**3GPP TSG RAN WG1 #102-e R1-200xxxx**

**e-Meeting, August 17th – 28th, 2020**

**Agenda item:** 8.1

**Source:** Moderator (Samsung)

**Title:** Revised moderatorsummary 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

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 six 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
	+ *H2:* The proposal can be endorsed without discussion in the upcoming weeks (i.e. unless pointed out otherwise, the moderator will propose to the chair that the proposal be endorsed by Aug 17th thereby not counted toward the six-thread quota)
* *Non-essential (N)*: this includes all other purposes such as spec optimization and low priority issues
1. Maintenance issues

The issues are summarized in the following table:

Table 1 Summary of issues

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **#** | **Issue (summary)** | **Companies** | **Initial assessment** | **Company inputs (if any)** |
| LP.1 | When Pi/2 BPSK is used for the PUSCH transmission, i.e., *DMRSuplink-r16* in the *DMRS-UplinkConfig* IE is provided, different DMRS sequence  is generated on different DMRS ports associated with different CDM group $λ$. The specification in clause 6.4.1.2.1.1 of TS 38.211 does not clearly specify  for a PTRS port  or  is based on which CDM group. | Qualcomm | N |  |
|  |
| MB.1 | Specify the pathloss RS for PUSCH scheduled by DCI format 0\_2Note: Missing piece to enable the default PLRS for PUSCH scheduled by DCI 0\_2 | OPPO | H |  |
| MB.2 | Support enabling default PL RS in FR1Note: Proposed in multiple meetings but couldn’t have chance to be discussed | Huawei/HiSi, Qualcomm | H |  |
| MB.3 | [Editorial] Align the RRC parameter names with the latest TS 38.331. TP2-TP8 from ZTE + TP from Nokia [43]Note: Obviously needed, not controversial | ZTE, Nokia/NSB | H2 |  |
| MB.4 | Support the feature of simultaneous spatial relation update across multiple BWPs/CCs when default spatial relation for SRS is enabledNote: Unresolved issue from the last meeting, priority is unclear | Support: Vivo, Sony. Not support: LGE | N | Qualcomm: This is a remaining issue from last meeting. Support to continue discussion.  |
| MB.5 | [Editorial] Clarify that RRC can provide two CC lists and the applied CC list is determined by the MAC-CE. TP1 from ZTENote: The current spec seems clear | ZTE | N |  |
| MB.6 | Exclude multi-TRP CC from the simultaneous TCI state activationNote: Motivation seems unclear | OPPO | N |  |
| MB.7 | Support the feature of default spatial relation/PL RS for multi-DCI based MTRPNote: late optimization for Rel-16, many impacts on spec as well as UE features | Apple | N |  |
| MB.8 | Clarification on measurement restrictionDefine the measurement restriction for L1-SINR, where* For two report settings, *timeRestrictionForChannelMeasurements* defines the measurement restriction for CMR, and *timeRestrictionForInterferenceMeasurements* defines the measurement restriction for dedicated IMR.

For one report setting, *timeRestrictionForChannelMeasurements* defines the measurement restriction for CMR, and *timeRestrictionForInterferenceMeasurements* defines the measurement restriction for interference measurement based on the same resources for CMRNote: Based on previous conclusion and should not take too much effort, also have impact on RAN4’s work | Support: vivo, FutureweiConcern (H should be N): Qualcomm | H | FUTUREWEI: we assume here “report setting” should be “resource setting”. Ok to discuss but assume the behavior should be the same for other type of CSI report.Qualcomm: Non-essential. The RAN1 #99 conclusion means no further discussion on this topic. UE can apply same rule for CQI to L1-SINR, no ambiguity. There are many similar issues not clarified.  |
| MB.9 | QCL assumption for CMR without QCL indicationOne of the following changes can avoid the ambiguity.* UE considers the case as an error case
	+ One way to clarify the ambiguity is considering it as an error case.
* Extending the current UE behavior
	+ According to the current specification, when a UE is configured with two Resource Settings for L1-SINR, the UE can apply same QCL-TypeD assumption for CMR resource and the corresponding IMR resource. We may extend the current UE behavior to this case.

Note: UE behavior is unclear if QCL-TypeD for CSI-RS is not provided for both CMR and IMR, but this looks to be a general issue for P-CSI-RS | Interdigital, Huawei/HiSi, OPPO | H | FUTUREWEI: This is related to the RAN4 LS R1-2006952 on scenarios of P1 CSI-RS without QCL. Also not clear whether the issue is only for QCL-TypeD or more generalQualcomm: Non-essential. If no QCL indicated, UE can use the PO beam to receive. Same as for SSB. No new rule is needed. |
| MB.10 | Various editorial issues (TP): See Appendix ANote: Obviously needed, not controversial | Apple. MTK, Sony, ZTE, APT  | H2 |  |
| MB.11 | L1-SINR report without dedicated IMRFor CMR without IMR, define the interference should be measured based on total received power on dedicated CSI-RS resource for channel measurement excluding the power of the NZP CSI-RS corresponds to interference and noise.Note: There should be legacy UE behavior for SINR measured with CMR only. In Rel-15, SS-SINR/CSI-SINR is defined with CMR only. | MTK | N |  |
| MB.12 | QCL for IMR:The agreed behavior that the QCL for IMR is based on that of CMR should exclude the case when aperiodic L1-SINR is triggered and the report setting is associated with periodic/semi-persistent CSI-RSNote: According to previous agreement, gNB should avoid the case that one CSI-RS would be with two different QCL assumption | vivo | N |  |
| MB.13 | NZP+ZP IMR:There are two alternatives:* Alt1: Add the restriction that all CMR should be QCLed w.r.t ‘QCL-TypeD’ if both NZP IMRs and ZP IMR are configured.
* Alt2: Remove NZP+ZP based interference measurement

Note: Already discussed for a few meetings without much consensus | Huawei/HiSi, LGE | N |  |
| MB.14 | Scheduling restriction for NZP IMR:In L1-SINR measurement, if the CMR is associated with a *NZP-CSI-RS-ResourceSet* with parameter *repetition* set to 'on', both the CMR and the associated IMR cannot be configured over the symbols during which the UE is also configured to monitor the CORESET.Note: According to some comments in last meeting, this seems to be a RAN4 issue. | Huawei/HiSi | N |  |
| MB.15 | EPRE for L1-SINR: When L1-RSRP is measured by NZP CSI-RS, UE should not compensate the L1-RSRP by the associated EPRE parameters.Note: Out of scope | Qualcomm  | N |  |
| MB.16 | BWP for CORESET #0 beam reset by RACH:In case of CORESET 0 beam updated by RACH, the updated beam is applied to CORESET 0 in all BWPsNote: Out of scope | Qualcomm | N |  |
| MB.17 | PUCCH/PDCCH Beam after CBRA-BFR for PCell/PSCell BFR* During contention-based BFR, if Msg.3 or Msg.A of CBRA-BFR contains BFR MAC CE, the UE shall transmit PUCCH using the spatial filter which is used for the PRACH transmission, until reconfigured/reactivated by the gNB.
* During contention-based BFR, if Msg.3 or Msg.A of CBRA-BFR contains BFR MAC CE, the UE shall monitor PDCCH in all CORESETs using QCL assumption of SSB index selected for the PRACH transmission.

Note: Out of scope | Docomo, Ericsson, Nokia/NSB, Qualcomm | N | Qualcomm: This is for SpCell BFR with BFR MAC-CE introduced in R16 in RAN2, so it is not out of scope.  |
| MB.18 | BFD RS monitoring behavior:If explicit BFD is configured before SCell fails, UE should stop monitoring the previously configured explicit BFD RS(s) after receiving the response for the step-2 MAC-CE* UE can start implicit BFD after receiving TCI activation/reconfiguration for failed SCell

Note: RAN2 issue per comments from several companies in the last meeting | Qualcomm  | N | Qualcomm: From our RAN2 folks, it does not belong to RAN2, because all BFD monitoring behavior is captured in RAN1 spec. Prefer not to direct back and forth.  |
| MB.19 | Clarification of SSB for BFD: Clarify whether SS/PBCH blocks can be provided for BFDNote: According to a previous agreement, SSB cannot be used for SCell BFD. Rel-15 CR seems to be a better place to clarify SSB for PCell/PSCell BFD | CATT | N |  |
|  |  |
| MT.1 | Closed-loop Power control for multi-DCI based related with Out-of-order operation：* As described in the note of FG 16-2a-3, the UE supporting out-of-order UL operation does not support same closed loop index for PUSCH associated with different TRPs. But in current specification, in some cases for example when all the PUSCH using default closed loop power index use the same closed loop index. That cause issues. Furthermore, the UE behavior with that note seems not clear, as suggested by ZTE [6].
* ZTE [6] proposed to specify in TS 38.213 that if the UE supports out-of-order, the UE expects to be configured with different l values for PUSCH scheduled by different TRP.
* OPPO [15] proposed to clarify in TS 38.213 that the default loop index for PUSCH/PUCCH associated with CORESETPoolIndex = 1 is l = 1.

and PDCCH prioritization based QCL-TypeD for PDCCH in Multi-DCI based transmission* ZTE[6] proposed to support two QCL-TypeD for PDCCH reception at a given time in M-DCI.
* Intel [14] proposed to extend the PDCCH prioritization based on QCL-TypeD to M-DCI multi-TRP operation.
* Ericsson [36] proposed that PDCCH QCL-TypeD priority rule is applied within CORESETs from the same TRP for the UE supporting two simultaneous QCL-TypeDs.
* Qualcomm [41] proposed that in M-DCI based multi-TRP, priority rules shall be defined within CORESETs within the same TRP.
* Nokia [45] proposed that for a UE capable reception of two different QCL-TypeD, the PDCCH monitoring priority rule based QCL-TypeD apply within CORESETs with the same CORESETPoolIndex.

Note: The UE could meet difficulty to support uplink out-of-order operation due to the note added in FG 16-2a-3 and the current specification on closed loop power control index. | ZTE, Intel, Ericsson, Qualcomm, Nokia/NSB, OPPO | H | FUTUREWEI: it is not clear what exact the issue intended here. It may help to list the related contributions.Qualcomm: For the first issue (closed loop power control), the note is related to UE capability discussion. We do not see any specification impact in 38.213 due to the note. Hence, we do not agree that the first issue is “H”. For the second issue (QCL-TypeD), we are supportive. In addition, this issue is closely related to MT.13 and they should be discussed together.  |
| MT.2 | PDSCH processing time for URLLCScheme 3Note: missing for scheme 3 in the spec | Huawei/HiSi, Qualcomm  | H |  |
| MT.3 | Various editorial changes (TP): see Appendix B Note: still need discussion | Vivo, Spreadtrum, Sharp, ZTE, OPPO, CATT, LGE, Huawei/HiSi | H | Qualcomm: For issue MT.3.2, the first sentence of paragraph mentions “Independent of the configuration of *tci-PresentInDCI* and *tci-PresentInDCI-ForFormat1\_2*”, which should be applicable to all parts of the paragraph. From our point, the structure of the paragraph can be enhanced for better readability. Issue MT.3.8 is also in the same category.For issue MT.3.5, spec mentions “UE shall separately apply the procedures described in Clauses 9.1 and 9.2.3 for reporting HARQ-ACK information …” which implies that a single-TRP CC is not considered two times. Even if clarification is needed, it should be captured in the right place.  |
| MT.4 | Default QCL for AP CSI-RS in multi-DCI based M-TRPNote: discussed in previous meeting, no conclusion, can be considered optimization  | vivo, ZTE, Apple, NTT DOCOMO, Qualcomm, Nokia | N |  |
| MT.5 | Default TCI-state for PDSCH of cross-carrier scheduling in multi-DCI based M-TRPNote: optimization | vivo, Qualcomm | N |  |
| MT.6 | CSI/SR UCI overlapping with two HARQ-ACK PUCCH /PUSCH of two different TRPsNote: can be resolved via implementation | Vivo | N |  |
| MT.7 | Sub-slot based HARQ-ACK feedback in multi-DCI based multi-TRPNote: current spec is clear | vivo | N |  |
| MT.8 | PDSCH overlapping with PDCCH from different TRPNote: current spec is clear | vivo | N |  |
| MT.9 | Active BWP operation in multi-DCI based M-TRP systemNote: optimization | ZTE, Lenovo/MotM, NTT DOCOMO | N |  |
| MT.10 | SPS transmission in multi-DCI based M-TRPNote: optimization | Samsung, Qualcomm  | N | Qualcomm: We do not agree with the note. This issue is high priority as SPS does not work if 2 values of CORESETPoolIndex are configured. Does the note here mean that SPS is optimization in general? |
| MT.11 | PDCCH BD/CCEs in Multi-DCI based systemNote: can be resolved via implementation  | Spreadtrum, Qualcomm | N | Qualcomm: Clarification regarding the note here is needed. We appreciate it if it can be explained how the issue (for dual connectivity) can be resolved via implementation. |
| MT.12 | Radio link monitoring in multi-DCI based M-TRPNote: optimization | Apple, NTT DOCOMO | N |  |
| MT.13 | Collision between QCL-typeD of PDCCH and default QCL of PDSCHNote: optimization | Apple | N | Qualcomm: As mentioned above, this issue can be considered together with MT.1. |
| MT.14 | Out-of-order operation of DL shall be allowed within a slotNote: optimization | CATT | N |  |
| MT.15 | Default TCI-state for PDSCH in Single-DCI based transmissionNote: discussed in previous meeting, no conclusion | Vivo, ZTE, LGE | N |  |
| MT.16 | Default QCL for AP CSI-RS in single-DCI based M-TRPNote: discussed in previous meeting, no conclusion | vivo, ZTE, Apple, Ericsson, NTT DOCOMO, Qualcomm, Nokia/NSB | N |  |
| MT.17 | Default TCI-state for PDSCH of cross-carrier scheduling in single-DCI M-TRPNote: optimization | Vivo, Samsung | N |  |
| MT.18 | Determining RV values for Scheme 4Note: current spec is clear | ZTE, CATT | N |  |
| MT.19 | 3 CDM groups vs 2 TCI states in Single-DCI based multi-TRPNote: Current specification suggests that when 2 TCI states are indicated, 3 CDM groups cannot be indicated. | Apple | N |  |
| MT.20 | SPS transmission in Single-DCI based multi-TRPNote: optimization | Ericsson and Qualcomm  | N | Qualcomm: Does the note here mean that SPS in general is optimization or proposed enhancement is optimization? |
| MT.21 | Time restriction on S and L for TDM scheme ANote: current spec is clear | Ericsson | N |  |
| MT.22 | Type-1 HARQ-ACK codebook determination for Scheme 3Note: current spec is clear | NTT DOCOMO, Nokia/NSB | N | Qualcomm: This issue should be listed as editorial issue (as part of MT.3), and should be clarified. |
|  |  |
| MU.1 | Two clarifications for TS38.2145.2.2.2.5 Enhanced Type II Codebook<Unchanged part omitted>The parameter $R$ is configured with the higher-layer parameter *numberOfPMISubbandsPerCQISubband-r16*. This parameter controls the total number of precoding matrices $N\_{3}$ indicated by the PMI as a function of the number of configured subbands in *csi-ReportingBand*,...Add the text “(if reported)” after the FD basis indicator, $i\_{1,6,l}$, in the description of Group 1 in Sec. 5.2.3 to include the case in which this indicator is not reported, for $M\_{ν}=1$.Note: Obviously needed, not controversial | Nokia/NSB, Spreadtrum, vivo | H2 | Qualcomm: ok with these editorial changes. |
| MU.2 | Refinement on CBSR equation Note: previously proposed for a few meetings | MotM/Lenovo | N  | Qualcomm: open to discuss |
| MU.3 | When $N\_{3}>19$, the size of the intermediate set is give by $N\_{3}^{'}=\left⌈2M\_{1}\right⌉$ for RI={1,2,3,4}, where $M\_{1}$ is the number of FD bases selected for RI={1,2}.Note: previously proposed for a few meetings | Qualcomm  | N |  |
|  |  |
| UL.1 | Finalizing TPMI grouping indication & answer to RAN2 LS for Mode 2Alt1. Add new TPMI group(s)Alt2. No change in TPMI group, and UE can report >1 TPMI groupsAlt3. Revise at least one TPMI group* Answer to RAN2 LS: TPMIs for 4-port non-coherence can be deduced from the reported set of TPMIs for 4-port partial-coherence. 4-port full coherent UE follow the same way as 4-port partial coherent UE to report full power TPMIs.

Note: discussed over several meetings, but needed for RAN2 to proceed | Alt1. Huawei/HiSi. ZTE, vivo, OPPO, Apple, LGE, Samsung (2nd pref)Alt2. Samsung (1st pref), OPPO, Apple Alt3. Qualcomm  | H | Qualcomm: Like the Rapporteur already mentioned, this issue is tied with how we answer the RAN 2 LS. For each solution, it needs to include two parts 1) proposal to finalize the TPMI grouping 2) the answer to RAN2 LS if take the solution. These two parts have to be discussed together. Making a decision based on only on the first part does not make sense. Therefore, we strongly suggest proponents of each solution add their answers to RAN2 LS in their solution to complete the proposals. |
| UL.2 | 2-port PTRS for mode 16.2.3.1 UE PT-RS transmission procedure when transform precoding is not enabled…- PUSCH antenna port 1000 and 1002 in indicated TPMI share PT-RS port 0, and PUSCH antenna port 1001 and 1003 in indicated TPMI share PT-RS port 1 except for the cases that *ul-FullPowerTransmission* is configured to *fullpowerMode1*, and TPMI=2 in Table 6.3.1.5-1, or one of the TPMI 12-15 in Table 6.3.1.5-2 and Table 6.3.1.5-3 in [4, TS 38.211] is indicated.- UL PT-RS port 0 is associated with the UL layer [x] of layers which are transmitted with PUSCH antenna port 1000 and PUSCH antenna port 1002 in indicated TPMI, and UL PT-RS port 1 is associated with the UL layer [y] of layers which are transmitted with PUSCH antenna port 1001 and PUSCH antenna port 1003 in indicated TPMI, where [x] and/or [y] are given by DCI parameter *PTRS-DMRS association* as shown in DCI format 0\_1 described in Clause 7.3.1 of [5, TS38.212].- For the cases that *ul-FullPowerTransmission* is configured to *fullpowerMode1*, and TPMI=2 in Table 6.3.1.5-1, or one of the TPMI 12-15 in Table 6.3.1.5-2 and Table 6.3.1.5-3 in [4, TS 38.211] is indicated, PUSCH antenna port 1000, 1001, 1002 and 1003 in the indicated TPMI share PT-RS port 0. | Huawei/HiSi | H |  |
| UL.3 | Align the RRC parameter *ul-FullPowerTransmission-r16*across specifications TS 38.212, 213, 214Note: Obviously needed, not controversial | Spreadtrum | H2 |  |
| UL.4 | Support for single-port SRS in mode 1Alt1 (OPPO). Add “if each SRS resource in the *SRS-ResourceSet* with *usage* set to 'codebook' has one SRS port, $s=1$”Alt2 (Spreadtrum). Add “A UE shall not expect to be configured with higher layer parameter *ul-FullPowerTransmission-r16* set to ‘*fullpowerMode1’* and *SRS-ResourceSe*t with *usage* set to ‘*codebook*’ with single port SRS resource simultaneously.”Note: Discussed last meeting, common understanding seems to indicate that it’s not needed  | Spreadtrum, OPPO | N |  |
| UL.5 | Clarification on port coherence for 2Tx and 4Tx partially coherent UEProposal:* As a first priority, specify that a UE configured for partially coherent operation in full power Mode 1 is not expected to maintain relative phase between ports 0 and 2 nor between ports 1 and 3
* As a second priority, specify that a UE configured for noncoherent operation in full power Mode 1 is not expected to maintain phase coherence among any of its ports.

Note: previously proposed common understanding seems to indicate that it’s not needed | Ericsson | N |  |
| UL.6 | Clarification on 2Tx codebook subset for 2-port SRS (TS 38.214)6.1.1.1 Codebook based UL transmission<Unchanged part omitted>A UE reporting its UE capability of 'partialAndNonCoherent' transmission shall not expect to be configured by *codebookSubset* with 'fullyAndPartialAndNonCoherent*'* and when higher layer parameter *nrofSRS-Ports* in an *SRS-ResourceSet* with *usage* set to 'codebook' indicates that two SRS antenna ports are configured, the UE shall not expect to be configured by *codebookSubset* with 'fullyAndPartialAndNonCoherent*'*. A UE reporting its UE capability of 'nonCoherent' transmission shall not expect to be configured by *codebookSubset* with *'*fullyAndPartialAndNonCoherent*'* or with *'*partialAndNonCoherent'.A UE shall not expect to be configured with the higher layer parameter *codebookSubset* set to *'*partialAndNonCoherent' when higher layer parameter *nrofSRS-Ports* in an *SRS-ResourceSet* with *usage* set to 'codebook' indicates that two SRS antenna ports are configured.Note: Strictly speaking, not ULFPTX issue, the need is unclear (redundant relative to the next two sentences)  | vivo | N |  |

1. Conclusion

The above summary will be used as a starting point of the discussion during the preparation week to select up to six (per chairman instruction) email threads for the coming weeks.

# Appendix A: TP for MB.10

***TP for 38.212***

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 6.3.2.1.2 CSI <unchanged part omitted>The mapping order of CSI fields of one report for CRI/RSRP or SSBRI/RSRP reporting is provided in Table 6.3.1.1.2-8. The mapping order of CSI fields of one report for CRI/SINR or SSBRI/SINR reporting is provided in Table 6.3.1.1.2-8A.The procedure in clause 6.3.2 described for CSI part 1 is also applicable for one report for CRI/RSRP, SSBRI/RSRP, CRI/SINR, or SSBRI/SINR reporting.Table 6.3.2.1.2-3: Mapping order of CSI fields of one CSI report, CSI part 1

|  |  |
| --- | --- |
| CSI report number | CSI fields |
| CSI report #nCSI part 1 | CRI as in Tables 6.3.1.1.2-3/4/6, if reported |
| Rank Indicator as in Tables 6.3.1.1.2-3/4/5 or 6.3.2.1.2-8, if reported |
| Wideband CQI for the first TB as in Tables 6.3.1.1.2-3/4/5 or 6.3.2.1.2-8, if reported |
| Subband differential CQI for the first TB with increasing order of subband number as in Tables 6.3.1.1.2-3/4/5 or 6.3.2.1.2-8, if reported |
| Indicator of the number of non-zero wideband amplitude coefficients $M\_{0}$ for layer 0 as in Table 6.3.1.1.2-5, if reported |
| Indicator of the number of non-zero wideband amplitude coefficients $M\_{1}$ for layer 1 as in Table 6.3.1.1.2-5 (if the rank according to the reported RI is equal to one, this field is set to all zeros), if 2-layer PMI reporting is allowed according to the rank restriction in Clauses 5.2.2.2.3 and 5.2.2.2.4 [6, TS 38.214] and if reported |
| Indicator of the total number of non-zero coefficients summed across all layers $K^{NZ}$ as in Table 6.3.2.1.2-8, if reported |
|  |
|  |
| Note: Subbands for given CSI report *n* indicated by the higher layer parameter *csi-ReportingBand* are numbered continuously in the increasing order with the lowest subband of *csi-ReportingBand* as subband 0. |

<unchanged part omitted>Table 6.3.2.1.2-6: Mapping order of CSI reports to UCI bit sequence , with two-part CSI report(s)

|  |  |
| --- | --- |
| UCI bit sequence | CSI report number |
|  | CSI part 1 of CSI report #1 as in Table 6.3.2.1.2-3 or Table 6.3.1.1.2-8 or Table 6.3.1.1.2-8A |
| CSI part 1 of CSI report #2 as in Table 6.3.2.1.2-3 or Table 6.3.1.1.2-8 or Table 6.3.1.1.2-8A |
| … |
| CSI part 1 of CSI report #n as in Table 6.3.2.1.2-3 or Table 6.3.1.1.2-8 or Table 6.3.1.1.2-8A |

<unchanged part omitted> |

***TP for 38.213***

|  |
| --- |
| **6 Link Reconfiguration**A UE can be provided, for each BWP of a serving cell, a set  of periodic CSI-RS resource configuration indexes by *failureDetectionResources* and a set  of periodic CSI-RS resource configuration indexes and/or SS/PBCH block indexes by *candidateBeamRSList* or *candidateBeamRSListExt-r16* or *candidateBeamRSSCellList-r16* for radio link quality measurements on the BWP of the serving cell. If the UE is not provided  by *failureDetectionResources* for a BWP of the serving cell, the UE determines the set  to include periodic CSI-RS resource configuration indexes with same values as the RS indexes in the RS sets indicated by *TCI-State* for respective CORESETs that the UE uses for monitoring PDCCH and, if there are two RS indexes in a TCI state, the set  includes RS indexes with QCL-TypeD configuration for the corresponding TCI states. The UE expects the set  to include up to two RS indexes. The UE expects single port RS in the set . The UE expects single-port or two-port CSI-RS with frequency density equal to 1 or 3 REs per RB in the set . |

TS 38.213 Section 9.2.4

-------- unchanged part omitted ---------------

A UE can be configured by *SchedulingRequestResourceConfig* a set of configurations for SR in a PUCCH transmission using either PUCCH format 0 or PUCCH format 1. A UE can be configured by *schedulingRequestID-BFR-SCell-r16* a configuration for LRR in a PUCCH transmission using either PUCCH format 0 or PUCCH format 1. The UE can be provided, by *phy-PriorityIndex-r16* in *SchedulingRequestResourceConfig*, a priority index 0 or a priority index 1 for the SR. If the UE is not provided a priority index for SR, the priority index is 0.

The UE is configured a PUCCH resource by *SchedulingRequestResourceId*, or by *schedulingRequestID-BFR-SCell-r16*, providing a PUCCH format 0 resource or a PUCCH format 1 resource as described in Clause 9.2.1. The UE is also configured a periodicity  in symbols or slots and an offset  in slots by *periodicityAndOffset* for a PUCCH transmission conveying SR. If  is larger than one slot, the UE determines a SR transmission occasion in a PUCCH to be in a slot with number  [4, TS 38.211] in a frame with number  if .

-------- unchanged part omitted ---------------

TS 38.213 Section 9.2.5.1 UE procedure for multiplexing HARQ-ACK or CSI and SR in a PUCCH

In the following, a UE is configured to transmit  PUCCHs for respective  SRs in a slot, as determined by a set of *schedulingRequestResourceId* and a *schedulingRequestResourceId* associated with *schedulingRequestID-BFR-SCell-r16*, with SR transmission occasions that would overlap with a transmission of a PUCCH with HARQ-ACK information from the UE in the slot or with a transmission of a PUCCH with CSI report(s) from the UE in the slot.

-------- unchanged part omitted ---------------

If a UE would transmit a PUCCH with  HARQ-ACK information bits in a resource using PUCCH format 2 or PUCCH format 3 or PUCCH format 4 in a slot, as described in Clauses 9.2.1 and 9.2.3,  bits representing a negative or positive SR, in ascending order of the values of *schedulingRequestResourceId* anda *schedulingRequestResourceId* associated with *schedulingRequestID-BFR-SCell-r16*, are appended to the HARQ-ACK information bits and the UE transmits the combined  UCI bits in a PUCCH using a resource with PUCCH format 2 or PUCCH format 3 or PUCCH format 4 that the UE determines as described in Clauses 9.2.1 and 9.2.3. If one of the SRs is a positive LRR, the value of the  bits indicates the positive LRR. An all-zero value for the  bits represents a negative SR value across all  SRs.

If a UE would transmit a PUCCH with  CSI report bits in a resource using PUCCH format 2 or PUCCH format 3 or PUCCH format 4 in a slot,  bits representing corresponding negative or positive SR, in ascending order of the values of *schedulingRequestResourceId* and a *schedulingRequestResourceId* associated with *schedulingRequestID-BFR-SCell-r16*, are prepended to the CSI information bits as described in Clause 9.2.5.2 and the UE transmits a PUCCH with the combined  UCI bits in a resource using the PUCCH format 2 or PUCCH format 3 or PUCCH format 4 for CSI reporting. If one of the SRs is a positive LRR, the value of the  bits indicates the positive LRR. An all-zero value for the  bits represents a negative SR value across all  SRs.

***TP for 38.214***

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| < Start of the text proposal on TS 38.214 v16.2.0 section 5.6.1.6>< Unchanged parts are omitted >5.1.6.1 CSI-RS reception procedureThe CSI-RS defined in Clause 7.4.1.5 of [4, TS 38.211], may be used for time/frequency tracking, CSI computation, L1-RSRP computation, L1-SINR computation and mobility. < Unchanged parts are omitted >< End of the text proposal on TS 38.214 v16.2.0 section 5.6.1.6> |

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| 5.2.1.4.1 Resource Setting configuration< Unchanged parts are omitted >For semi-persistent or periodic CSI, each *CSI-ReportConfig* is linked to periodic or semi-persistent Resource Setting(s):- When one Resource Setting (given by higher layer parameter *resourcesForChannelMeasurement*) is configured, the Resource Setting is for channel measurement for L1-RSRP or for channel and interference measurement for L1-SINR computation.- When two Resource Settings are configured, the first Resource Setting (given by higher layer parameter *resourcesForChannelMeasurement*) is for channel measurement and the second Resource Setting (given by higher layer parameter *csi-IM-ResourcesForInterference*) is used for interference measurement performed on CSI-IM. For L1-SINR computation, the second Resource Setting (given by higher layer parameter *csi-IM-ResourcesForInterference* or higher layer parameter *nzp-CSI-RS-ResourceForInterference*) is used for interference measurement performed on CSI-IM or on NZP CSI-RS.< Unchanged parts are omitted > |

***TP for 38.215***

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| 5.1.6 CSI signal-to-noise and interference ratio (CSI-SINR)< Unchanged parts are omitted >For CSI-SINR determination CSI reference signals transmitted on antenna port 3000 according to TS 38.211 [4] shall be used. If CSI-SINR is used for L1-SINR, CSI reference signals transmitted on ports 3000, 3001 can be used for CSI-SINR determination.< Unchanged parts are omitted > |

# Appendix B: TP for MT.3

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| **MT.3 index** | **Summary of TP** | **Proposing companies** |
| MT.3.1 | Align the RRC parameter names | Vivo, Spreadtrum, Sharp |
| MT.3.2 | Default QCL of PDSCH for DCI format 1\_2 | vivo |
| MT.3.3 | TCI states for inter-slot PDSCH repetition | vivo |
| MT.3.4 | Clarify UL transmission from different TRP shall be TDMed | ZTE |
| MT.3.5 | Type 1 HARQ codebook | ZTE |
| MT.3.6 | TBS determination for Scheme 3 | ZTE |
| MT.3.7 | Wideband PRG for Scheme 2a/2b | ZTE |
| MT.3.8 | A missing condition for two default TCI state for Multi-DCI based system in TS 38.214 | OPPO |
| MT.3.9 | One part in the agreement made in RAN1#101e was not captured in TP | OPPO |
| MT.3.10 | TP to capture the case “is not provided with CORESETPoolIndex” in TS 38.213 | Spreadtrum |
| MT.3.11 | One Typo correction | CATT |
| MT.3.12 | TP for the case “*startingSymbolOffset is* not configured” | LGE |
| MT.3.13 | determine $n\_{HARQ-ACK}$ for PUCCH transmission in M-DCI M-TRP | Huawei/HiSi |

# References

1. R1-2005353 Remaining issues on Multi beam operation vivo
2. R1-2005354 Remaining issues on Multi TRP operation vivo
3. R1-2005355 Miscellaneous corrections on Rel-16 MIMO vivo
4. R1-2005449 Maintenance of multi-beam operation ZTE
5. R1-2005450 Maintenance of full power UL transmission ZTE
6. R1-2005451 Maintenance of Multi-TRP enhancements ZTE
7. R1-2005554 Remaining issues on NR MIMO Interdigital Inc.
8. R1-2005559 Remaining issues on multi-beam operation Sony
9. R1-2005624 Remaining issues on multi-beam operation Mediatek Inc.
10. R1-2005679 Remaining issues on multi-beam operation enhancement CATT
11. R1-2006588 Discussion on remaining issues of multi-TRP/panel transmission CATT
12. R1-2005819 Maintenance on multi-TRP operation Lenovo, Motorola Mobility
13. R1-2005924 Maintenance on MU-CSI Enhancements Lenovo, Motorola Mobility
14. R1-2005853 Corrections to multi TRP Intel Corporation
15. R1-2005975 Text proposals for enhancements on multi-TRP and panel Transmission OPPO
16. R1-2005976 Text proposals for Multi-beam Operation Enhancement OPPO
17. R1-2005977 Discussion and Text proposals for full TX power UL transmission OPPO
18. R1-2006115 On maintenance of Rel.16 MU CSI enhancements and multi-beam operation Samsung
19. R1-2006117 On Rel.16 multi-TRP/panel transmission Samsung
20. R1-2006118 On UL full power transmission Samsung
21. R1-2006249 Remaining issues on CSI enhancement for MU-MIMO Spreadtrum Communications
22. R1-2006256 Discussion on remaining issues on UL full power transmission Spreadtrum Communications
23. R1-2006257 Discussion on remaining issues for multi-TRP operation Spreadtrum Communications
24. R1-2006395 Remaining issues for Multi-TRP in Rel-16 Huawei, HiSilicon
25. R1-2006396 Remaining issues on multi-beam enhancements in R16 Huawei, HiSilicon
26. R1-2006397 Remaining issues on UL full power transmission in R16 Huawei, HiSilicon
27. R1-2006494 Remaining issues on Multi-TRP enhancement Apple
28. R1-2006495 Remaining issues on Beam Management Apple
29. R1-2006496 Remaining issues on Rel-16 full power transmission Apple
30. R1-2006551 Corrections for enhancements on MIMO for NR Sharp
31. R1-2006593 Text proposals on enhancements on multi-TRP/panel transmission LG Electronics
32. R1-2006594 Remaining issues on multi beam operation LG Electronics
33. R1-2006595 Discussions on full Tx power UL transmission LG Electronics
34. R1-2006608 Corrections for Full Power UL Transmission Ericsson
35. R1-2006688 Remaining issues on single-DCI based Multi-TRP Ericsson
36. R1-2006689 Remaining issues on multi-DCI based Multi-TRP Ericsson
37. R1-2006635 Maintenance of SCell Beam Failure Recovery Asia Pacific Telecom co. Ltd
38. R1-2006700 Remaining issues on multi-TRP/panel transmission NTT DOCOMO, INC.
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41. R1-2006781 Multi-TRP Enhancements Qualcomm Incorporated
42. R1-2006782 Enhancements on Multi-beam Operation Qualcomm Incorporated
43. R1-2006840 Correction of RRC parameter name for AP-TRS Nokia, Nokia Shanghai Bell
44. R1-2006841 Maintenance of Rel-16 CSI enhancement Nokia, Nokia Shanghai Bell
45. R1-2006842 Maintenance of Rel-16 Multi-TRP operation Nokia, Nokia Shanghai Bell