**3GPP TSG RAN WG1 #107-e R1-21xxxxx**

**e-Meeting, November 11th – 19th, 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 | 1. Duplicated description of “in slot n”:  “when the UE would transmit a PUCCH with HARQ-ACK information in slot n corresponding to the PDSCH carrying the activation command ~~is transmitted in slot n~~”  2. Clarify the reference SCS µ:  “…the UE assumptions on updating spatial relation for the SRS resource shall be applied for SRS transmission starting from the first slot that is after slot n+3N\_slot^(subframe,µ) where µ is the SCS configuration for the PUCCH.”  FL: Necessary corrections and they are editorial. | Huawei, HiSilicon | E | Apple: In principle, we are fine with the editorial CR for the first the change, for the second change, we think some discussion should be needed. In general, we think this can be considered as “H”, since the second change defines a new behavior.  Samsung: Agree with Moderator’s assessment for both issues. Regarding issue 2, since other parts related to MAC-CE activation in 214 also mentioned “µ is the SCS configuration for the PUCCH”, we are fine as “E”. |
| MB.2 | Clarify that gNB response for SCell-BFR is associated with a PUSCH with a same HARQ process number and a same serving cell as for the PUSCH including the BFR MAC-CE rather than just with a same HARQ process number. (R1-2110966)  FL: It seems to be a good clarification. | ZTE | H | Apple: We agree with FL proposal  Samsung: Agree with Moderator’s assessment.  LG: Fine to discuss this. |
| MB.3 | Clarify the SCS of 28 symbols based on failed serving cell(s). (R1-2110967)  FL: It was discussed twice, but there is no consensus due to concern from Qualcomm. Whether to discuss it again can be up to Qualcomm. | ZTE | H | Apple: Hopefully we can reach consensus for this issue. But if companies’ position does not change, we would suggest not to discuss this issue.  Samsung: Agree with Moderator’s assessment. Also we have similar view with Apple, if we cannot reach a consensus on this meeting, then at least a conclusion is needed that there is no consensus.  LG: Fine to discuss and agree with Apple/Samsung. |
| MB.4 | Remove an unnecessary change from editor in alignment CR in RAN1 #106b. Clarify that UE can indicate both SSB and CSI-RS for CBD to higher layer. (R1-2111851)  FL: This is an editorial change to remove one unnecessary change. | Apple | E | Apple: We agree to handle it as editorial CR  Samsung: Agree with Moderator’s assessment.  LG: we think that it is better to revise the sentence more precisely rather than adopting Apple’s TP, i.e. one candidate RS ID is reported for one SCell according to TS38.321, e.g.  For the SCell(s), upon request from higher layers, the UE indicates to higher layers whether there is at least one periodic CSI-RS configuration index or SS/PBCH block index from the set  with corresponding L1-RSRP measurement~~s~~ that is~~are~~ larger than or equal to the Qin,LR threshold, and provides the periodic CSI-RS configuration index~~es~~ or SS/PBCH block index~~es~~ from the set  and the corresponding L1-RSRP measurement~~s~~ that is~~are~~ larger than or equal to the Qin,LR threshold, if any, for each SCell. |
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| MT.1 | Add description of using Table 7.3.1.2.2-1A/2A/3A/4A for NC-JT transmission in DCI 1\_2 in 38.212 (R1-2111672)  FL: necessary editorial change | Ericsson | E | Apple: We agree to handle it as editorial CR  Samsung: Agree with Moderator’s assessment.  LG: Agree with FL’s assessment. |
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| MU.1 | Correction on RI and LI reporting  FL: Editorial. The 1st bullet may be revised as:  For Type I CSI feedback, Part 1 contains RI (if reported), CRI (if reported), CQI for the first codeword (if reported). Part 2 contains PMI (if reported) , LI (if reported) and contains the CQI for the second codeword (if reported) when RI value is larger than 4. | CATT (R1-2111219) | E | Apple: We agree to handle it as editorial CR. Both the LI part and the 2L-1 part.  Samsung: Agree that it is editorial, also agree with the FL’s revision of the 1st bullet.  LG: Agree with FL’s assessment. |
| MU.2 | mapping between K^NZ indicator and candidate values  FL: Not critical (may be a good clarification but not needed) | Qualcomm,  Huawei/HiSi | N | Samsung: non critical, but OK to clarify, e.g. similar to RI  LG: Agree with FL’s assessment. |
| MU.3 | Typo corrections  FL: Editorial | Nokia/NSB (R1-2112355) | E | Apple: We agree to handle it as editorial CR  Samsung: Agree with E  LG: Agree with FL’s assessment. |
| MU.4 | if , the value is negative  FL: This has been discussed in the past. This is a corner case, will not in practice almost surely. | Qualcomm | N | Samsung: agree with N. As discussed previously, this is an optimization of corner case, whose probability of occurrence is extremely small. The UE will not report such small K^NZ values. Or, the NW can avoid this from happening by configuring paraComb values that don’t have this issue.  LG: Agree with FL’s assessment. |
| MU.5 | CSI frequency granularity when Mv=1  A CSI Reporting Setting is said to have a wideband frequency-granularity if  - *reportQuantity* is set to 'cri-RI-PMI-CQI', or 'cri-RI-LI-PMI-CQI', *cqi-FormatIndicator* is set to 'widebandCQI' and *pmi-FormatIndicator* is set to 'widebandPMI', or  *- reportQuantity* is set to 'cri-RI-PMI-CQI', or 'cri-RI-LI-PMI-CQI', *codebookType* is set to 'typeII -r16' or 'typeII-PortSelection-r16' with and *cqi-FormatIndicator* is set to 'widebandCQI', or  - *reportQuantity* is set to 'cri-RI-i1' or  FL: This was agreed in RAN1#106b-e for Rel-17 FDD CSI codebook (for Mv=1). But the need for Rel-16 CB is unclear since with Mv=1 and WB CQI, WB PMI should be implied even without the added condition.  If added, this could be perceived as E. Otherwise N | Samsung | Either N or E | Apple: We are open to discuss. But we have concern since wideband frequency-granularity will impact the low latency AP-CSI reporting, i.e., Table 5.4-1 in 38.214, at least.  Samsung: since we already agreed to this for R17 codebook, the intension here is to fix this issue for R16 codebook also.  LG: It is not essential that the design of eTypeII CB in Rel-16 is mainly focused on Mv >1 case. Besides, in case of Mv=1, there is no problem for UE to report CSI. |
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| UL.1 | When higher layer parameter *ul-FullPowerTransmission* is set to 'fullpowerMode2',  - the UE can be configured with one SRS resource or multiple SRS resources with same or different number of SRS ports within an SRS resource set with *usage* set to 'codebook', and only one SRS resource in the SRS resource set may be transmitted at a given time instant.  FL: Rel-15 also supports configured 2 SRS resources for usage “codebook”, where SRS is not precoded hence gNB should configure 2 SRS resources in time non-overlapping symbols or slots | Apple | N | Apple: This issue also exists in Rel-15 as FL mentioned. But there is a UE capability on number of SRS resources for CB in Rel-15 and usually UE would report 1 for this UE capability. But for uplink full power mode 2, normally more than 1 SRS resources should be supported, then this issue become critical.  Samsung: open to discuss  LG: Agree with FL’s assessment. |
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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 | R1-2110966 | Draft CR on gNB response for SCell-BFR | ZTE |
| 2 | R1-2110967 | Draft CR on SCS determination of 28 symbols for Rel-16 SCell BFR | ZTE |
| 3 | R1-2111219 | Draft CR on MU-CSI enhancement | CATT |
| 4 | R1-2111672 | Clarification on DCI 1\_2 antenna port determination in TS 38.212 | Ericsson |
| 5 | R1-2111851 | CR on SCell Candidate Beam Detection | Apple |
| 6 | R1-2111852 | CR on SRS Transmission for Uplink Full Power | Apple |
| 7 | R1-2112195 | Discussion on UCI issues for eType II CSI | Qualcomm Incorporated |
| 8 | R1-2112355 | Corrections on eType II codebook tables | Nokia |
| 9 | R1-2112399 | Correction on the description of MAC-CE application time in TS 38.214 | Huawei, HiSilicon |
| 10 | R1-2112412 | Correction of UCI mapping for eType II codebook | Huawei, HiSilicon |
| 11 | R1-2111713 | Correction on frequency granularity of CSI based on Rel.16 Type II codebooks | Samsung |
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