**3GPP TSG-RAN WG4 Meeting # 99-e R4-21xxxxx**

**Electronic Meeting, 19 – 27 May 2021**

**Agenda item:** 5.1.1.2, 5.1.2.1, 5.1.4.1

**Source:** Moderator (Apple)

**Title:** Email discussion summary for [99e][319] Demod\_R16\_Maintenance\_Part1

**Document for:** Information

# Introduction

In this email thread for Rel-16 NR Demod Maintenance, we will treat the following topics:

* Rel-16 eMIMO Performance Maintenance (5.1.1.2)
	+ PDSCH demod requirements with multi-TRxP
	+ PMI reporting with eType II codebook
* Rel-16 UE power saving performance Maintenance (5.1.2.1)
* Rel-16 URLLC performance Maintenance
	+ UE Demod (5.1.4.1.1, 5.1.4.1.2)
	+ BS Demod (5.1.4.1.3)

# Topic #1: eMIMO Performance Maintenance

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [R4-2109202](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109202.zip) | Intel Corporation | **Simulation results for mTRP Tx schemes**Simulation Results for PDSCH demod - mTRP |
| [R4-2109203](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109203.zip) | Intel Corporation | **CR: Performance requirements for single-DCI based multi-TRP Repetition Tx schemes (R16)**Remove square brackets from performacne requriements for single-DCI based multi-TRP Repetition Tx schemes |
| R4-2109204 | Intel Corporation | **CR: Performance requirements for single-DCI based multi-TRP Repetition Tx schemes (R17)**Cat A CR |
| [R4-2109338](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109338.zip) | Apple | **CR : TRS config update for multi-TRxP test cases - R16**Updated TRS config for TRxP1 and TRxP2 to have slot offset [5,6] and [15,16] for FDD and [10,11] and [30,31] for TDD.For the multi-TRxP test cases the TRS from TRxP1 and TRxP2 associated with different TCI states for PDSCH are scheduled on the same slot. This requires additional UE capability (*maxSimultaneousResourceSetsPerCC*) to indicate the number of TRS resource sets UE can track simultaenously. The multi-TRxP test cases don’t have applicability based on this additional UE capability. We need to either update the applicability of multi-TRxP based on this additional capability or update the test configuration to have TRS from different TRxP on different slots. A detailed description is provided in R4-2109348 for HST-DPS. We recommend to extend the applicability by changing the TRS config for TRxP1 and TRxP2 to have slot offset [5,6] and [15,16] for FDD and [10,11] and [30,31] for TDD to have the same relative delta between TRS from 2 TRxP. |
| R4-2109339 | Apple | **CR : TRS config update for multi-TRxP test cases - R17**Cat A CR |
| R4-2109809 | Samsung | **Simulation results summary for eMIMO performance requirements**Placeholder for results collection |
| [R4-2110572](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110572.zip) | Huawei, HiSilicon | **CR : Updating PDSCH requirement with Single-DCI based SDM scheme**Update the requirement for single-DCI based SDM scheme based on the newly submitted results and agreements |
| [R4-2110573](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110573.zip) | Huawei, HiSilicon | **CR : Updating PDSCH requirement with Multi-DCI based transmission scheme**Update the requirement for multi-DCI based transmission scheme based on the newly submitted results and agreements |
| R4-2110574 | Huawei, HiSilicon | **CR : Updating PDSCH requirement with Single-DCI based SDM scheme**Cat A CR |
| R4-2110575 | Huawei, HiSilicon | **CR : Updating PDSCH requirement with Multi-DCI based transmission scheme**Cat A CR |
| [R4-2110638](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110638.zip) | Ericsson | **Update of simulation results of PDSCH with multi-TRP transmission**Simulation Results for PDSCH demod - mTRP |
| [R4-2109269](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109269.zip) | Nokia, Nokia Shanghai Bell | **CR: Corrections to align the description of PMI test cases with TS 38.214**Alignment of description and parameter configuration with TS 38.214Change 1: replace “transmission mode 1” with “transmission scheme 1” (2 instances in Sec. 6.3 and 1 instance in Sec. 8.3). See Sec. 5.1.1.1 of 38.214.Change 2: replace “Multiple PMI” with “Single PMI” for the sections related to Enhanced Type II Codebook (4 instances in the titles of Sec. 6.3.2.1.6, 6.3.2.2.6, 6.3.3.1.6 and 6.3.3.2.6). For eType II, there is always single PMI being reported indicating the precoding matrices for all configured PMI subbands. See, for example, Sec 5.2.2.2.5 of TS 38.214: “The parameter 𝑅 is configured with the higher-layer parameter numberOfPMI-SubbandsPerCQI-Subband. This parameter controls the total number of precoding matrices $N\_{3}$ indicated by the PMI”Change 3: replace the parameter value of pmi-FormatIndicator from “Subband” to “Not configured” (4 instances in Tables 6.3.2.1.6-1, 6.3.2.2.6-1, 6.3.3.1.6-1 and 6.3.3.2.6-1). According to Sec. 5.2.1.4 of TS 38.214: “a UE is not expected to be configured with pmi-FormatIndicator if codebookType is set to 'typeII-r16' or 'typeII-PortSelection-r16'.” |
| R4-2109270 | Nokia, Nokia Shanghai Bell | **CR: Corrections to align the description of PMI test cases with TS 38.214**Cat A CR |
| [R4-2109810](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109810.zip) | Samsung | **CR: Clean up CR for Rel-16 eMIMO PMI test cases**Remove [ ] for eMIMO PMI requirements |
| R4-2109811 | Samsung | **CR: Clean up CR for Rel-16 eMIMO PMI test cases**Cat A CR |

## Open Issues Summary

### Sub-topic 1-1 PDSCH Demod requirements with multi-TRxP

2 companies have submitted updated simulation results in this meeting. Based on updated summary of simulation results the span in alignment results for 3 test cases is > 3. Need to decide on how to handle the outlier results and define requirements.

**Issue 1-1-1: Update of requirements for PDSCH demod requirements with multi-TRP**

* Proposals
	+ Option 1: for the test cases that result span in ideal results among companies' larger than [2.5]dB, RAN4 does not consider the farthest result(s) from the ideal AVERAGE value, until the span becomes within [2.5]dB. The final requirements are derived from AVERAGE impairment results with corresponding ideal results whose span is within [2.5]dB. (Agreed WF in RAN4#98e)
	+ Option 2: Consider relaxation of threshold for deriving requirements for outlier cases.
* Recommended WF
	+ Discuss further how to finalize requirements
	+ Update the simulation results summary and finalize requirements
	+ Corresponding CRs shall be updated accordingly

**Issue 1-1-2: Update of TRS config for PDSCH demod requirements with multi-TRP**

* Proposals
	+ [Apple] Update TRS config for TRxP1 and TRxP2 to have slot offset [5,6] and [15,16] for FDD and [10,11] and [30,31] for TDD.
* Recommended WF
	+ Further discuss

## Companies’ views collection for 1st round

### Open issues

*Companies are encouraged to comment in the CR comments collection for Issue 1-1-2*

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | Sub-topic 1-1 Issue 1-1-1: |

### CRs/TPs comments collection

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| [R4-2109203](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109203.zip)(Intel) | Moderator: To be updated based on results summary |
| Company A |
|  |
| [R4-2109338](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109338.zip)(Apple) | Company A |
| Company B |
|  |
|  |
| [R4-2110572](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110572.zip) (Huawei) | Moderator: To be updated based on results summary |
| Company A |
|  |
|  |
| [R4-2110573](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110572.zip) (Huawei) | Moderator: To be updated based on results summary |
| Company A |
|  |
|  |
| [R4-2110638](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110638.zip) (Ericsson) | Moderator: To be updated based on results summary |
| Company A |
|  |
|  |
| [R4-2109269](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109269.zip) (Nokia) | Company A |
| Company B |
|  |
|  |
| [R4-2109810](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109810.zip) (Samsung) | 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 in 2nd round (if applicable)

## Summary from 2nd round (if applicable)

# Topic #2: UE-Power Saving Performance Maintenance

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2110168 | Intel Corporation | **CR : corrections of PDCCH-WUS requirements (R16)**1. Update of configuration structure for Normal PDCCH parameter in tables with Test Parameters
2. Remove “Number of UE antennas” parameter from Table 7.3.2.2.3-1
 |
| R4-2110169 | Intel Corporation | **CR : corrections of PDCCH-WUS requirements (R16)**Cat A CR. |

## Open Issues Summary

None

## Companies’ views collection for 1st round

### Open issues

None

### CRs/TPs comments collection

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| R4-2110168(Intel) | Company A |
| Company B |
|  |

## Discussion in 2nd round (if applicable)

## Summary from 2nd round (if applicable)

# Topic #3: URLLC UE Demod Maintenance

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [R4-2109190](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109190.zip) | Intel Corporation | **Simulation results for UE URLLC pre-emption indication demodulation requirements**Updated simulation results |
| [R4-2109344](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109344.zip) | Apple | **CR: URLLC requirements for PDSCH slot aggregation in FR2 - R16**Removed square brackets |
| R4-2109345 | Apple | **CR: URLLC requirements for PDSCH slot aggregation in FR2 - R17**Cat A CR |
| [R4-2110561](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110561.zip) | Huawei, HiSilicon | **CR : Cleanup of UE performance requirements for FR1 URLLC PDSCH repetitions over multiple slots (Rel-16)**The bracket of SNR values for FR1 URLLC PDSCH repetitions over multiple slots are removed. |
| [R4-2110562](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110562.zip) | Huawei, HiSilicon | **CR : Cleanup of UE performance requirements for FR1 URLLC PDSCH repetitions over multiple slots (Rel-17)**Cat A CR |
| [R4-2110742](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110742.zip) | Ericsson | **CR: Finalization of URLLC pre-emption and mapping type B requirements**Remove square brackets around requirement values |
| R4-2110743 | Ericsson | **Finalization of URLLC pre-emption and mapping type B requirements**Cat A CR |
| [R4-2110942](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110942.zip) | MediaTek inc. | **CR : Editorial correction to UE performance requirements for FR1 pre-emption and FR2 PDSCH mapping Type B R16**1. Modifiy reference channels for FR1 pre-emption indication requirements, including 2Rx and 4Rx
2. Correct the table number in section 5.2.2.2.8
3. Added FRC for FR1 pre-emption indication requirements
4. Correct the table number in section 7.2.2.2.3
 |
| R4-2110943 | MediaTek inc. | **CR : Editorial correction to UE performance requirements for FR1 pre-emption and FR2 PDSCH mapping Type B R17**Cat A CR |
| [R4-2111349](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2111349.zip) | Qualcomm Incorporated | **CR : Corrections for FR2 URLLC Requirements**1. FRC number for FR2 URLLC PDSCH Repetitions Requirements is corrected.
2. Table numbers for FR2 PDSCH Type B Requirements are corrected.
 |
| R4-2111529 | Qualcomm Incorporated | **CR : Corrections for FR2 URLLC Requirements**Cat A CR |
| [R4-2109346](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109346.zip) | Apple | **CR : CQI Reporting requirements with Table3 - R16**Remove square brackets |
| R4-2109347 | Apple | **CR : CQI Reporting requirements with Table3 - R17**Cat A CR |

## Open Issues Summary

### Sub-topic 3-1 Update of simulation results for pre-emption indication

* Proposals
	+ 1 company submitted updated simulation results for pre-emption indication requirements
* Recommended WF
	+ Request TDoc for updated simulation results collection
	+ Update corresponding CR covering pre-emption indication requirements.

## Companies’ views collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | Sub-topic 3-1  |

### CRs/TPs comments collection

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| R4-2109344(Apple) | Company A |
| Company B |
|  |
|  |
| R4-2110561(Huawei) | Moderator: Cat A CR is already uploaded |
| Company A |
|  |
|  |
| R4-2110742(Ericsson) | Company A  |
| Company B |
|  |
|  |
| R4-2110942(MediaTek) | Company A  |
| Company B |
|  |
|  |
| R4-2111349(Qualcomm) | Company A  |
| Company B |
|  |
|  |
| R4-2109346 (Apple) | Company A  |
| Company B |
|  |
|  |

## Discussion in 2nd round (if applicable)

## Summary from 2nd round (if applicable)

# Topic #4: URLLC BS Demod Maintenance

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2109191 | Intel Corporation | **Simulation results for BS URLLC demodulation requirements**Updated simulation results |
| R4-2109602 | Ericsson | **Simulation results for URLLC PUSCH repetation A demodulation**Updated simulation results |
| R4-2109603 | Ericsson | **CR :URLLC PUSCH repetation A demodulation in TS38.104 (catF)**Removing SNR brackets in clause 8.2.7 and 11.2.2.5 of TS38.104.Update SNR value according to the latest agreement. |
| R4-2109604 | Ericsson | **CR : URLLC PUSCH repetation A demodulation in TS38.141-1 (catF)**Removing SNR brackets in clause 8.2.7.5 of TS38.141-1. |
| R4-2109605 | Ericsson | **CR : URLLC PUSCH repetation A demodulation in TS38.141-2 (catF)**Removing SNR brackets in clause 8.2.7.5 of TS38.141-2.Update SNR value according to the latest agreement. |
| R4-2109606 | Ericsson | **CR : URLLC PUSCH repetation A demodulation in TS38.104 (catA)**Cat A CR. |
| R4-2109607 | Ericsson | **CR : URLLC PUSCH repetation A demodulation in TS38.141-1 (catA)**Cat A CR. |
| R4-2109608 | Ericsson | **CR : URLLC PUSCH repetation A demodulation in TS38.141-2 (catA)**Cat A CR. |
| R4-2109710 | NTT DOCOMO, INC. | **CR : TS 38.141-2 Updates of performance requirements of PUSCH repetition type A for URLLC**Based on the result of RAN4#98-e, remove square brackets from the SNR values in Table 8.2.7.5.1-1 to Table 8.2.7.5.1-8. |
| R4-2109711 | NTT DOCOMO, INC. | **CR : TS 38.141-2 Updates of performance requirements of PUSCH repetition type A for URLLC**Cat A CR. |
| R4-2109803 | Samsung | **CR : PUSCH repetition type A and PUSCH mapping type B radiated performance requirements for TS 38.104**Remove the [] for requirements |
| R4-2109804 | Samsung | **CR : PUSCH repetition type A and PUSCH mapping type B radiated performance requirements for TS 38.104**Cat A CR. |
| R4-2110563 | Huawei, HiSilicon | **CR : TS38.104 Cleanup of BS performance requirements for URLLC FR1 PUSCH repetition Type A (Rel-16)**The SNR values are removed for FR1 PUSCH repetition Type A performance requirements. |
| R4-2110564 | Huawei, HiSilicon | **CR : TS38.104 Cleanup of BS performance requirements for URLLC FR1 PUSCH repetition Type A (Rel-17)**Cat A CR |
| R4-2110565 | Huawei, HiSilicon | **CR : TS38.141-1 Cleanup of BS conformance testing for URLLC demodulation requirements with higher BLER (Rel-16)**The bracket of SNR values are removed for FR1 PUSCH repetition Type A performance requirements. |
| R4-2110566 | Huawei, HiSilicon | **CR : TS38.141-1 Cleanup of BS conformance testing for URLLC demodulation requirements with higher BLER (Rel-17)**Cat A CR |
| R4-2110567 | Huawei, HiSilicon | **CR : TS38.141-2 Cleanup of BS conformance testing for FR2 URLLC PUSCH repetition Type A (Rel-16)**The bracket of SNR values for FR2 PUSCH repetition Type A performance requirements are removed. |
| R4-2110568 | Huawei, HiSilicon | **CR to TS38.141-2 Cleanup of BS conformance testing for FR2 URLLC PUSCH repetition Type A (Rel-17)**Cat A CR |
| R4-2110581 | Ericsson | **Simulation result summary sheet for URLLC PUSCH demodulation**Results collection |
| R4-2110588 | Nokia, Nokia Shanghai Bell | **CR : 38.104: Low latency and ultra-low BLER FR1 BS demodulation requirements**Table 8.2.8.2-1 => 0.65 is 0.5 as per [R4-2103905]Table 8.2.8.2-4 => -0 is 0 as per [R4-2103905]Table 8.2.6.2-7 => remove space |
| R4-2110589 | Nokia, Nokia Shanghai Bell | **CR : 38.104: Low latency and ultra-low BLER FR1 BS demodulation requirements**Cat A CR |

## Open Issues Summary

### Sub-topic 4-1 Requirements for PUSCH for high reliability

* Proposals
	+ 2 companies have submitted updates simulation results
* Recommended WF
	+ Update the results collection spreadsheet
	+ Capture the requirements in corresponding CRs

## Companies’ views collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | Sub-topic 4-1  |

### CRs/TPs comments collection

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| R4-2109603(Ericsson) | Company A |
| Company B |
|  |
|  |
| R4-2109604(Ericsson) | Company A |
| Company B |
|  |
|  |
| R4-2109605(Ericsson) | Company A |
| Company B |
|  |
|  |
| R4-2109710(NTT DoCoMo) | Company A |
| Company B |
|  |
|  |
| R4-2109803(Samsung)  | Company A |
| Company B |
|  |
|  |
| R4-2110563(Huawei) | Moderator: Cat A CR already uploaded |
| Company A |
| Company B |
|  |
| R4-2110565(Huawei) | Moderator: Cat A CR already uploaded |
| Company A |
| Company B |
|  |
| R4-2110567(Huawei) | Moderator: Cat A CR already uploaded |
| Company A |
| Company B |
|  |
| R4-2110588(Nokia) | Company A |
| Company B |
|  |
|  |

## Discussion in 2nd round (if applicable)

## Summary from 2nd round (if applicable)

# 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