**3GPP TSG-RAN WG4 Meeting # 99-e R4-2108444**

**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** |
| Qualcomm | Sub-topic 1-1 Issue 1-1-1: We prefer Option 2.Issue 1-1-2: As far as we understand the capability “maxSimultaneousResourceSetsPerCC”, it defines how many TCI states UE can track simultaneously. So, we think that UE will have to support maxSimultaneousResourceSetsPerCC > 1 regardless of how TRS is allocated if UE is tracking 2 TCI states, which is true for all multi-TRP requirements defined in RAN4. We could not find any restriction in the spec which says that it only applies to the case where TRS is allocated on the same slot. Therefore, we don’t see how changing the TRS allocation helps. Can Apple please clarify? |
| Apple | Issue 1-1-1: With option1 - For 2 of the tests eliminating the worst outlier brings the span below 3 dB. But for 1 test 8-2, 2 results need to be removed to bring down the span. With option 2 - Based on the results the span is over 3dB, so relaxing the threshold to 3.5 dB would only help. Issue 1-1-2: To Qualcomm : We don’t see that in either UE capability or UE feature list that *maxSimultaneousResourceSetsPerCC* and *maxNumberActiveTCI-PerBWP* have any inter dependency and are defined separately. Our understanding of simultaneously track TRS is to be able to process TRS in the same slot. If the TRS from different TCI states comes in different slots, the additional UE capability is not needed in our understanding. We are fine with introducing applicability rule based on UE capability, if that is preferred.  |
| Samsung | Issue 1-1-1Basesd on results summary, most of test cases' simulation results among companies can align with gap within [2.5]dB, excepting 3 cases as case 4-1. case 7-1 and case 8-2. For the cases within [2.5]dB, we can update the requirements based on the average impairment results For the case 4-1, as per offline checking, company are fine to remove the outiler results to performance derivation For the case 7-1 and case 8-2, companies are still checking the results and update results later. Therefore, we suggest that we can come back in 2nd round to check, if there is any results updated during this meetingTherefore, we can come back in 2nd round, if there is any results updated.Issue 1-1-2We donot prefer to change the TRS configuration, it may have impact on performance requirement, meanwhile, the FRC should be updated if TRS configuration is changed. The 2 activated TCI states is associated with two TRPs , even changing TRS from different TCI states comes in different slots, UE should support to track 2 activated TCI states configured by two PDCCHs if UE suport multi-DCI with multi-TRP transmission, considering this feature is a UE opional feature |
| Huawei, HiSilicon | Issue 1-1-2Similar agreements can be applied here as the discussion on DPS. For our understanding, UE tracks two TRS resource sets simultaneously doesn’t mean UE tracks two TRS resource sets at the same slot, it means UE maintain two TRS resource sets measurement results simultaneously.maxSimultaneousResourceSetsPerCC indicates the maximum number of TRS resource sets per CC which the UE can track simultaneouslyIn this case, maxSimultaneousResourceSetsPerCC is needed to set larger than 1, no matter how the TRS is configured.  |
| Ericsson | Issue 1-1-1:Regarding the test case 4-1 (sDCI SDM test 1a TDD 2Rx), our result is outlier. We are ok to set requirement without our result for 4-1. Regarding the test cases 7-2/8-2, we slight prefer Option 2, if the results do not change during the meeting. Issue 1-1-2:Follow the agreements on [320] Issue 3-1: |
| Intel | Issue 1-1-1: Support Option 1 that is previous agreement.Issue 1-1-2:We should follow the agreements on [320] Issue 3-1. |

### 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) | Qualcomm: It may have to be revised based on outcome of Issue 1-1-2. |
| Apple: If the proposed change is agreeable, the FRC tables also need to be updated. Depending on discussion, we are also fine to update the applicability based on UE capability.  |
| Huawei: We prefer to have applicability updated.  |
| Apple2: Based on agreements in GTW session for similar issue related to HST-DPS ([320] Issue 3-1), the multi-TRP test cases will be applicable to UEs that supports *maxSimultaneousResourceSetsPerCC* ≥ 2 and *maxNumberActiveTCI-PerBWP* ≥ 2 in addition to the capability for different multi-TRP transmission schemes.We will revise the CR accordingly.  |
| [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 |
| Huawei: further update the requirement. |
|  |
|  |
| [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 |
| Qualcomm: Please update reason and consequences in the cover sheet to say multi-DCI instead of single-DCI based SDM scheme. |
| Huawei: further update the description and requirements.  |
|  |
| [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) | Qualcomm: Agree with Change 1 and Change 3. However, we don’t agree with Change 2. UE will have to report separate PMI for each subband, so it should still be called Multiple PMI. |
| Apple: Changes 1, 2 are fine. But we have the same comments as Qualcomm for change 2. It should be multiple PMI for SB PMI reporting.  |
| Samsung: Similar comment as Qualcomm and Apple for change 2, Different with wideband reporting, multiple PMI is reporting separately for each subbandFor change 1 and change 3, we are fine |
| Huawei: Similar comments as Qualcomm, Apple and Samsung.  |
| Nokia: Regarding Change 2, as PMI is a precoding matrix indicator, the Type I and Type II PMI’'s are defined as multiple i2 indicators, one for each subband (or wideband) as defined in 38.214 Sections 5.2.2.2.1-5.2.2.2.4. The reporting is defined in a similar manner in 38.212 Section 6.3.1.1.2 (See Table 6.3.1.1.2-11). On the other hand, the eType II codebooks (38.214 Sections 5.2.2.2.5 and 5.2.2.2.6) are designed to feed back a single i2 indicator which indicates multiple matrices (one for each PMI subband) which are extracted from the PMI. Thus, the eType II PMI’'s are single indicators.Here is the part of 5.2.1.4 of 38.214 that relates to that: |
| [R4-2109810](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109810.zip) (Samsung) | Apple: Ok with update.  |
| Company B |
|  |
|  |

## Summary for 1st round

### Open issues

|  |  |
| --- | --- |
|  | **Status summary**  |
| **Sub-topic #1-1** | *Tentative agreements:***Issue 1-1-2: Update of TRS config for PDSCH demod requirements with multi-TRP**The multi-TRP test cases will be applicable to UEs that supports *maxSimultaneousResourceSetsPerCC* ≥ 2 and *maxNumberActiveTCI-PerBWP* ≥ 2 in addition to the capability for different multi-TRP transmission schemes.*Candidate options:***Issue 1-1-1: Update of requirements for PDSCH demod requirements with multi-TRP*** + Option 1: Eliminate outlier results to reduce span to ≤ [2.5] dB as agreed WF in RAN4#98e.
	+ Option 2: Consider relaxation of threshold for deriving requirements for outlier cases.

*Recommendations for 2nd round:***Issue 1-1-1: Update of requirements for PDSCH demod requirements with multi-TRP**Companies are encouraged to check and update simulation results for multi-TRP transmission schemes. Based on agreed WF in RAN4#98-e, outlier results shall be eliminated to reduce the span in alignment results to define SNR requirements.  |

### CRs/TPs

TDoc recommendations are provided in Section 5.

## 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 |
|  |

## Summary for 1st round

### Open issues

None

### CRs/TPs

TDoc recommendations are provided in Section 5.

## 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** |
| Apple | Sub-topic 3-1 We would like to request Huawei to share the summary of simulation results for Intel’s results to be updated.  |
| Intel | We also would like to check whether TDD results from all companies are aligned with simulation assumptions (i.e. pre-emption pattern) which were agreed in RAN4 98-e-bis. |
| Huawei | The simulation results were uploaded (R4-2101333) in the folder of ”Simulation results”. |

### 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) | Apple: The requirements should be updated based on updated summary for pre-emption indication. |
| Company B |
|  |
|  |
| R4-2110942(MediaTek) | Qualcomm: Part of the CR overlaps with Qualcomm CR R4-2111349. Can Qualcomm CR be merged in MediaTek CR?  |
|  Intel: Suggestion on CR drafting for FRC: update existing table with adding new column rather than removing on whole table and adding of new table. |
|  |
|  |
| R4-2111349(Qualcomm) | Company A  |
| Company B |
|  |
|  |
| R4-2109346 (Apple) | Company A  |
| Company B |
|  |
|  |

## Summary for 1st round

### Open issues

|  |  |
| --- | --- |
|  | **Status summary**  |
| **Sub-topic #3-1** | *Tentative agreements:***Update of simulation results for pre-emption indication** Simulation results summary shall be updatyed based on updated results.*Recommendations for 2nd round:***Update of requirements for pre-emption indication** SNR requirements shall be updated CRs corresponding to updated value.  |

### CRs/TPs

TDoc recommendations are provided in Section 5.

## 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  |
| Samsung | We are fine with recommended WF. Considering there are still results updated in this meeting, would like to check whether the [] is kept or to be removed? |
| Nokia, Nokia Shanghai Bell | We are fine with updating the current CRs, under the condition that [] are removed this meeting.This topic should be closed for good this meeting; notwithstanding potential future necessary corrections, that are very strongly technically justified. |

### 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)  | [Nokia] Does a potential agreement in Sub-topic 4-1, impact the FR2 high reliability values? |
| Company B |
|  |
|  |
| R4-2110563(Huawei) | Moderator: Cat A CR already uploaded@Huawei, I will include the request for revision for the Cat F and Cat A CRs in TDoc recommendations.  |
| Huawei: the SNR values should be updated.To moderator: The Cat A CRs were uploaded by mistake, as the SNR values should be updated, 3 new tdoc number are needed. I will ask for the new tdoc number in [300]. Sorry for the mistake. |
|  |
|  |
| R4-2110565(Huawei) | Moderator: Cat A CR already uploaded |
| Huawei: the SNR values should be updated. |
| Company B |
|  |
| R4-2110567(Huawei) | Moderator: Cat A CR already uploaded |
| Huawei: the SNR values should be updated. |
| Company B |
|  |
| R4-2110588(Nokia) | Company A |
| Company B |
|  |
|  |

## Summary for 1st round

### Open issues

|  |  |
| --- | --- |
|  | **Status summary**  |
| **Sub-topic #4-1** | *Tentative agreements:***Requirements for PUSCH for high reliability** Simulation results summary shall be updated based on updated results.Requirements are finalized in this meeting.*Recommendations for 2nd round:***Requirements for PUSCH for high reliability** SNR requirements shall be revised in CRs corresponding to updated value.  |

### CRs/TPs

TDoc recommendations are provided in Section 5.

## Discussion in 2nd round (if applicable)

## Summary from 2nd round (if applicable)

# Recommendations for Tdocs

## 1st round

**New tdocs**

|  |  |  |
| --- | --- | --- |
| **Title** | **Source** | **Comments** |
| Summary of simulation results of NR UE demod with higher BLER (FR1 and FR2) | Huawei, HiSilicon | Updated summary of results |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation**  | **Comments** |
| **eMIMO Performance** |
| [R4-2109203](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109203.zip) | CR to TS 38.101-4: Performance requirements for single-DCI based multi-TRP Repetition Tx schemes | Intel | Revised |  |
| [R4-2109338](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109338.zip) | CR to 38.101-4 on TRS config update for multi-TRxP test cases - R16 | Apple | Revised |  |
| [R4-2110572](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110572.zip) | CR for 38.101-4: Updates on PDSCH requirement with Single-DCI based SDM scheme | Huawei, HiSilicon | Revised |  |
| R4-2110573 | CR for 38.101-4: Updates on PDSCH requirement with Multi-DCI based transmission scheme | Huawei, HiSilicon | Revised |  |
| [R4-2109269](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109269.zip) | Corrections to align the description of PMI test cases with TS 38.214 | Nokia, Nokia Shanghai Bell | Revised |  |
| [R4-2109810](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109810.zip) | Clear up CR for Rel-16 eMIMO PMI test cases | Samsung | Agreeable |  |
| **UE Power Saving** |
| R4-2110168 | CR on corrections of PDCCH-WUS requirements | Intel | Agreeable |  |
| **URLLC UE Demod** |
| [R4-2109344](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109344.zip) | CR: URLLC requirements for PDSCH slot aggregation in FR2 - R16 | Apple | Agreeable |  |
| [R4-2110561](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110561.zip) | CR : Cleanup of UE performance requirements for FR1 URLLC PDSCH repetitions over multiple slots (Rel-16) | Huawei, HiSilicon | Agreeable |  |
| [R4-2110742](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110742.zip) | CR: Finalization of URLLC pre-emption and mapping type B requirements | Ericsson | Revised |  |
| R4-2110942 | CR : Editorial correction to UE performance requirements for FR1 pre-emption and FR2 PDSCH mapping Type B R16 | MediaTek | Revised | Also include changes from R4-2111349. |
| R4-2111349 | CR : Corrections for FR2 URLLC Requirements | Qualcomm | Merged | Merged with R4-2110942 |
| [R4-2109346](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109346.zip) | CR : CQI Reporting requirements with Table3 - R16 | Apple | Agreeable |  |
| **URLLC BS Demod** |
| R4-2109603 | CR :URLLC PUSCH repetation A demodulation in TS38.104 (catF) | Ericsson | Merged | Merged to R4-2109803 |
| R4-2109604 | CR : URLLC PUSCH repetation A demodulation in TS38.141-1 (catF) | Ericsson | Merged | Merged to R4-2110565 |
| R4-2109605 | CR : URLLC PUSCH repetation A demodulation in TS38.141-2 (catF) | Ericsson | Merged | Merged to R4-2109710 |
| R4-2109710 | CR : TS 38.141-2 Updates of performance requirements of PUSCH repetition type A for URLLC | NTT DOCOMO, INC. | Revised | Capture revised SNR requirements for FR1 and FR2, R4-2110567 |
| R4-2109803 | CR : PUSCH repetition type A and PUSCH mapping type B radiated performance requirements for TS 38.104 | Samsung | Revised | Capture revised SNR requirements for FR1 and FR2, R4-2110563 |
| R4-2110563 | CR : TS38.104 Cleanup of BS performance requirements for URLLC FR1 PUSCH repetition Type A (Rel-16) | Huawei, HiSilicon | Merged | Merged with R4-2109803 |
| R4-2110564 | CR : TS38.104 Cleanup of BS performance requirements for URLLC FR1 PUSCH repetition Type A (Rel-17)Cat A CR | Huawei, HiSilicon | Not pursued |  |
| R4-2110565 | CR : TS38.141-1 Cleanup of BS conformance testing for URLLC demodulation requirements with higher BLER (Rel-16) | Huawei, HiSilicon | Revised | Capture revised SNR requirements |
| R4-2110566 | CR : TS38.141-1 Cleanup of BS conformance testing for URLLC demodulation requirements with higher BLER (Rel-17)Cat A CR | Huawei, HiSilicon | Revised | Capture revised SNR requirements |
| R4-2110567 | CR : TS38.141-2 Cleanup of BS conformance testing for FR2 URLLC PUSCH repetition Type A (Rel-16) | Huawei, HiSilicon | Merged | Merged to R4-2109710 |
| R4-2110568 | CR to TS38.141-2 Cleanup of BS conformance testing for FR2 URLLC PUSCH repetition Type A (Rel-17)Cat A CR | Huawei, HiSilicon | Not pursued |  |
| R4-2110588 | CR : 38.104: Low latency and ultra-low BLER FR1 BS demodulation requirements | Nokia, Nokia Shanghai Bell | Agreeable |  |

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