**3GPP TSG-RAN WG4 Meeting # 104-e R4-22XXXXX**

**Electronic Meeting, 15 – 26 Aug 2022**

**Agenda item:** 11.7.4

**Source:** Moderator (Nokia, Xiaomi)

**Title:** Email Discussion Summary for [104-e][133] FR2\_enh\_req\_Ph3

**Document for:** Information

# Introduction

*Briefly introduce background, the scope of this email discussion (e.g. list of treated agenda items) 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

It is appreciated that the delegates for this topic put their contact information in the table below.

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)

## Scope

This T-doc will be used to guide and summarize the email discussion for the topic of Rel-16 NR HST BS demodulation requirements (AI 7.15.3.2), with the email thread identifier “[97e][327] NR\_HST\_Demod\_BS”.

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

7.15.3.2 BS demodulation requirements

7.15.3.2.1 PUSCH requirements

7.15.3.2.2 PRACH requirements

7.15.3.2.3 UL timing adjustment requirements

Priority topics are marked directly in the open issues’ summaries.

## Notes on email discussions

From the meeting arrangement:

|  |
| --- |
| * 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
* Length of file names shall be reduced, e.g.
	+ At the beginning of first round, moderators share / ftp / tsg\_ran / WG4\_Radio / TSGR4\_98\_e / Inbox / Drafts / [98e][101] NR\_NewRAT\_SysParameters\Summary\_101\_1st round\_v01.docx
	+ After update by company A: Summary\_101\_1st round\_v02\_companyA
	+ After update by company B: Summary\_101\_1st round\_v03\_companyA\_companyB
	+ After update by company C: Summary\_101\_1st round\_v04\_companyB\_companyC
 |

# Topic #1: Title

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

## Companies’ contributions summary

|  |  |  |  |
| --- | --- | --- | --- |
| **T-doc number** | **T-doc name** | **Company** | **Proposals / Observations** |
| [**R4-2211915**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2211915.zip) | Beam correspondence for RRC\_INACTIVE and initial access | Apple | **Observation 1: The only SSB-based beam correspondence requirement is applicable for initial access.****Observation 2:** **For Random Access SDT and Configured Grant SDT in RRC\_INACTIVE, UEs need to measure SSBs to determine its suitable TX beam for transmitting data over RACH or PUSCH, both of which have a resource mapping to SSB beam index and SS-RSRP measurement.****Observation 3: The current only SSB-based requirement is also applicable for RA-SDT and CG-SDT.****Proposal 1: It is proposed that the current SSB based beam correspondence requirement are reused for Initial access, Random Access SDT and Configured Grant SDT.****Proposal 2: To save test effort, beam correspondence requirement is only tested for initial access.****Proposal 3: It is proposed to further discuss the following points in Oct. meeting*** **How to achieve the maximum output power condition in initial access.**
* **How to balance testing time and test performance, e.g. whether it is feasible to use sparse grid.**
* **New test procedures and test settings**
 |
| [**R4-2211992**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2211992.zip) | FR2 beam correspondence for RRC\_INACTIVE and initial access | Samsung | **Observation 1: spherical coverage is the prime metric for beam correspondence****Observation 2: open loop power control mechanism leads to varying uplink power configuration in spherical coverage measurement****Proposal 1: it is proposed to enable the maximum output power in the beam correspondence of initial access and RRC\_INACTIVE.****Proposal 2: in order to achieve maximum output power in initial access and RRC\_INACTIVE state, RAN4 to discuss and down-select among following options*** **Option 1: multiple times test along with decreasing DL RS power level**
* **Option 2: hold RAR message to enable power ramp until maximum output power**
* **Option 3: adopt a test mode to force UE transmit with maximum output power**

**Observation 3: it is difficult for many test systems to measure one of the component EIRP without beam lock when the component EIRP PolMeas is different from PolLink.****Proposal 3: a compensation approach can be considered to address the testability limitation. RAN4 can further discuss how to determine the compensation value** $Δ\_{pol} $**at each measurement grid point:****EIRP = maximum (EIRP(PolMeas=q, PolLink=q), EIRP(PolMeas=f, PolLink=f)) +** $Δ\_{pol}$**Proposal 4: beam correspondence for initial access or RRC\_INACTIVE can be verified only at the 50%-tile direction obtained from connected mode to save test time.** |
| [**R4-2212070**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212070.zip) | UE beam correspondence requirements for RRC\_INACTIVE and initial access | Nokia, Nokia Shanghai Bell | **Observation 1**: For supporting new UE beam correspondence requirements for RRC\_INACTIVE and initial access UE needs to support both *beamCorrespondenceWithoutUL-BeamSweeping* and *beamCorrespondenceSSB-based-r16* UE capabilities**Proposal 1:** Define DRX cycles for UE beam correspondence requirements for RRC\_INACTIVE and initial access in IDLE mode to ensure that UE performs beam correspondence well also in these UE power saving modes.**Proposal 2:** Reuse the existing SSB based UE beam correspondence requirement scenarios for RRC\_INACTIVE with some updates in the assumptions (e.g. RRC\_INACTIVE, DRX cycles for DRX operations and Random Access SDT and Configured Grant SDT for UL transmission)**Proposal 3:** Reuse the existing SSB based UE beam correspondence requirement scenarios for initial access in IDLE with some updates in the assumptions like IDLE mode, DRX cycles for DRX operations, UL transmission using msg1 in RACH procedure and only defining requirements for spherical coverage. |
| [**R4-2212306**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212306.zip) | Beam correspondence requirements for initial access | CMCC | **Observation 1: Legacy specified tolerance requirements only make sense for UE with UL beam sweeping to avoid very bad BC performance to reduce beam management complexity. There is no minimum tolerance requirement for UE supporting BC without UL sweeping.****Observation 2: for UEs at cell edge, better BC capability could help UE achieve better UL EIRP towards gNB and enhance UL coverage.****Proposal 1: it is suggested to define new tolerance requirement for UE at initial access with smaller tolerance limit between the best-matched beam and automatically chosen beam.** |
| [**R4-2212331**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212331.zip) | On initial access beam correspondence | Qualcomm Incorporated | **Proposal 1: The Rel-18 beam correspondence requirement applicability can therefore be summarised as:**

|  |  |  |
| --- | --- | --- |
|  | UE that supports ***beamCorrespondenceWithoutUL-BeamSweeping*** and ***beamCorrespondenceSSB-based-r16*** | Other UEs |
| MSG1/MSGA | Needs new requirement, mandatory | Needs new requirement, mandatory |
| MSG3 | No need for dedicated requirement due to overlap with PUSCH requirement | Needs new requirement, mandatory |

**Proposal 2: MSG1 EIRP (peak and spherical) requirements are the same as those for single CC DFT-s-QPSK** |
| [**R4-2212592**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212592.zip) | Discussion on beam correspondence requirements for RRC\_INACTIVE and initial access | Xiaomi | **Issue 1: How should the beam correspondence requirements be verified based on the associated SSB?****Issue 2: Does the UE need to indicate support beam correspondence without UL beam sweeping for RRC\_inactive and initial access?****Issue 3: How does the UE indicate the capability of supporting beam correspondence without UL beam sweeping for RRC\_inactive and initial access?**And we proposed:**Proposal 1: The beam correspondence for non-SDT, RA-SDT in initial access and CG-SDT in RRC\_inactive should be verified based on radiated preamble power pattern.****Proposal 2: The UE need indicate support beam correspondence without UL beam sweeping for RRC\_inactive and initial access.****Proposal 3: Send LS to RAN1 and RAN2 to ask them consider how to indicate the capability of supporting beam correspondence without UL beam sweeping for RRC\_inactive and initial access.** |
| [**R4-2212788**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212788.zip) | Beam correspondence for RRC\_INACTIVE and initial access | Ericsson, Sony | **Proposal 1: introduce a BC test for initial access as shown in Section 3 of this contribution for verification of the correspondence between the TX and RX beams during the RACH procedure, a relevant test to add to the existing connected-mode tests.** |
| [**R4-2212791**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212791.zip) | Discussion on verification of beam correspondence during initial access | vivo | **Observation 1:** It is feasible to force the UE to continuously send msg1 by prohibiting the SS from sending RAR (msg2) to the UE during the test.**Observation 2:** UE may change its Tx beam of msg1 if RAR is always not received.**Observation 3:** Defining the spherical coverage as an exact power level will restrict the beam choice during initial access which is not expected.**Proposal 1:** Whether the corresponding Tx beam will be changed and how to avoid this behavior during the test should be further discussed.**Proposal 2:** The min peak EIRP for initial access should be defined and can be 7 dB lower than the requirement in connected state.**Proposal 3:** Further discuss following options for spherical coverage in initial access:* **Option 1**: Define a specific EIRP value at N% of the distribution of radiated power.
* **Option 2:** Define the gain drop difference between Rx and corresponding Tx beam at N% of the distribution of radiated power.
* **Option 3:** Define the N% of all test point can finish access procedure successfully with corresponding Tx beam.
 |
| [**R4-2213313**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2213313.zip) | R18 Discussion on FR2 beam correspondence in initial access | OPPO | ***Observation 1: There is no common understanding in RAN4 whether the beam correspondence requirements defined up to now are only applied for RRC connected mode.******Observation 2: UE beam selection behavior under initial access and connected mode are same for UE which both are based on SSB RSRP measurement.******Observation 3: There is no limitation of beam width used in initial access, but in test the fine beam will be used which is same as connected mode since max power is scheduled in test.******Observation 4: Beam correspondence requirement is defined under max power, and PRACH max power can be achieved by power ramping.******Proposal 1: Initial access beam correspondence can be verified via PRACH minimum peak EIRP and spherical coverage requirement.******Observation 5: There is no different in Beam correspondence requirement for initial access and RRC Inactive.******Proposal 2: Same beam correspondence requirements are applied for initial access and RRC Inactive.******Observation 6: The intention and value of RAR measurement is unclear, and seems out of scope of Beam correspondence.******Observation 7: RAR measurement may change UE’s UL beam management strategy and then change the*** ***relationship to existing EIRP performance requirements.******Proposal 3: Initial access beam correspondence can focus on PRACH power measurement, and FFS the intention and value of RAR measurement and also impact to UE beam management if RAN4 pursue it.******Proposal 4: Study harmonizing beam correspondence for initial access and connected to reduce test time.*** |
| [**R4-2213374**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2213374.zip) | On beam correspondence requirement in RRC\_IDLE or RRC\_INACTIVE for Rel-18 NR FR2 | Huawei, HiSilicon | **Observation 1: A UE could be considered as meeting the ‘Beam correspondence’ requirements if the UE could meet the EIRP CDF requirements without UL sweeping.****Observation 2: UL sweeping process is based on SRS configuration in RRC\_CONNECTED mode.****Observation 3: In RRC\_IDLE and RRC\_INACTIVE mode, there is no effective process to request the UE to do UL sweeping.****Proposal 1: In RRC\_IDLE and RRC\_INACTIVE mode, 2nd approach could be adopted to verify UE’s beam correspondence requirements based on EIRP CDF requirements without UL sweeping.****Proposal 2: EIRP CDF requirements in RRC\_IDLE and RRC\_INACTIVE mode are expected to be different from existing requirements in RRC\_CONNECTED mode, taking into consideration the difference of ‘rough beam’ and ‘fine beam’.** |
| [**R4-2213761**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2213761.zip) | Workplan for NR RF requirements enhancement for frequency range 2 (FR2), Phase 3 | Nokia, Xiaomi | **Work plan** |

## Open issues summary

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

*Interested companies are expected to add their views directly under the respective issues in a dialogue-like form, i.e., identical to how the chair would record views during a f2f meeting.*

*Please add further table rows as required and do not change previous comments of your company or other companies. Answering to questions from other companies is encouraged.*

### Sub-topic 1-1

*Sub-topic description:*

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

**Issue 1-1-1: Approve workplan in R4-2213761**

* Proposals
	+ Option 1: Yes
	+ Option 2: Modification is needed
* Recommended WF
	+ TBA

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX |  |
| YYY |  |
| XXX |  |

**Issue 1-1-2: TBA**

* Proposals
	+ Option 1: TBA
	+ Option 2: TBA
* Recommended WF
	+ TBA

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX |  |

### Sub-topic 1-2

*Sub-topic description*

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

**Issue 1-2-1: TBA**

* Proposals
	+ Option 1: TBA
	+ Option 2: TBA
* Recommended WF
	+ TBA

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX |  |

### Sub-topic 1-X: Other

*Sub-topic description:*

*In this sub-topic companies are invited to bring issues to the attention of the group, which have not been captured in the previous sub-topics.*

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX |  |

### 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 | Title, Source |
| Company A |
| Company B |
|  |
| YYY | Title, Source |
| 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:* |
|  |  |

*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*

*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)

## Summary on 2nd round (if applicable)

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

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

# Topic #2: Title

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

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-20xxxxx | Company A | Proposal 1:Observation 1: |
|  |  |  |

## Open issues summary

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

*Interested companies are expected to add their views directly under the respective issues in a dialogue-like form, i.e., identical to how the chair would record views during a f2f meeting.*

*Please add further table rows as required and do not change previous comments of your company or other companies. Answering to questions from other companies is encouraged.*

### Sub-topic 1-1

*Sub-topic description:*

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

**Issue 1-1-1: TBA**

* Proposals
	+ Option 1: TBA
	+ Option 2: TBA
* Recommended WF
	+ TBA

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX |  |
| YYY |  |
| XXX |  |

**Issue 1-1-2: TBA**

* Proposals
	+ Option 1: TBA
	+ Option 2: TBA
* Recommended WF
	+ TBA

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX |  |

### Sub-topic 1-2

*Sub-topic description*

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

**Issue 1-2-1: TBA**

* Proposals
	+ Option 1: TBA
	+ Option 2: TBA
* Recommended WF
	+ TBA

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX |  |

### Sub-topic 1-X: Other

*Sub-topic description:*

*In this sub-topic companies are invited to bring issues to the attention of the group, which have not been captured in the previous sub-topics.*

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX |  |

### 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 | Title, Source |
| Company A |
| Company B |
|  |
| YYY | Title, Source |
| 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:* |
|  |  |

*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*

*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)

## 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”* |
|  |  |

# Recommendations for Tdocs

## 1st round

**New tdocs**

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

**Existing tdocs**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Tdoc number** | **Revised to** | **Title** | **Source** | **Recommendation**  | **Comments** |
| R4-22xxxxx |  | 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** | **Revised to** | **Title** | **Source** | **Recommendation**  | **Comments** |
| R4-22xxxxx |  | CR on … | XXX | Agreeable, Revised, Merged, Postponed, Not Pursued |  |
| R4-22xxxxx |  | WF on … | YYY | Agreeable, Revised, Noted |  |
| R4-22xxxxx |  | 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