**3GPP TSG RAN WG1 #106-e R1-2106863**

**e-Meeting, August 16th – 27th, 2021**

**Agenda item:** 7.2.6

**Source:** Moderator (Samsung)

**Title:** Summary for Rel.16 NR eMIMO maintenance

**Document for:** Discussion and Decision

1. Introduction

The moderator summary of the maintenance-related issues raised in the submitted contributions for Rel.16 NR\_eMIMO maintenance is given below. The listed maintenance issues are under the usual designations:

* LP: low-PAPR RS
* MB: Multi-beam operation
* MT: Multi-TRP
* MU: Type-II enhancement for MU-CSI
* UL: UL full power transmission
* O: Other

An initial assessment on each of the issues is given (but can be revised based on the outcome of the discussion during the preparation week). The assessment will be used as a basis to select four issues (per chairman instruction) for further discussion in the upcoming weeks.

* *High priority (H):* this includes high-priority item (essential, pending issues, broken spec components) and proposed editorial changes that either enhance the clarity of the specs or correct mistakes
* *Non-essential (N)*: this includes all other purposes such as spec optimization and low priority issues
* *Editorial (E)*: this includes editorial issues that will be handled as editorial CRs (to be communicated to the editors/chairs) and thereby not counted toward the four-thread quota

1. Maintenance issues

The issues are summarized in the following table:

**Table 1 Summary**

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| **#** | **Issue (summary of CR proposal)** | **Companies** | **Initial assessment** | **Company inputs (if any)** |
| MB.1 | Clarifying that for multiple slots of PUCCH, the applied same spatial setting is determined in the first slot of the multiple slots. Besides, one typo for Clause 7.3.1 is corrected.  FL: this is for clarification. Essentiality of this CR depends on group’s view whether current wording can create such ambiguity | ZTE | N | Apple: Disagree with FL’s assessment. We think there is ambiguity in current spec, and it is reasonable to fix it. |
| MB.2 | Clarify that the slot k is counted based on the last slot with ACK transmission for the action time for MAC CE based pathloss RS update  FL: this seems a common issue for all spec text describing ack timing and the last slot would be a common understanding of the group | Apple | N | Apple: Disagree with FL’s assessment. We agree that there are similar issues for other MAC CE, but we can only discuss this PC MAC CE under this agenda, since it was introduced in this agenda. We are open to discuss the issue in general if companies are fine. Without any conclusion or agreement, we cannot say something is common understanding. Therefore, we think this should be fixed. |
| MB.3 | Replace *spatialRelationInfo* with spatial relation to clarify UE behavior when both features of default spatial relation and simultaneous multi-CC spatial relation update are enabled for a CC.  FL: discussed in #102-e pre-phase but could not conclude this. Either adopting the CR or making a conclusion to preclude this case would be necessary. | Vivo | H | Apple: Disagree with FL’s assessment. This introduces a new feature and we have mentioned that this new feature has a problem when gNB updates the beam for CORESET in different CCs. |
| MB.4 | To correct that for SCell candidate beam detection, UE should indicate whether it identifies one new beam instead of one new beam from CSI-RS and another one new beam from SSB. (R1-2107717)  FL: The correction is aligned with previous agreement and suggest considering it as “E” | Apple | E | Apple: Agree with FL’s assessment. |
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| MT.1 | In R1-2106539, ZTE suggested to Clarifying that for a same group of candidate PDSCHs corresponding to a same  value, the UE does not expect to receive more than one PDSCH in a same DL slot per TRP rather than across two TRPs for multi-DCI based MTRP in section 9.1.2.1 of 38.213.  FL: this is a good clarification for the cases of non-mDCI-based mTRP and m-DCI based mTRP. Suggest to correct it | ZTE | H | Apple: We suggest we mark it as “E”. This does not require new agreement. |
| MT.2 | R1-2106934 suggests to correct on Typo in 5.1.6.1.1 of 38.214: correct “type-A” to “typeA”  FL: typo correction | CATT | E | Apple: Agree with FL’s assessment. |
| MT.3 | R1-2107202 suggest to clarify in Section 5.1 of 38.214 that “the UE is expected to be scheduled with the same active BWP and the same SCS” is only applied to PDCCHs associated with different values of CORESETPoolIndex.  FL: As in previous agreement, the UE expects same BWP and SCS for PDSCHs scheduled by different TRPs in m-DCI based mTRP. This correction is aligned with previous agreement. | OPPO | E | Apple: Agree with FL’s assessment. |
| MT.4 | R1-2107320 suggests to Specify that each PDSCH repetition of TDMschemeA and FDMschemeB is counted separately for data rate limitation in Section 5.1.3 of 38.214.  FL: current specification of data rate limitation does not cover the case of mTRP repetition schemes with > 1 PDSCH repetition in one slot. So suggest to discuss this issue and make specification | Qualcomm | H | Apple: We suggest we mark it as “E”. This does not require new agreement. |
| MT.5 | R1-2107990 (along with the discussion paper R1-2107989) suggest to specify the default TCI state for AP CSI-RS for the case of that trigger PDCCH and CSI-RS has different SCS in mTRP systems.  FL: This CR suggests to specify the default TCI state for AP CSI-RS in cross-carrier scheduling case for mTRP systems. The default TCI state for PDSCH of mTRP in cross-carrier scheduling case was discussed in previous meeting and we made the following conclusion in RAN1#105-e meeting:  **Conclusion**  **No spec change is needed in Rel-16 for the issue of default TCI states of multi-TRP PDSCH in the case of cross-carrier scheduling**  **For the issue of default TCI state of AP CSI-RS in cross-carrier scheduling, we might discuss and at least make a conclusion.** | Vivo | H | Apple: Since we concluded in last meeting no further conclusion on default beam for PDSCH in R16, we do not think it is necessary to enhance default beam for CSI-RS. The default beam behavior should be common for PDSCH and CSI-RS, since UE is not able to generate >2 default beams. |
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| MU.1 | R1-2106993: Clarification that PMI component i1,2 may not be reported  FL: Valid and editorial | CATT | E | Apple: Agree with FL’s assessment. |
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| O.1 | R1-2106470: Correction on QCL acquisition in TS38.214  Claim: The description “*if the qcl-Type is set to 'typeD' of the PDSCH DM-RS is different from that of the PDCCH DM-RS with which they overlap in at least one symbol*” is unclear and not aligned with agreement in RAN1#92 (stating irrespective of the time offset between the reception of the DL DCI and the corresponding PDSCH)  FL: Claim seems valid and needs some discussion | Huawei, HiSi | H | Apple: We suggest we mark it as “E”. This does not require new agreement. |
| O.2 | R1-2106471: Correction on DM-RS position in TS38.211  Remove the placeholder in the table 7.4.1.1.2-4 in TS 38.211, where new values are introduced in Rel-16  FL: If the new values are simply placeholders, either clarification is needed or they need to be removed | Huawei, HiSi | H | Apple: We suggest we mark it as “E”. This does not require new agreement. |
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1. Discussion and proposal

From the inputs shared by participating companies during the preparation phase, the following **observation** can be made:

* The following issues can be handled as E (a part of editorial CR):
* The following issues can be designated as H (requiring discussion and additional agreements/conclusions):

# References

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| --- | --- | --- | --- |
| 1 | R1-2106470 | Correction on QCL acquisition in TS 38.214 | Huawei, HiSilicon |
| 2 | R1-2106471 | Correction on DM-RS position in TS 38.211 | Huawei, HiSilicon |
| 3 | R1-2106538 | Clarification on default spatial setting of PUCCH with multiple slots | ZTE |
| 4 | R1-2106539 | Draft CR on number of received PDSCHs for multi-TRP transmission | ZTE |
| 5 | R1-2106863 | Summary for Rel.16 NR eMIMO maintenance | Moderator (Samsung) |
| 6 | R1-2106933 | Correction on MU-CSI enhancement | CATT |
| 7 | R1-2106934 | Correction on QCL-type set for aperiodic CSI-RS | CATT |
| 8 | R1-2107202 | Draft CR for M-DCI based M-TRP transmission | OPPO |
| 9 | R1-2107320 | Draft CR on sum data rate for tdmSchemeA and fdmSchemeB | Qualcomm Incorporated |
| 10 | R1-2107716 | Draft CR on Action Time for Pathloss Reference Signal Update | Apple |
| 11 | R1-2107717 | Draft CR on SCell candidate beam detection | Apple |
| 12 | R1-2107987 | Discussion on spatial relation update across CCs for SRS | vivo |
| 13 | R1-2107988 | Draft CR on spatial relation update across CCs for SRS | vivo |
| 14 | R1-2107989 | Discussion on default QCL assumption of AP CSI-RS in MTRP operation when the triggering PDCCH and the CSI-RS have different numerologies | vivo |
| 15 | R1-2107990 | Draft CR on default QCL assumption of AP CSI-RS in MTRP operation when the triggering PDCCH and the CSI-RS have different numerologies | vivo |
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