**3GPP TSG-RAN WG4 Meeting #102-e R4-220XXXX**

**Electronic Meeting, February 21 – March 3, 2022**

**Agenda item:** 10.8.1 & 10.8.2

**Source:** Moderator (CMCC)

**Title:** Email discussion summary for [102-e][211] NR\_HST\_FR1\_enh\_RRM\_1

**Document for:** Information

# Introduction

This email discussion focuses on RRM for Rel-17 NR FR1 HST, and in particular the agenda items:

10.8.1 General

10.8.2 RRM core requirements

10.8.2.1 Intra-frequency measurements

10.8.2.2 Inter-frequency measurements

10.8.2.3 L1-SINR measurements

10.8.2.4 Other

The targets of email discussion for 1st round and 2nd round are:

* 1st round: focus on discussing the open issues and strive to minimize the open issues
* 2nd round: according to 1st round discussion, discuss left open issues for 2nd round, and strive to agree on the draft CRs.

# Topic #1: intra-frequency measurements

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2204269 | CMCC | Draft CR on enhanced requirements for SCell measurement for Rel-17 FR1 HST requirements |

## Open issues summary

N/A

## Companies views’ collection for 1st round

### Open issues

### CRs/TPs comments collection

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

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| R4-2204269 (CMCC) | Company A |
| Company B |
|  |

## 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:* |

### CRs/TPs

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

*Note: The tdoc decisions shall be provided in Section 3 and this table is optional in case moderators would like to provide additional information.*

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

## Discussion on 2nd round (if applicable)

# Topic #2: inter-frequency measurements

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

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2204889 | Huawei, Hisilicon | Correction on inter-frequency measurements for FR1 HST |

## Open issues summary

N/A

## Companies views’ collection for 1st round

### Open issues

### CRs/TPs comments collection

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

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| R4-2204889 (Huawei, Hisilicon) | Company A |
| Company B |
|  |

## 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:* |

### CRs/TPs

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

*Note: The tdoc decisions shall be provided in Section 3 and this table is optional in case moderators would like to provide additional information.*

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

## Discussion on 2nd round (if applicable)

# Topic #3: other

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

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| T-doc number | Company | Proposals / Observations |
| R4-2203710 | Qualcomm, Inc. | Proposal 1: SNR upper bound for L1-RSRP measurement requirement should follow R16 SS-SINR.  Proposal 2: Rel-17 FR1 HST RRM enhancement, including CA enhancement and inter-frequency measurement enhancement, is release independent from Rel-16. |
| R4-2203741 | Apple | Proposal 1: Existing L1-SINR measurement requirements are reused for HST, and the upper bound of the side condition is 5dB. |
| R4-2203742 | Apple | CR on L1-SINR measurement in FR1 HST |
| R4-2203743 | Apple | Proposal 1: Whether release independent is supported or not shall consider both RRM requirements and demodulation requirements.  Proposal 2: Rel-17 FR1 HST RRM enhancement, including CA enhancement and inter-frequency measurement enhancement, is release independent from Rel-16. |
| R4-2203897 | CATT | Proposal 1: Existing L1-SINR measurement requirements are reused for HST, and the upper bound of the side condition is 5dB. |
| R4-2204204 | MediaTek (Shenzhen) Inc. | Observation 1: Considering the carrier frequency (2.1GHz for 15kHz and 3.6GHz for 30kHz) and UE speed (500 km/hr), the carrier frequency offset should be 1944Hz and 3333Hz.  Observation 2: For the channel model in HST, it should be AWGN with 2\*Doppler shift.  Observation 3: For the frequency tracking, UE is not required to perform the frequency compensation for the SS-SINR and L1-SINR measurement.  Observation 4: For L1-SINR in R16 eMIMO, the average accuracy are 2.1 dB and 1.9 dB in the baseband for 15kHz and 30kHz, respectively.  Proposal 1: For L1-SINR measurement in HST, the upper bound of the Ês/Iot side condition should be 5 dB. |
| R4-2204260 | CMCC | Proposal 1: Existing L1-SINR measurement requirements are reused for HST, and the upper bound of the side condition is 5dB  Proposal 3: it is proposed that Rel-17 FR1 HST RRM enhancement, including CA enhancement and inter-frequency measurement enhancement, are release independent from Rel-15. |
| R4-2204273 | OPPO | Proposal 1: Can compromise to option 1 that existing L1-SINR measurement requirements are reused for HST, and the upper bound of the side condition is 5dB.  Proposal 2: Whether release independent is supported or not shall consider both RRM requirements and demodulation requirements. |
| R4-2204334 | vivo | Proposal 1 L1-SINR measurements should be applicable to FR1 HST.  Observation 1 RRM requirements was defined for CSIRS-based CMR-only L1-SINR measurements in R16 eMIMO.  Observation 2 According to demod discussion in R16 HST, the baseline scenario for defining requirements should be DPS 1a, which is for UE only capable of tracking 1 TCI state.  Observation 3 According to TS 38.101-4, 972Hz Doppler shift for SCS15kHz HST single tap is only for performance verification, and it is not meant to indicate the max Doppler shift UE needs to dealt with in real SCS15kHz HST deployment.  Observation 4 According to TRS pattern specified in RAN1 specs, the frequency track ability of TRS is +/-1750Hz for SCS15kHz, and +/-3500Hz for SCS30kHz.  Observation 5 In R16 SS-SINR accuracy evaluations for HST, no performance degradation is shown on the serving cell SS-SINR measurement if the one-tap scenario is considered, even assuming 1944Hz Doppler shift.  Observation 6 The considered scenario in R17 is different, since CSI-RSs are UE-specific RS, but SSBs are cell-specific RSs.  Proposal 2 RAN4 confirm to prioritize the case that UE is capable of tracking only 1 TCI for L1-SINR measurements in HST scenario.  Proposal 3 RAN4 may add a note in TS 38.133 to the L1-SINR measurement accuracy requirements, ‘For L1-SINR measurements requirements in HST scenario, the considered max doppler shift should not beyond 1750Hz, at least for UE that supports tracking only 1 TCI state.’  Proposal 4 No need to add any upper bound to the side condition of L1-SINR requirements under FR1 HST scenario.  Proposal 5 Remove the evaluation assumptions on propagation condition or revise it to Table B3.3-1 in TS 38.101-4.  Observation 7 Significant performance degradation can be observed when Doppler spread is 1944Hz and SCS is 15kHz, which is caused by disfunction of TRS-based frequency tracking. |
| R4-2204713 | Ericsson | Proposal 1: Support option 1, Existing L1-SINR measurement requirements are reused for HST, and the upper bound of the side condition is 5dB. |
| R4-2204714 | Ericsson | Proposal 1: Support Option 2 and Option 3, both RRM requirements and demodulation requirements are release independent from Rel-16. |
| R4-2204890 | Huawei, Hisilicon | Proposal 1: The upper bound of the L1-SINR side condition can be 5dB. |
| R4-2204891 | Huawei, Hisilicon | Proposal 1: Whether release independent is supported or not shall consider both RRM requirements and demodulation requirements. |
| R4-2205209 | Nokia, Nokia Shanghai Bell | Proposal 1a: Simulation evaluation for the L1-SINR accuracy requirement for FR1 HST should be based on the agreed simulation assumptions in the WF, where frequency tracking is enabled.  1b: Current L1-SINR measurement requirement can be reused in HST, no upper bound of side condition. |

## 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: L1-SINR

**Issue 3-1-1: how to specify the L1-SINR requirements for high speed scenario**

* Proposals
  + Option 1 (QC, Apple, CATT, MTK, CMCC, OPPO, Ericsson, HW): Existing L1-SINR measurement requirements are reused for HST, and the upper bound of the side condition is 5dB
  + Option 2 (vivo, Nokia): Existing L1-SINR measurement requirements are reused for HST, no upper bound of side condition
* Recommended WF
  + More discussion is needed

|  |  |
| --- | --- |
| **Issue 3-1-1: how to specify the L1-SINR requirements for high speed scenario** | |
| **Company** | **Comments** |
| XXX | …. |
|  |  |

### Sub-topic 3-2: release independent

**Issue 3-2-1: release independent**

* Proposals
  + Option 1 (CMCC): Rel-17 FR1 HST RRM enhancement, including CA enhancement and inter-frequency measurement enhancement, is release independent from Rel-15
  + Option 2 (QC, Apple, Ericsson): Rel-17 FR1 HST RRM enhancement, including CA enhancement and inter-frequency measurement enhancement, is release independent from Rel-16.
  + Option 3 (Apple, OPPO, Ericsson, HW): Whether release independent is supported or not shall consider both RRM requirements and demodulation requirements
* Recommended WF
  + More discussion is needed

|  |  |
| --- | --- |
| **Issue 3-2-1: release independent** | |
| **Company** | **Comments** |
| XXX | …. |
|  |  |

## Companies views’ collection for 1st round

### Open issues

### 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** |
| R4-2203742 (Apple) | Company A |
| Company B |
|  |

## 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:* |

### CRs/TPs

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

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

## Discussion on 2nd round (if applicable)

*Moderator can provide summary of 2nd round here. Note that recommended decisions on tdocs should be provided in the section titled ”Recommendations for Tdocs”.*

# Recommendations for Tdocs

## 1st round

**New tdocs**

|  |  |  |
| --- | --- | --- |
| **Title** | **Source** | **Comments** |
| WF on … | YYY |  |
| LS on … | ZZZ | To: RAN\_X; Cc: RAN\_Y |
|  |  |  |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation** | **Comments** |
| R4-210xxxx | CR on … | XXX | Agreeable, Revised, Merged, Postponed, Not Pursued |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

Notes:

1. Please include the summary of recommendations for all tdocs across all sub-topics incl. existing and new tdocs.
2. For the Recommendation column please include one of the following:
   1. CRs/TPs: Agreeable, Revised, Merged, Postponed, Not Pursued
   2. Other documents: Agreeable, Revised, Noted
3. For new LS documents, please include information on To/Cc WGs in the comments column
4. Do not include hyper-links in the documents

## 2nd round

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation** | **Comments** |
| R4-210xxxx | CR on … | XXX | Agreeable, Revised, Merged, Postponed, Not Pursued |  |
| R4-210xxxx | WF on … | YYY | Agreeable, Revised, Noted |  |
| R4-210xxxx | LS on … | ZZZ | Agreeable, Revised, Noted |  |
|  |  |  |  |  |

Notes:

1. Please include the summary of recommendations for all tdocs across all sub-topics.
2. For the Recommendation column please include one of the following:
   1. CRs/TPs: Agreeable, Revised, Merged, Postponed, Not Pursued
   2. Other documents: Agreeable, Revised, Noted
3. Do not include hyper-links in the documents

# Annex

Contact information

|  |  |  |
| --- | --- | --- |
| **Company** | **Name** | **Email address** |
|  |  |  |

Note:

1. Please add your contact information in above table once you make comments on this email thread.
2. If multiple delegates from the same company make comments on single email thread, please add you name as suffix after company name when make comments i.e. Company A (XX, XX)