requirements for other formats (i.e., format 1/2/3), so we prefer to add “Burst format 0” column as below:Number of TX antennas | Number of RX antennas | Propagation conditions and correlation matrix (Annex G) | Frequency offset | SNR (dB) |
| Burst format 0 |
| 1 | 2 | TDLC300-100 Low | 400 Hz | TBD |
| AWGN | 625 Hz | TBD |
| AWGN | 1340 Hz | TBD |
| 4 | TDLC300-100 Low | 400 Hz | TBD |
| AWGN | 625 Hz | TBD |
| AWGN | 1340 Hz | TBD |
| 8 | TDLC300-100 Low | 400 Hz | TBD |
| AWGN | 625 Hz | TBD |
| AWGN | 1340 Hz | TBD |

Ericsson: We think HST should be distanced from the non-HST section at least. So it’d be better that PRACH have the same structure as PUSCH to use a separate section for HST PRACH. Regarding DoCoMo’s additional comment that more format might be introduced in the future, separate section is also a better choice for maintaining and application.

Samsung: follow LTE approach, create new table with High speed mode with restricted type A and type B for long format, insert new row for requirement of short format.

PUSCH HST (with only 350kph inside for now)-> both 350 and 500 should be included with same section,

Additionally, please Huawei use the latest spec for CR, since [] in normal mode is agreed to remove in the last meeting.

As for table title, we suggest to keep with terminology with high speed mode, which is follow LTE, not the new terminology. Meanwhile, the motivation is to differentiate with Normal Mode as follows.

Table 8.4.2.1-1 PRACH missed detection requirements for Normal Mode

Table 8.4.2.1-2 PRACH missed detection requirements for High speed Mode restricted set type A

Table 8.4.2.1-5 PRACH missed detection requirements for High speed Mode restricted set type B

The spec should be written with readable for both LTE and NR.

ZTE: We prefer to separate HST and non-HST even for PRACH.

*CMCC: For the wording "The performance requirements for high speed train (table 8.4.2.2-4 and 8.4.2.2-5) are optional" in the revised CR shared by HW, we prefer to remove it. The applicability rule of performance requirements for high speed condition can be specified in 38.141 in the section of applicability rule, similar way as in Rel-15.*

Moderator: In round 1 all CR commenting companies seem to have agreed on having this statement. It copies the statements from PUSCH and UL TA. Do you sustain objection?

* R4-2001474, CR for TS 38.141-1: Introduction of PRACH performance requirements for NR HST (Huawei)

Proposed WF: As above.

Comments: *[Chronological order]*

Nokia: Idem.

NTT DOCOMO: Same comment.

Ericsson: Same comments as R4-2001473.

Samsung: Same comment

ZTE: Same comment.

* R4-2001475, CR for TS 38.141-2: Introduction of PRACH performance requirements for NR HST (Huawei)

Proposed WF: As above.

Comments: *[Chronological order]*

Nokia: Idem.

NTT DOCOMO: Same comment.

Ericsson: Same comments as R4-2001473.

Samsung: Same comment

ZTE: Same comment.

## 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”* |
| R4-2002410 | Not available. Mark as “not pursued”. Title: CR for TS 38.104: Introduction of PRACH demodulation requirements for NR HST |
| R4-2002411 | Not available. Mark as “not pursued”. Title: CR for TS 38.141-1: Introduction of PRACH performance requirements for NR HST |
| R4-2002412 | Not available. Mark as “not pursued”. Title: CR for TS 38.141-2: Introduction of PRACH performance requirements for NR HST |

# 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 configuration  Proposal 1: SRS bandwidth configuration is proposed as C\_SRS = 11, B\_SRS =0, for 40RB C\_SRS = 21, B\_SRS =0, for 80RB  Proposal 2: SRS transmission comb is proposed as K\_TC: 2  Proposal 3: SRS transmission periodicity is proposed as TSRS =10.  SRS slot configuration  Proposal 4: Keep the same SRS parameters specified in 38.104/141-1/141-2 for requirements and testing.  Moving propagation conditions  Proposal 5: The timing difference between moving UE and stationary UE should be scaled with 15KHz SCS: Δτ - (TA -31)x16\*64Tc 30KHz 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 transmission  Observation 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 frames  Other parameters  Proposal 2: Adopt parameters in Table 2.2-1 for UL timing adjustment.  Table 2.2-1 Parameters needed to be determined  Parameter Value  DMRS type type1  symbols length 14 for both PUSCH type A and B  start symbol index 0 for both PUSCH type A and B  resource allocation type type 1  SRS bandwidth configuration BSRS=0, CSRS=11 for 40RBs  BSRS=0, CSRS=21 for 80RBs  SRS transmission comb 2 |
| R4-2001687 | Nokia, Nokia Shanghai Bell | N/A |
| R4-2001689 | Nokia, Nokia Shanghai Bell | Previous observations about UL TA testing  Observation 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 shift  Proposal 5: RAN4 to not consider Doppler shift in UL TA scenarios with 350 kph and 500 kph UE speed.  UL TA choice of KPI  Observation 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 placement  Proposal 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, Nokia, ZTE, Ericsson, Intel ): 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, Nokia, ZTE, Ericsson, Intel ): KTC=2.
* Recommended WF
  + Choose KTC=2.

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

* Proposals
  + Option 1 (Samsung, Huawei, ZTE, Ericsson ): TSRS =10.
  + Option 2 (Nokia, ): Match the repetition periodicity of the special slot of the ultimately chosen TDD pattern.
* 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, Huawei, Nokia, ZTE, ): 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, Samsung, ZTE, Ericsson ): 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

* + Option 2 (Nokia, ): Match all occurrences of the special slot of the ultimately chosen TDD pattern.
* Recommended WF
  + Collect companies’ input

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

* Proposals
  + Option 1 (Huawei, Samsung, ZTE, ): The last symbol in the special slot.
  + Option 2 (Nokia, Ericsson ): 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, Ericsson, ): Second to last symbol in chosen SRS slot.
  + Option 2 (Samsung, Huawei, ): Last symbol in chosen SRS slot.
  + Option 3 (Samsung, ZTE, ): 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, Huawei, ZTE,):

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

* + Option 2 (Nokia, ): Use the technical content from option 1, but write using TS.
  + Other options not precluded.
* Recommended WF
  + Chose option 1.

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

* Proposals
  + Option 1 (Nokia, Samsung, Ericsson, Huawei, ZTE, Intel): 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 (Huawei, Samsung, DoCoMo, ZTE, ): Keep previous agreement.
  + Option 2 (Nokia, ): Use SNR@95% of maximum throughput for the moving UE.
  + Option 3 (Intel, ): Keep decision open. Study test metrics under time estimation error.
* Recommended WF

### 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, Nokia, Samsung, ): Remove PUSCH mapping type B assumptions and requirements.
  + Option 2 (Huawei, ZTE, ): Keep previous agreement, and use applicability rule to test only one.
* Recommended WF
  + Collect companies’ input.

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

* Proposals
  + Option 1 (Huawei, Samsung, Ericsson, Nokia, ZTE, ): 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: |
| Nokia, Nokia Shanghai Bell | 4-1-1: Nokia would like to support option1/WF.  4-1-2: Nokia would like to support option1/WF.  4-1-3: This discussion should be dependent on the TDD pattern discussion. For FDD we can agree with option 1, for TDD we want to set the periodicity to match the repetition periodicity of the special slot of the ultimately chosen TDD pattern.  4-1-4: Nokia would like to support option1/WF.  4-1-5: We want to align with our proposal (option 2) in Issue 2-2-1. Transmit SRS in every special slot of the ultimately chosen TDD pattern. Otherwise TOE (timing offset estimation) implementations that rely mostly on SRS will not be viable. RAN4 should not force specific implementations and close avenues for optimisations.  4-1-6: Remain with previous proposal as captured in option 2. Leaving a symbol gap to the PUSCH transmission avoid issues with transient periods.  4-1-7: Same as 4-1-6.  4-2-1: From a technical point of view, we agree with option 1. Though, we prefer to capture the relationship in the CR using TS instead of TC. This aligns the formula with LTE and highlights differences to LTE.  4-2-2: Remain with previous proposal as captured in option 1. Align with LTE tests.  4-3-1: Remain with previous proposal as captured in option 2. 70%TPUT is not a sensitive enough test to show implementation errors. Same shortcoming observed in LTE.  4-4-1: Nokia wants to support option 1. It is unclear how the type B inclusion came to be, since “normal” PUSCH discussions were clearly limited to type A only.  4-4-2: Nokia would like to support option1/WF. Nokia re-used the PUSCH HST TDRA (time domain resource allocation) for evaluations in UL TA, which coincides with option 1. |
| Samsung | Sub topic 4-1:  Issue 4-1-1: SRS bandwidth configuration TBA  Prefer option 1: Use the same terminology with RAN1 spec for SRS configuration parameters C\_SRS = 11, B\_SRS =0, for 40RB and C\_SRS = 21, B\_SRS =0, for 80RB.  Issue 4-1-2: SRS transmission comb  Prefer option 1: To align with SRS configuration for LTE  Issue 4-1-3: SRS transmission periodicity  Prefer option 1: To align with SRS configuration for LTE, since the SRS transmission periodicity is 10ms, only 1 slot is for SRS transmission in radio frame  Issue 4-1-4: SRS slot configuration differences between TS 38.104 and TS 38.141  Prefer option 1: Same SRS slot configuration specified in 38.104/141-1/141-2 for requirements and testing  Issue 4-1-5: SRS transmit slot configuration  Prefer option 1: Follow previous WF  Issue 4-1-6: SRS symbol placement within slot for TDD  Prefer option 1: Follow previous WF. Based on RAN1 design, if one SRS symbol configured, the location should be the last symbol in current slot.  Issue 4-1-7: SRS symbol placement within slot for FDD  Prefer option 1 and 3: Follow previous WF. Based on RAN1 design, if one SRS symbol configured, the location should be the last symbol in current slot. [Moderator: Should this read “ Prefer option 2 and 3”?]  Sub topic 4-2:  Issue 4-2-1: Timing difference between moving UE and stationary UE scaling by TA command  Prefer option 1  Issue 4-2-2: Applying Doppler shift into account  Prefer option 1: Follow LTE approach, there is no Doppler shift into account for AWGN with moving UE and stationary UE. The test purpose of UL timing is to verify the impact of timing offset.  Sub topic 4-3:  Issue 4-3-1: Test metric  Prefer option 1: Keep previous agreement  Sub topic 4-4:  Issue 4-4-1: UL TA PUSCH mapping type B  Prefer option 2: To reduce the test effort, type A is enough. [Moderator: Should this read “Prefer option 2”? Having only type A is option 1. I have recorded Samsung as supporting option 1, please comment if this is wrong.]  Issue 4-4-2: UL TA PUSCH time domain resource allocation  Prefer option 1: Keep previous agreement |
| Ericsson | Issue 4-1-1: we are OK with option 1.  Issue 4-1-2: we are OK with option 1.  Issue 4-1-3: we are OK with option 1.  Issue 4-1-5: we are OK with option 1  Issue 4-1-6: we are OK with option 2  Issue 4-1-7: we are OK with option 1  Issue 4-2-2: We prefer option1 that do not consider Doppler shift for UE with 350km/h and 500km/h speed.  Issue 4-3-1: We see that 95% in this case makes a more meaningful requirement. On the other hand, not all companies have provided results for this meeting, so it is not clear if there is sufficient time to change the metric. If we would agree to change it, we should also agree that it is not automatically assumed that we use 95% in case other scenarios with multipath channel are introduced in the future, as it is not clear if the results would be stable in such cases.  Issue 4-4-1: We prefer option1 to remove type B assumption and requirements.  Issue 4-4-2: We agree with option1. |
| Huawei, HiSilicon | Issue 4-1-1: We agree Option 1.  Issue 4-1-2: We agree Option 1.  Issue 4-1-3: We agree Option 1. As per the agreements reached in last meeting, SRS is transmitted once per radio frame.  Nokia: We disagree that a conclusion has been reached on this in the last meeting. R4-1912809 specifically states that one SRS per radio frame is only option 1 and other options are not precluded. Are you referring to this WF?  To Nokia: At last meeting, a new WF R4-1915886 was approved rather than R4-1912809 which was approved at 92bis meeting. I think you should refer to the new WF R4-1915886.  [Moderator remark: Comment received after 5pm PST.]  Issue 4-1-4: We prefer Option 1. Same SRS slot configuration specified in 38.104/141-1/141-2 for requirements and testing.  Issue 4-1-5: We agree Option 1. This proposal is just used to confirm the agreement reached in last meeting.  Nokia: We disagree that an agreement was reached in the last meeting. R4-1912809 specifically states "Transmit SRS in slot#1 in radio frames for FDD mode" as option 1 and other options are not precluded. There are no mentions of the TDD slot configuration to be found in the UL TA part of the WF. Are you referring to this WF?  To Nokia: At last meeting RAN4#93, WF R4-1915886 was approved rather than R4-1912809 which was approved at 92bis meeting. I think you should refer to the new WF R4-1915886.  [Moderator remark: Comment received after 5pm PST.]  Issue 4-1-6: We prefer Option 1. After long discussion during Rel-15, RAN4 agreed that no transient period needs to be considered in RAN4 demodulation requirements definition.  Issue 4-1-7: We prefer Option 2. After long discussion during Rel-15, RAN4 agreed that no transient period needs to be considered in RAN4 demodulation requirements definition.  Issue 4-2-1: We agree Option 1. We prefer to use Tc that is aligned with NR core specification.  Issue 4-2-2: We prefer Option 1. Do not consider Doppler shift in UL TA scenarios with 350 kph and 500 kph UE speed (as in LTE).  Issue 4-3-1: We prefer Option 1. Keep previous agreement.  Issue 4-4-1: We prefer Option 2. Keep previous agreement. Define both PUSCH mapping type A and B, and the application rule can be introduced as the existing normal performance requirements to test only one.  Issue 4-4-2: We agree Option 1. |
| ZTE | Issue 4-1-1: We are ok with Option 1.  Issue 4-1-2: We are ok with the recommended WF.  Issue 4-1-3: Ok with Option 1.  Issue 4-1-4: The same configuration should be specified.  Issue 4-1-5: Ok with Option 1.  Issue 4-1-6: Ok with Option 1.  Issue 4-1-7: Ok with Option 3, same as TDD.  Issue 4-2-1: Option 1 is fine.  Issue 4-2-2: Ok with Option 1.  Issue 4-3-1: We prefer to keep 70%  Issue 4-4-1: Ok with Option 2.  Issue 4-4-2: We are fine with the recommended WF. |
| NTT DOCOMO | Issue 4-3-1: We prefer Option 1. |
| Intel | **Issue 4-1-1: SRS bandwidth configuration TBA**  Agree with option 1  **Issue 4-1-2: SRS transmission comb**  Agree with option 1  **Issue 4-2-2: Applying Doppler shift into account**  Agree with option 1. Demodulation performance with high Doppler frequency is verified in separate test cases.  **Issue 4-3-1: Test metric**  Performance indicator should be rather sensitive to identify implementation problems. In this case we prefer to keep this discussion open and ask companies to provide their results for different test metrics assuming time estimation error. |

### 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 | Ericsson: We think N\_id0 =0 is not correct because it will be different for different user. We suggest N\_id0=0 for the first user and N\_id0=1 for another user. |
|  |
|  |
| 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:* |
| Sub-topic 4-1 SRS configuration | *Tentative agreements:*   * SRS bandwidth configuration   + Choose C\_SRS = 11, B\_SRS =0, for 40RB and C\_SRS = 21, B\_SRS =0, for 80RB. * SRS transmission comb   + Choose KTC=2. * SRS transmission periodicity   + Choose TSRS =10. * SRS slot configuration differences between TS 38.104 and TS 38.141   + Same SRS slot configuration specified in 38.104/141-1/141-2 for requirements and testing. * SRS transmit slot configuration   + FDD     - Slot #1 in radio frames   + TDD     - 15kHz SCS: Slot #3 in radio frames     - 30kHz SCS: Slot #7 in radio frames   *Candidate options:*   * SRS symbol placement within slot for TDD   + Option 1: The last symbol in the special slot.   + Option 2: Second to last symbol in the special slot. * SRS symbol placement within slot for FDD   + Option 1: 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.   *Recommendations for 2nd round:*  The following issues should be further discussed by email during round 2, however failure to agree does neither impact other issues nor delay feature introduction in specification:   * SRS symbol placement within slot for TDD * SRS symbol placement within slot for FDD |
| Sub-topic 4-2 Moving propagation conditions | *Tentative agreements:*   * Timing difference between moving UE and stationary UE scaling by TA command   + 15KHz SCS: Δτ - (TA -31)x16\*64Tc 30KHz SCS: Δτ - (TA -31)x16\*32Tc * Taking Doppler shift into account.   + Do not consider Doppler shift in UL TA scenarios with 350 kph and 500 kph UE speed.   *Recommendations for 2nd round:*  Consider the tentative agreements as stable. |
| Sub-topic 4-3 Test metric | *Tentative agreements:*  None.  *Candidate options:*   * Test metric   + Option 1: SNR@70% of maximum throughput for the moving UE.   + Option 2: Keep decision open. Study test metrics under time estimation error.   *Recommendations for 2nd round:*  Do not continue the discussion. Assume 70%TPUT as baseline. Proponents and opponents of 70%TPUT are invited to provide studies in next meeting. |
| Sub-topic 4-3 UL TA PUSCH configuration | *Tentative agreements:*   * UL TA PUSCH time domain resource allocation   + Choose start=0, length=14, type 1.   *Candidate options:*   * UL TA PUSCH mapping type B   + Option 1: Remove PUSCH mapping type B assumptions and requirements.   + Option 2: Have PUSCH mapping type A and B requirements and use applicability rule to test only one. * (New) DM-RS scrambling sequence initialization   + Option 1: Chose scramblingID0/*NID*0=0 for moving UE and scramblingID0/*NID*0=1 for stationary UE.   + Option 2: Use scramblingID0/*NID*0=0 for all.   *Recommendations for 2nd round:*  The following issues should be further discussed by email during round 2:   * UL TA PUSCH mapping type B * DM-RS scrambling sequence initialization |

*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”* |
| R4-2000805 | To be revised. Capture at least outcome of DM-RS scrambling sequence discussion or capture TBD. |
| R4-2000806 | To be revised. Capture at least tentative agreement on TA formula. |

## Discussion on 2nd round (if applicable)

**Issue 4.5.1 SRS symbol placement within slot for TDD**

* Option 1: The last symbol in the special slot.
* Option 2: Second to last symbol in the special slot.

Proposed WF: The last symbol in the special slot (option 1).

Comments: *[Chronological order]*

Nokia: As a compromise: would it be agreeable to not fix the exact symbol in the special slot? We already agreed that single symbol SRS is sent in the special slot, we can leave it up to test implementation which symbol is used.

Huawei: We prefer Option 1. This proposal is just used to confirm the agreement reached in last meeting RAN4#93, the approved WF is R4-1915886. We did not notice any technical issue to use the last symbol.

Samsung, option 1, since only 1 SRS symbols is agreed, Based on RAN1 spec, it shall be the last symbol

Nokia: We are not aware of any RAN1 specification that would force us to place all 1 SRS symbol configurations in the last symbol of the slot. Would a reference be available?  
38.214 6.2.1 specifically states “The UE may be configured by the higher layer parameter resourceMapping in SRS-Resource with an SRS resource occupying NS \in {1, 2, 4} adjacent symbols within the last 6 symbols of the slot,…”

**Issue 4.5.2 SRS symbol placement within slot for FDD**

* Option 1: 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.

Proposed WF: Follow agreement from SRS placement within slot for TDD.

Comments: *[Chronological order]*

Nokia: It seems logical to follow the decision in TDD. Hence option 3.

Huawei: Option 3 is reasonable to follow the agreement for Issue 4.5.1 for TDD

Samsung: option 2 and option 3 for both TDD and FDD, the last symbol in chosen SRS slot

**Issue 4.5.3 Test metric**

* Option 1 (Samsung, ZTE): SNR@70% of maximum throughput for the moving UE.
* Option 2 (Nokia, Ericsson, Huawei): Keep decision open. Study test metrics under time estimation error.

Proposed WF: Continue with SNR@70%TPUT as baseline and study the pertinence and sensitivity of the baseline KPI to SNR changes and algorithm implementation until next meeting.

Comments: *[Chronological order]*

Moderator: Option 2 seems like an agreeable way forward.

Nokia: We recognize that it is difficult to change the previous agreement at this point. We hope that companies will check this issue observed by us with their back-office until next meeting. For now we can continue with 70%TPUT as prior decision, and if no other companies see the need in the next meeting, we can simply not add/change the 70%.

Ericsson: We think Option 2 is a proper way forward.

Huawei: Nokia’s proposal is accept for us.

Samsung: Option 1, I am not fully understanding the motivation for study the metrics under time estimation error. Timing estimation error is related with implementation issue. Normally, the receiver will estimation the timing offset and do the timing offset compensation operation. Definitely, the timing estimation error should be existed due to the different estimation algorithm.

The purpose of UL timing adjustment is to investigate the impact of timing offset existing. Similar with frequency offset, following the logical of option 2, shall we study the test metrics under the frequency offset error?

From RAN4 perspective, many demodulation test including the test parameters with timing offset and frequency offset. From the receiver side, we always use the practical timing/frequency offset estimation. If no timing /frequency estimation error, why we add these parameter?

ZTE: Keep the current agreement at this moment. If there is a strong change demand later, we can revisit then.

**Issue 4.5.4 UL TA PUSCH mapping type B**

* Option 1 (Nokia, ZTE): Remove PUSCH mapping type B assumptions and requirements.
* Option 2 (Huawei, Samsung): Have PUSCH mapping type A and B requirements and use applicability rule to test only one.

Proposed WF: Do not go back on previous WF, i.e., have PUSCH mapping type A and B requirements and use applicability rule to test only one.

Comments: *[Chronological order]*

Nokia: We have a weak preference for option 1. HST PUSCH has no test for type B, so seems clear that the same was intended for PUSCH UL TA; otherwise a company would need to implement both in compliance testing to use the type B in UL TA.  
Option 2 gives us the some option, at increase specification writing/reading complexity.

Huawei: We prefer Option 2, i.e. Keep previous agreement, and have PUSCH mapping type A and B requirements and use applicability rule to test only one.

As per WF R4-1915886 approved last meeting, an agreement to UL TA PUSCH mapping type has been made that both PUSCH mapping type A and B is introduced. It is unreasonable to go back discussion on this issue.

Samsung: Option 2, if some of company not prefer remove PUSCH mapping type B.

ZTE: Same view as Nokia.

**Issue 4.5.5 (New) DM-RS scrambling sequence initialization**

* Option 1 (Huawei, Nokia, ZTE, Samsung): Chose scramblingID0/NID0=0 for moving UE and scramblingID0/NID0=1 for stationary UE.
* Option 2 (Samsung): Use scramblingID0/NID0=0 for all.

Proposed WF: Chose scramblingID0/NID0=0 for moving UE and scramblingID0/NID0=1 for stationary UE (option1).

Comments: *[Chronological order]*

Moderator: Option 1 seems like an agreeable way forward.

Nokia: We can see the reasoning behind this request from round 1. Unfortunately, it was “hidden” in a CR comment. One should not use the exact same DM-RS configuration for two UEs, if avoidable. Hence, option 1 seems like the only way forward.

Huawei: Agree with Option 1.

Samsung: : Either option 1 or option 2 is fine, since the RB allocation for each UE is FDM, whether use the same DMRS scrambling sequence initialization or not, there is no impact for the performance/

ZTE: Option 1.

**Issue 4.5.6 CRs**

* R4-2000805, CR for 38.104: introduction of UL timing adjustment (ZTE)

Proposed WF: Capture the sections and (only) agreed test parameters.

Comments: *[Chronological order]*

Nokia: Capture outcome of issue 4.5.5.

Huawei: Change the test parameter of ‘DM-RS position (l0)’ in Table 8.2.5-1 to ’ DM-RS position (l0) for PUSCH mapping type A’ to make it clearer.

Samsung: it seems that we have many open issues for structure and test parameters. We suggest to postpone the CR on UL timing requirement if we cannot achieve consensus.

Moderator: If we want to stay within the work plan, we need to agree the UL TA CRs in this meeting. I think we have enough agreements to capture a meaningful requirement section and appendix.   
The remaining decisions can be included later in a small CR, along with the simulation results.

ZTE: We will revise the CR accordingly.

* R4-2000806, CR for 38.104: Appendix for UL timing adjustment (ZTE)

Proposed WF: Capture the sections and (only) agreed test parameters.

Comments: *[Chronological order]*

Nokia: Capture outcome of issue 4.5.5.

Samsung: it seems that we have many open issues for structure and test parameters. We suggest to postpone the CR on UL timing requirement if we cannot achieve consensus.

ZTE: Same.

## 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”* |
| R4-2002413 | Agreeable. Title: CR for 38.104: introduction of UL timing adjustment |
| R4-2002414 | Agreeable. Title: CR for 38.104: Appendix for UL timing adjustment |