**3GPP TSG RAN WG1 #103-e R1-2008140**

**e-Meeting, October 26th – November 13th, 2020**

**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

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
  + *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 Oct 23rd thereby not counted toward the four-thread quota). It can be merged with any of the assigned threads without any further discussion. This includes TPs associated with previous agreements.
* *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)

1. Maintenance issues

The issues are summarized in the following table:

**Table 1 Summary**

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| **#** | **Issue (summary)** | **Companies** | **Initial assessment** | **Company inputs (if any)** |
| MB.1 | Specifying TCI state codepoint mapping for DCI format 1\_2  FL note: Remaining work from the Reply LS (R1-2007197) | Support : Samsung  [R1-2008139](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2008139.zip)  , Qualcomm  [R1-2008611](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2008611.zip)  , Ericsson  [R1-2008638](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2008638.zip)  , Apple, LG, Nokia/NSB, Huawei/HiSi, Docomo, OPPO, Futurewei, MediaTek, NEC, Intel | H | Apple: Okay  LG: OK to discuss  Nokia: as it was agreed in the RAN1 LS answer to have the TCI codepoints clarification, it is a priority to get this done int he spec, agree with the current classification as H. Discuss further the CR proposals from Samsung and Ericsson.  Huawei, HiSilicon: Fine to discuss.  Docomo: Support  OPPO: Ok  FUTUREWEI: agree to discuss.  Ericsson: Agree to discuss with high priority.  MediaTek: Support  NEC: Support.  Intel: Agree to discuss |
| MB.2 | Clarifying that multi-CC simultaneous TCI update can be applied to CORESET#0  FL note: Good clarification for aligning TS38.321 and TS38.213 | Support: Vivo  [R1-2008674](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2008674.zip)  No: Apple, Qualcomm, OPPO, Futurewei | N | Apple: We do not see the necessity of this CR, since the corresponding behavior is clearly defined in 38.321. In addition, this CR seems ambiguous since the range of p is defined to be 0<p<12 or 0<p<16, which is configured by controlResourceSetId, and this CR proposed a condition like p>=0.  From the product implementation perspective, we do not see ambiguity in terms of the expected UE behavior. We are fine to make 38.213 clearer. But we think more time should be given to clarify the issues that has product implementation impact such as MT.13 and MT.17.  Qualcomm: Strictly speaking, not needed. Because the main bullet “a CORESET index p, by controlResourceSetId, where” does not have any restriction on the index p. So it can be equal to 0.  Vivo: Support.  To address Apple’s concern, this is not to change the following part, configuration of CORESETResourceSetID is still limited to p>0, the same as in the current spec:  a CORESET index , by *controlResourceSetId*, where  - if *CORESETPoolIndex* is not provided, or if a value of *CORESETPoolIndex* is same for all CORESETs if *CORESETPoolIndex* is provided;  - if *CORESETPoolIndex* is not provided for a first CORESET, or is provided and has a value 0 for a first CORESET, and is provided and has a value 1 for a second CORESET;  To address QC’s concern, this is related to the following paragraph where p is explicitly mentioned but only limited to p>0 in previous paragraph:  if the UE is provided by *simultaneousTCI-UpdateList-r16* or *simultaneousTCI-UpdateListSecond-r16* up to two lists of cells for simultaneous TCI state activation, the UE applies the antenna port quasi co-location provided by *TCI-States* with same activated *tci-StateID* value to CORESETs with index in all configured DL BWPs of all configured cells in a list determined from a serving cell index provided by a MAC CE command  Nokia: agree with th FL proposal that this issue is not critical.  Docomo: Support as H2  OPPO: Not needed. Agree with Apple and QC.  The paragraph cited by vivo is only for the CORESET configured by ControlResourceSet, thus p>0. However, for CORESET#0, index p = 0. Thus, the current spec has no issue. Some information is copied & pasted from TS 38.331 for reference   |  | | --- | | *controlResourceSetId*  Identifies the instance of the *ControlResourceSet* IE. Value 0 identifies the common CORESET configured in *MIB* and in *ServingCellConfigCommon* (*controlResourceSetZero*) and is hence not used here in the *ControlResourceSet* IE. Other values identify CORESETs configured by dedicated signalling or in *SIB1*. The *controlResourceSetId* is unique among the BWPs of a serving cell.  If the field *controlResourceSetId-v1610* is present, the UE shall ignore the *controlResourceSetId* field (without suffix). |   -- ASN1START  -- TAG-CONTROLRESOURCESETID-START  ControlResourceSetId ::= INTEGER (0..maxNrofControlResourceSets-1)  ControlResourceSetId-r16 ::= INTEGER (0..maxNrofControlResourceSets-1-r16)  ControlResourceSetId-v1610 ::= INTEGER (maxNrofControlResourceSets..maxNrofControlResourceSets-1-r16)  -- TAG-CONTROLRESOURCESETID-STOP  -- ASN1STOP  FUTUREWEI: not needed. |
| MB.3 | Aligning RRC parameter names with TS38.331 (MediaTek’s TP handles the names of the CC lists and Nokia’s TP handles the names of QCL types)  FL note: Editorial corrections | Support (E): MediaTek  [R1-2008514](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2008514.zip)  , Nokia/NSB, Apple, LG, Docomo, Futurewei, MediaTek, NEC, Intel | E | Apple: Okay  LG: Support  Nokia: disagree with the FL proposals, these type of changes should be taken into account during RAN1#103-e. Propose to include a new categorization in the as Editorial ‘'and these should be pushed to the spec editors!  Docomo: Support as H2  FUTUREWEI: Chairman will have dedicated editors’ alignment CR email thread to also handle such issues.  MediaTek: Support FL’s proposal.  NEC: Support.  Intel: To be handled in editor CRs as announced by Chairman |
| MB.4 | Text change made in #102-e for default PL RS for DCI format 0\_2 was not same as the agreed TP, and it is proposed to adopt the agreed TP due to potential misunderstanding of the current text.  FL note: Current text seems to have the same meaning with the agreed TP. | Support: ZTE  [R1-2007748](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2007748.zip)  , Nokia/NSB, Docomo, Futurewei, NEC  No: LG | H2 | LG: Agree with FL’s assessment  ZTE: This issue should be marked as H2.   * According to our knowledge, “the PUSCH transmission is scheduled by a DCI format 0\_1 or format 0\_2 that does not include an SRI field” in the endorsed TP corresponds to the case that a PUSCH is scheduled by DCI format 0\_1 or format 0\_2 and meanwhile there is a single SRS resource configured for CB/nonCB transmission, i.e., an SRI field in DCI is saved. It is NOT equivalent to the “the PUSCH transmission is not scheduled by DCI format 0\_0 that does not include SRI field” in current spec.   BTW, are there any companies/proponents who can nicely clarify the meaning of the above highlighted sentence in current spec? In our views, it is confusing.  Nokia: agree that the CR should be implemented as endorsed by RAN, consider this topic as H.  Docomo: We prefer to mark it as H2. The current specification is also confusing to us. We think this should be H2, rather than H, because this is how to capture the previous agreement.  FUTUREWEI: H2 is better  NEC: Support to be H2. |
| MB.5 | Further refinement on the QCL definition  FL note: Proposal is not related to Rel-16 features and seems not critical | Support : Samsung  [R1-2008139](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2008139.zip)  No: LG, Nokia/NSB, Futurewei | N | LG: Agree with FL’s assessment  Nokia: agree with FL! The QCL is clear also in Rel15 and follows the LTE definition also.  FUTUREWEI: agree that it is not needed |
| MB.6 | Supporting default spatial relation/PL RS for Rel-16 MTRP features  FL note: Extension of feature, considered as not essential issue | Support: Apple  [R1-2008437](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2008437.zip)  , Qualcomm, Samsung  No: Nokia/NSB, LG | N | Qualcomm: Support for it as “H”. The extension is beneficial, since mTRP default beam is only defined for DL but not for UL. So the reliability gain cannot be truly achieved if not considering UL enhancement  Nokia: this is not an essential correction under multi-beam. Even within multi-TRP discussion, it is not essential to define default spatial relation for multi-DCI based multi-TRP.  LG: Agree with FL’s assessment  FUTUREWEI: not essential  Samsung: Suggest changing to ‘H’. This proposal effectively reduces beam indication overhead for M-DCI M-TRP in FR2, where PUCCH/PUSCHs to different TRP need to be applied different beam/PL RSs. |
| MB.7 | Supporting default PL RS in FR1  FL note: Discussed in the last meeting but not agreed | Support: Qualcomm [R1-2008611](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2008611.zip)  , Huawei/HiSi R1-2008796 , Nokia/NSB, Futurewei  No: LG, OPPO, Apple | N | Qualcomm: Support for it as “H”. This topic is not selected for formal discussion in last meeting due to the limited topic #.  LG: Agree with FL’s assessment  Nokia: agree with QC’s proposal, this can be H item.  FUTUREWEI: agree with QC and Nokia to mark it as H  Apple: This would result in ASN.1 impact |
| MB.8 | Refined TP2 in R1-2007748:  The UE assesses the radio link quality only according to periodic CSI-RS resource configurations, or SS/PBCH blocks on the PCell or the PSCell, or periodic CSI-RS resource configuration, that are quasi co-located, as described in [6, TS 38.214], with the DM-RS of PDCCH receptions monitored by the UE.  Delete SSB in PCell/PSCell for BFD (TP2 in R1-2008213)  FL note: TP from ZTE reverts previous agreement, and TP from OPPO is related to PCell BFR. | Support: ZTE  [R1-2007748](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2007748.zip)  , OPPO, Ericsson, LG, Nokia/NSB, Futurewei | H2 | LG: Agree with FL’s assessment  Nokia: agree with FL  OPPO: SSB cannot be used as BFD RS in both SCell BFR and PCell BFR. But current text description in 38.213 does not align with each other. That shall be corrected.  FUTUREWEI: agree with FL  Ericsson: The ZTE TP is correct, and should be discussed. Note that ZTE only proposes to delete “on the PCell or PSCell”, since the text should apply to SCell as well. Editorial, could be H2 |
| MB.9 | After SCell BFR, define CORESET pool index = 0 for all CORESETs (TP3 in R1-2007748)  FL note: This is a new issue, but it seems this is related to Rel-17 TRP specific BFR. | Support : ZTE  [R1-2007748](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2007748.zip)  No : LG, Nokia/NSB, Futurewei, NEC | N | LG: Agree with FL’s assessment  Nokia: agree with FL  FUTUREWEI: agree with FL  NEC: agree with FL. |
| MB.10 | Correction on L1-SINR Resource Setting (R1-2007909)   1. Editorial correction (add SSB in CMR) 2. Support both ZP and NZP IMR   Do not support both ZP and NZP IMR (R1-2008571)  FL note: Whether to support both ZP and NZP IMR has been discussed multiple times. | #1  Support: FutureWei  [R1-2007909](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2007909.zip)  , LGE, Huawei, HiSilicon (R1-2008796), Qualcomm, MediaTek  No: Ericsson | H | Apple: Okay.  For the second bullet, we prefer to either not discuss it, or to remove the specification in bracket for CMR + ZP-IMR + NZP-IMR (not support this feature)  Qualcomm: Support for “H2” of LG’s proposal. This has been discussed multiple times and not agreed in the formal discussion among selected topics in last meeting.  LG: Although this issue has been controversial, it is unfortunate if there still exist some text in square brackets until v16.4.0 of Rel-16 spec.  Nokia: we propose to reject the FW CR on removing the square brackets, this issues dates back with a pending WA which we do not agree to confirm!  Huawei/HiSilicon: Support the 2nd bullet as proposed in R1-2008796.  FUTUREWEI: the issue need to be resolve so essential for a stable spec. Suggest to discuss as H.  Ericsson: N for 1. With a single resource setting, CSI-RS is the only option.  Samsung: If the square brackets are removed, it will be good to clarify the supported combination(s) of time-domain behavior of the NZP CSI-RS for interference and CSI-IM. For example, the supported combination would only hold for aperiodic NZP CSI-RS for interference and aperiodic CSI-IM. Would this be an acceptable compromise to the opposing companies?  MediaTek: Support LG’s revision |
| #2  Remove brackets (confirm WA): Futurewei, Huawei/HiSi, Samsung (with clarification)  Remove text (revert WA): Apple, LG, Nokia/NSB |
| MB.11 | Specify that the UE shall apply same QCL-TypeD assumption on channel measurement and interference measurement when QCL-TypeD RS is not configured to the NZP CSI-RS resource for channel measurement. (TP1 in R1-2008213)  Specify UE assumption and expectation when periodic CSI-RS configured as CMR for L1-SINR measurement is not provided with QCL indication (R1-2008796)  FL note: This seems to be a resubmission, and according to the feedback in previous meetings, not to configure QCL for CSI-RS looks to be a general issue. | Support : OPPO  [R1-2008213](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2008213.zip)  , Huawei/HiSi (R1-2008796), Apple  No: Qualcomm, LG, Docomo, Futurewei, Ericsson, Samsung, MediaTek | N | Apple: Okay. Good to discuss. However, we prefer the QCL-TypeD always be configured for NZP-CSI-RS or the default QCI behavior is well defined for NZP-CSI-RS  Qualcomm: Not essential. There is no valid use case for this scenario. If CMR has no QCL-D configured, UE does not even know it will be transmitted by same gNB beam over different occasions for UE to determine its Rx beam.  Nokia: this is an error case which does not need spec support! Propose to reject the CR.  LG: Seems not critical issue. It would be more typical to use L1-RSRP based BM for CSI-RS without QCL-D for initial P-1 or P-2 operation  Huawei, HiSilicon: We support discussing UE assumption and expectation when CSI-RS is not provided with QCL indication. Our proposal in R1-2008796 is if no QCL assumption is provided for a periodic NZP CSI-RS resource as CMR for L1-SINR measurement, the UE may assume all the instances of this CSI-RS are transmitted with the same downlink spatial domain transmission filter.  Docomo: We think not essential. We don’t understand the use case that CMR has no QCL-D configuration.  FUTUREWEI: not essential  Ericsson: No consensus in RAN1 if CSI-RS without QCL source is a valid use case. Suggest not to discuss.  Samsung: Not support. We do not expect the case when NZP CSI-RS has no QCL-TypeD.  MediaTek: We don’t think this is an essential issue. We prefer not to discuss this. |
| MB.12 | Update references to *nrofReportedRSForSINR* as to *nrofReportedRS* in 38.214. (R1-2008324, R1-2008641)  FL note: Editorial correction. | Support: Huawei/HiSi, Nokia/NSB  [R1-2008324](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2008324.zip)  , Apple, LG, Futurewei, MediaTek, Intel | E | Apple: Okay  LG: OK  Nokia: this is a slightly editorial issue, agree with HW, rating should be H  FUTUREWEI: can use the editors’ alignment CR email thread  MediaTek: Support  Intel: To be handled in editor CRs as announced by Chairman |
| MB.13 | PUCCH spatial relation assumption after CBRA-BFR (R1-2008536)  FL note: This was discussed in last meeting, and the proposal seems to be updated based on some discussion in last meeting. | Support : Docomo  [R1-2008536](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2008536.zip)  , Nokia/NSB, IDC, Apple, LG, Huawei/HiSi, Futurewei, NEC  No : OPPO, Ericsson, MediaTek | H | Apple: Okay, Supportive as high priority  LG: OK  Nokia: agree with FL.  Huawei, HiSilicon: Fine to be discussed.  Docomo: Support. This is important for operators.  OPPO: Do not support to discuss this issue again:   * One email thread was allocated for it in RAN1#102-e. But we could not reach consensus. We should not repeat the discussion again. * The issue here is out of the scope of rel16 eMIMO. * The function proposed in MB.13 can be supported by the feature of default spatial relation for PUCCH. Why do we need specify redundant functions?   FUTUREWEI: Ok to discuss  Ericsson: discussed many times. Little chance of consensus. Suggest not to discuss.  MediaTek: We have a doubt that we can have unified conclusion this time, but we are fine with the discussion.  NEC: Support. |
| MB.14 | Define measurement restriction related UE behavior for L1-SINR measurement (R1-2008674)  FL note: This seems to be related to previous conclusion and aligned with agreed CR for L1-RSRP. | Support : vivo  [R1-2008674](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2008674.zip)  , Apple, Nokia/NSB, Futurewei, MediaTek, Intel  No : Qualcomm | H | Apple: Okay, Supportive as high priority  Qualcomm: Not essential. Without additional clarification, UE will follow the same rule for L1-RSRP. No ambiguity.  Vivo: Don’t understand Qualcomm’s concern on this issue. L1-RSRP is already captured. L1-SINR related behavior should also be captured.  Nokia: Agree with Vivo’s proposal that it is good to clarify whether timeRestrictionForChannelMeasurements and timeRestrictionForInterfereceMeasurements can be simultanously configured for all resource settings. The clarification is especially needed for the case of “one resource setting” where same resource is used for both channel and interference measurement.  FUTUREWEI: Ok to discuss.  MediaTek: Support  Intel: Agree to discuss |
|  | |  | | |
| MT.1 | TP to capture the agreement on default TCI state of AP CSI-RS in mTRP   * ZTE (R1-2007750) proposed TP to capture the agreement * OPPO (R1-2008212) provided TP to capture the agreement of default TCI state of AP CSI RS in mTRP * Apple (R1-2008436) provided TP to capture that * Ericsson (R1-2008635) also provided TP for that agreement * vivo (R1-2008675) proposed TP too   FL note: it is the agreement made in last meeting but no time to discuss the TP in last meeting. | Support: ZTE, OPPO, Apple, Qualcomm, LG, Ericsson, vivo, Samsung, Docomo, Huawei/HiSi, Futurewei, Ericsson, MediaTek, CATT, NEC, Intel | H2 | Apple: Okay, Supportive as high priority  Qualcomm: Our understanding is that this item should be separately handled in terms of the budget, based on the following note:   * “Note: for the agreements from previous meetings without the corresponding TPs, draft CRs are to be prepared and endorsed in email threads separately, from the budget above”.   LG: OK  Nokia: This should not consume a separate email tread. No new agreement is needed. It is just capturing the TP.  vivo: OK  Huawei, HiSilicon: can be considered as H2, for the sake of discussing spec updates.  Docomo: Support it as high priority  FUTUREWEI: agree with FL.  Ericsson: Agree with Qualcomm and Nokia that this is a TP for the agreement made last meeting, and this should not consume one email thread from the budget. This should be treated with high priority.  Samsung: Support  MediaTek: Support  CATT: Support  NEC: Support.  Intel: Agree this could be handled outside email budget |
| MT.2 | Issue 1: The issue of PDCCH and PDSCH collide with different QCL-TypeD   * ZTE (R1-2007750) proposed to clarify UE behavior for the case when PDCCH and PDSCH with different QCL-TypeD collide. * Apple (R1-2008436) propose that priority rule of PDSCH colliding with PDCCH is applied to per CORESETPoolIndex * vivo (R1-2008675) proposed to conclude that PDSCH and PDCCH for different TRP shall not overlap   Issue 2: Clarify PDCCH monitoring with respect to a QCL-TypeD in M-DCI mTRP:   * ZTE(R1-2007750) proposed to support two QCL-TypeD for PDCCH reception at a given time in M-DCI. * Intel [R1-2007938] proposed to extend the PDCCH prioritization based on QCL-TypeD to M-DCI multi-TRP operation. * Spreadtrum (R1-2008093) proposed to specify the priority rules of monitoring PDCCHs is applied within the CORESETs with the same value of CORESETPoolIndex * Qaulcomm (R1-2008610) proposed to specify that Rel. 15 procedures on PDCCH for QCL prioritization is done per CORESETPoolIndex * Nokia (R1-2008723) proposed to specify that For a UE capable of simultaneous reception with different QCL-TypeD, the PDCCH monitoring priority rule based on QCL-TypeD is applied within CORESETs of the same coresetPoolIndex. | Support: ZTE, Intel, Spreadtrum, Apple, vivo, Nokia/NSB, Qualcomm,  Ericsson, Futurewei,  No: LG, Huawei/HiSi, Samsung, MediaTek | H | Apple: Okay, Supportive as high priority  Qualcomm: Supportive as high priority.  LG: Both issues are not essential; it can be discussed in Rel-17 if needed. Issue 2 was discussed in the last UE feature session but no consensus was reached.  Nokia: This is an essential correction as specification otherwise not allowing simultaneous reception in FR2.  vivo: OK  Huawei, HiSilicon: For issue 1, it is unclear/unspecified how to handle PDCCH/PDSCH collision with different QCL-Type D for intra-TRP in Rel-15. Therefore, it can be risky whether/how changes are applied to inter-TRP cases, including both S-DCI and M-DCI based M-TRP transmission and a certain Rel-15 UE behavior, e.g. i.e. *CORESETPoolindex* is transparent to TRP from UE perspective.  For issue 2, supporting two different type-D PDCCH reception simultaneously is more or less contradict to the latest 38.331.  “*simultaneousReceptionDiffTypeD-r16*  Indicates whether the UE supports simultaneous reception with different Type D as specified in TS38.213 [11]. This applies to PDSCHs.”  Also both issues 1 and 2 are inter-wined. If we can support PDSCH+PDSCH and PDCCH+PDCCH with different type in issue 2, excluding PDCCH+PDSCH in issue 1 seems to be odd.  FUTUREWEI: Ok to discuss  Ericsson: fine to discuss both issues with high priority.  Samsung: Not support. Especially on issue 2, Rel-16 UE does not support reception of PDCCH+PDCCH with different QCL-TypeD since no consensus was made on the support of such capability in UE feature discussion.  MediaTek: Agree with LG and Samsung  NEC: Support.  Intel: Supportive as high priority |
| MT.3 | The issue of default TCI state for PDSCH in S-DCI mTRP   * ZTE (R1-2007750) propose to Clarify the default TCI state for single-DCI mTRP: scheme 1a/2a/2b for the following cases: When one TCI state is indicated and When two TCI states are indicated * vivo (R1-2008675) proposed to specify the default TCI state for:   + Indicating one TCI state   + TCI field is not present   + Scheme 2a/2b   FL note: this issue has been discussed in previous meeting | Support: ZTE, vivo, NEC  No: LG, OPPO, Futurewei, CATT | N | LG: Agree with FL’s assessment  ZTE: It is better to solve this issue to make spec correct. Otherwise, the default TCI states is only specified for TDMed schemes, but not for SDM, FDM and single-TRP.  Based on the current spec, if TDM is configured by RRC but the actual transmission is SDM, the default TCI states are still for TDM. This is not correct.  Nokia: Agree with FL. not an essential correction.  vivo: current spec is unclear and incomplete if we don’t treat the cases for default TCIs. Should be treated  OPPO: We have Agreed not to discuss this issue any more.  FUTUREWEI: agree with FL  CATT: Agree with FL. Current spec is clear.  NEC: Support. We think it’s better to define default TCI states for all schemes. |
| MT.4 | ZTE ((R1-2007750) proposed to specify the UE behavior in single-DCI mTRP transmission when sequenceOffsetforRV-r16 is not configured.  FL note: This issue can be avoided by implementation. | Support: ZTE, NEC  No: LG, Futurewei, CATT, Nokia/NSB | N | LG: Agree with FL’s assessment  ZTE: This issue can be solved very quickly, e.g. adopt the following change  Table 5.1.2.1-3: Applied redundancy version for the second TCI state ~~when~~ *~~sequenceOffsetforRV-r16~~* ~~is present~~  Nokia: There is no issue with the current specification. sequenceOffsetforRV-r16 should always present when SlotBased-R16 is used.  FUTUREWEI: agree with FL.  CATT: agree with FL.  NEC: Support ZTE’s proposal. |
| MT.5 | The issue of 3 CDMs groups in S-DCI mTRP:   * Apple (R1-2008436) proposed to clarify that 3 CDMs groups should not be used in mTRP   FL note: Current specification suggests that when 2 TCI states are indicated, 3 CDM groups cannot be indicated | Support: Apple  No: LG, Nokia/NSB, Futurewei, CATT | N | Apple: Just to clarify whether what FL’s note is common understanding, if that is the case, we suggest marking it as ‘H2’ and to make what FL said as a quick conclusion.  LG: Agree with FL’s assessment  Nokia: for SDM operation, spec already mention that 2 CDM groups are indicated. There is no case where 3 CDM groups are used with single DCI based multi-TRP. No specification changes are needed here.  FUTUREWEI: No need to discuss  CATT: agree with FL. |
| MT.6 | The issue of radio link monitoring in mTRP:   * Apple (R1-2008436) proposed to specify the method of UE determining RLM RS in M-DCI mTRP system   FL note: Optimization | Support: Apple, Docomo  No: LG, Nokia/NSB, Futurewei, CATT | N | Apple: This CR includes two changes: one is an editorial change to include Lmax = 8 since for mDCI, there can be 5 CORESETs. We suggest at least handling the following editorial change as ‘H2’.  “- For  and *Lmax* = 8, the UE selects the  RS provided for active TCI states for PDCCH receptions in CORESETs associated with the search space sets in an order from the shortest monitoring periodicity. If more than one CORESETs are associated with search space sets having same monitoring periodicity, the UE determines the order of the CORESET from the highest CORESET index as described in Clause 10.1.”  LG: Agree with FL’s assessment  Nokia: Just an additional restriction for multi-TRP. Not supported.  Docomo: Support it as high priority  FUTUREWEI: no need to discuss  CATT: agree with FL. |
| MT.7 | The issue of RV value for PDSCH scheme 4:   * CATT (R1-2007818) proposed that table 5.1.2.1-2 in 38.214 is used to specify the RV for PDSCH with aggregation factor or scheme 4. So, R1-2007818 proposed to use a separate table to specify the RV for PDSCH of scheme 4.   FL note: It seems there is no confusion in current spec. | Support: CATT  No: LG, Nokia/NSB, Futurewei | N | LG: Agree with FL’s assessment  Nokia: agree with FL  FUTUREWEI: No need  CATT: according to current spec, for scheme 4, the redundancy version applied to multiple transmission occasions associated with the first TCI state is derived from the table which was defined for slot aggregation transmission in Rel-15 when using the higher layer parameter *pdsch\_AggregationFatcor* to indicate the repetition number of PDSCH. However the description of the table is not appropriate for URLLC scheme 4 highlighted as below and may lead to a misunderstanding on repetition number indication. Therefore, we suggest to use a separate table for the illustration for scheme 4 to avoid the confusion.  Table 5.1.2.1-2: Applied redundancy version when *pdsch-AggregationFactor* is present   |  |  |  |  |  | | --- | --- | --- | --- | --- | | *rvid* indicated by the DCI scheduling the PDSCH | *rvid* to be applied to *n*th transmission occasion | | | | | *n* mod 4 = 0 | *n* mod 4 = 1 | *n* mod 4 = 2 | *n* mod 4 = 3 | | 0 | 0 | 2 | 3 | 1 | | 2 | 2 | 3 | 1 | 0 | | 3 | 3 | 1 | 0 | 2 | | 1 | 1 | 0 | 2 | 3 | |
| MT.8 | The issue of out-of-order of PDSCH in mTRP:   * CATT (R1-2007818) proposed to update 38.214 to support out-of-order of PDSCH from different TRPs within a slot: description in current 38.214 only supports out-of-order PDSCH across slot     FL note: It seems to be optimization | Support: CATT, Nokia/NSB  No: LG, Futurewei | N | LG: Agree with FL’s assessment  Nokia: Open to discuss more.  FUTUREWEI: not essential  CATT: In current specification, out-of-order operation for PDSCH to HARQ-ACK can be supported only in slot-level granularity. According to the agreement on TDMed PUCCHs within a slot, it is natural to support out-of-order operation for PDSCH to TDMed HARQ-ACK within a slot. |
| MT.9 | Spreadtrum (R1-2008093) proposed   * to add the constraint at N\_"cells" ^"Cap" in text description when UE does not report pdcch-BlindDetectionCA:   FL note: It captures what is included in one previous agreement. | Support: Spreadtrum, Qualcomm, OPPO, Intel  No: Apple, Nokia/NSB, Huawei/HiSi, Futurewei | N | Apple: We have concern on this issue. Yes, we do have a previous agreement. However, in Rel-15, when UE does not report pdcch-BlindDetectionCA, UE supports PDCCH monitoring BD and CCE linear scaling for any number of CCs. This is clearly captured in the Rel-15 specification. Rel-16 specification follows the same principle.  There are two options, which we prefer the first option   1. We do not discuss this issue, i.e., “N” 2. If we ever need to discuss this issue, we need to discuss the previous quoted agreement. It is “H”   Qualcomm: In our understanding, this is editorial, and a good clarification to avoid any confusion. This issue can be combined with issue MT. 19.  Nokia: not essential.  Huawei, HiSilicon: It is not needed. Following spec is clear enough to address :  “the UE determines, for the purpose of reporting *pdcch-BlindDetectionCA*, a number of serving cells as where R is a value reported by the UE.” Therefore “for the purpose of reporting *pdcch-BlindDetectionCA*” means that if is more than 4, the UE would report pdcch-BlindDetectionCA according to 38.306 otherwise " is always equal to or smaller than 4, similar with Rel-15 design principle.  OPPO: Good clarification based on previous agreement. Support to approve it  FUTUREWEI: not essential  Spreadtrum: Agree with FL as H2. It’s good clarification based on the agreement.  Response to Apple, the clarification is about the constraint on the value of N\_"cells" ^"Cap" based on the previous agreement, not PDCCH monitoring BD and CCE scaling issue. In Rel-15, when UE does not report pdcch-BlindDetectionCA, UE supports PDCCH monitoring BD and CCE linear scaling for any number of CCs. Rel-16 specification still follows the same principle.  Response to Huawei, the clarification will make the spec much clear.  Intel: Can be treated as editorial clarification |
| MT.10 | Spreadtrum (R1-2008093) proposed to delete redundant description in Section 9.1.2 of 38.213  FL note: Not essential | Support: Spreadtrum  No: LG, Nokia/NSB, Futurewei | N | LG: Agree with FL’s assessment  Nokia: not essential.  FUTUREWEI: not essential  Spreadtrum: We agree that the issue is not essential. But from the perspective of specification readability, the issue could be considered as H2. |
| MT.11 | Clarify in 38.214 the default TCI state for PDSCH of cross-carrier scheduling in single-DCI based mTRP   * Samsung (R1-2008141) propose to specify the default TCI state of PDSCH of cross-carrier in single-DCI based mTRP. * vivo (R1-2008675) also proposed to specify the default TCI state for cross-carrier scheduling case.   FL note: It is a further optimization. | Support: Samsung, vivo, ASUSTek  No: LG, Nokia/NSB, Futurewei, CATT | N | LG: Agree with FL’s assessment  Nokia: Agree with FL. We have not foreseen cross carrier scheduling optimizations with multi-TRP in Rel-16.  vivo: ok not to discuss CA related enhancement in Rel-16  FUTUREWEI: agree with FL  CATT: agree with FL.  ASUSTeK: We raised this issue under 7.2.10 (cross carrier scheduling of MR-DC) in R1-2008719 and it was proposed to discuss the issue in eMIMO agenda. We would like to have better understanding what “no further optimization” means (since the specification does not handle this situation correctly) , e.g. :   1. cross carrier scheduling would not work together with multiple TRPs (i.e. only single TRP operation for cross carrier scheduling) 2. cross carrier scheduling could work together with multiple TRPs and default beam used is the single TCI state defined in MR-DC 3. cross carrier scheduling could work together with multiple TRPs and default beam used is TCI state(s) defined in the context of eMIMO (it seems R1-2008141 and R1-2008675 is proposing this direction) 4. cross carrier scheduling could work together with multiple TRPs and which default beam used is based on which of “*enableDefaultTCIStatePerCoresetPoolIndex-r16/ enableTwoDefaultTCIStates-r16*”or “enableDefaultBeamForCCS” is configured   Is the first one the common understanding? |
| MT.12 | Issue of SPS transmission in mTRP:   * Samsung (R1-2008141) proposed to include the SPS of scheme 4 in the description of Type-1 HARQ-ACK codebook determination. * Samsung (R1-2008141) propose to specify how to receive two overlapped SPS PDSCHs associated with different TRPs in M-DCI mTRP * LGE proposed the following TP to support SPS of mTRP transmission.      * Qualcomm (R1-2008610) proposed Clarification that the RV sequence used across multiple repetitions in schemes 2b, 3, and 4 is based on setting rvid=0. And Qualcomm also proposed TP to specify that Each SPS PDSCH is associated with a CORESETPoolIndex value, and resolving overlap procedures are done within the same CORESETPoolIndex value * Ericsson (R1-2008637) provided TP for the change: specifies the RV values to be assumed for DL SPS scheduled with single DCI based multi-TRP PDSCH repetition schemes. To indicate RV values for DL SPS based multi-TRP PDSCH repetition schemes, a similar approach to what is adopted for Rel-15 based DL SPS PDSCH repetition is reused.   FL note: supporting mTRP SPS seems to be optimization | Support: Samsung, LGE, Qualcomm, Ericsson, MediaTek, NEC, Spreadtrum  No: Nokia/NSB, Futurewei, CATT,OPPO, Apple | N | Qualcomm: We suggest to remove the FL note as the issue is not an optimization. SPS is a basic feature, and excluding it for mTRP does not make sense to us. If there is no time in this meeting, the issue should be discussed in the next meeting.  LG: SPS transmission in M-DCI based M-TRP should be high priority as SPS PDSCHs overlapped in time cannot be supported even though a UE has capability receiving different PDSCHs at a given time.  Nokia: supporting SPS with multi-TRP was not discussed in Rel-16. May be something to add in a later release.  FUTUREWEI: this is additional feature considering Rel-16 is finished so not essential.  Ericsson: Similar view as Qualcomm. Note that the current spec allows the single DCI based multi-TRP PDSCH repetition schemes to be scheduled with CRC scrambled by C-RNTI, MCS-C-RNTI, CS-RNTI, or PDSCH scheduled without corresponding PDCCH transmission using sps-Config and activated by DCI format 1\_1 or 1\_2. The remaining part for single DCI based multi-TRP is to clarify which RV sequence to use. Without clarifying this further, the current spec is incompleted (i.e., SPS can be triggered via single DCI based multi-TRP but the spec is unclear on which RV sequence to use). If we don’t have time to discuss this in this meeting, we can discuss in future meeting. Note from FL should be removed.  Samsung: Suggest changing to ‘H’. SPS is supported already in S-DCI based M-TRP. There’s no reason to exclude SPS for M-DCI based M-TRP only.  MediaTek: OK to discuss  CATT: agree with FL.  NEC: Support to discuss.  Spreadtrum: Ok to discuss |
| MT.13 | The issue of PUCCH/PUSCH overlapping with two HARQ-ACKs associated with different TRPs   * OPPO (R1-2008211) and vivo (R1-2008675) proposed to specify in 38.213 that this case is not expected by the UE   FL note: it can be resolved by system implementation. | Support: OPPO, vivo  No: LG, Nokia/NSB, Futurewei, CATT | N | Vivo: This is high priority for us. There are commercial interest of deploying MDCI MTRP. For device to support MDCI MTRP, it is very likely that the UE needs to support separate HARQ-ACK PUCCH, to accommodate the non-ideal backhaul of NW. We need to have UE UL multiplexing rule clearly defined.  We propose this to be “H”, replacing UL.2    LG: Agree with FL’s assessment  Nokia: agree with FL.  OPPO: We think this issue is critical to avoid a hole in the spec otherwise the UE behavior is unclear when the case occurs. Agree with Apple to place this to H.  FUTUREWEI: not essential  CATT: agree with FL. |
| MT.14 | The issue of closed-loop power control in mTRP   * OPPO (R1-2008211) proposed to specify a default closed loop index for CORESETPoolIndex = 1 related with out-of-order operation. * OPPO (R1-2008211) proposed to specify the default pathloss for mTRP case.   FL note: The issue of closed-loop power control related with out-of-order was discussed in last meeting and some companies commented there is no spec impact | Support: OPPO, Huawei/HiSi (R1-2008796)  No: LG, Nokia/NSB, Futurewei, CATT | N | LG: Agree with FL’s assessment  Nokia: agree with FL.  Huawei, HiSilicon: please find Huawei’s TP in R1-2007896 for the issue as well.  OPPO: If this TP is not agreed, some modification is needed on the note in FG 16-2a-3, otherwise M-DCI based M-TRP can hardly work when UE reports support of UL out-of-order.  FUTUREWEI: agree with FL  CATT: agree with FL. |
| MT.15 | The issue of active BWP in M-DCI mTRP system:   * Lenovo/MOT (R1-2008293) proposed that If a UE detects two DCIs indicating a same active DL BWP change in a same slot, the UE is not required to receive or transmit in the cell during a time duration from the end of the third symbol of a slot where the UE receives the DCI until the beginning of a slot indicated by the smaller slot offset value of the time domain resource assignment fields in the two DCI   FL note: It seems to be further optimization. Comment from companies in previous meeting is this is not an issue. | Support: Lenovo/MotM, NEC  No: LG, Nokia/NSB, Futurewei, Ericsson, CATT | N | LG: Agree with FL’s assessment  Nokia: agree with FL.  FUTUREWEI: agree with FL  Ericsson: agree with FL  CATT: agree with FL.  NEC: Support to discuss. |
| MT.16 | CR on maximum number and index value of CORESET in M-DCI mTRP:   * Huawei (R1-2008325) proposed the TP on maximum number of CORESETs:      * Huawei (R1-2008326) proposed the TP on index value of CORESETs:     FL note: the current spec looks clear | Support: Huawei/HiSi, Futurewei  No: LG, Nokia/NSB, | N | LG: Agree with FL’s assessment  Nokia: not an essential correction to the specs. Open to discuss only for clarification purpose.  Huawei, HiSilicon: Prefer to discuss this TP due to following UE capability note:  *“Note: RAN1 will continue discussing how the network will interpret the signaled maximum number of CORESETs in components (1) and (2) (i.e., candidate value 5 for component (1) and candidate value 3 for component (2)) of FG 16-2a, e.g., when CORESET #0 is not configured”.*  FUTUREWEI: Ok to discuss. |
| MT.17 | The issue of sub-slot based HARQ-ACK feedback vs M-DCI mTRP:   * Apple (R1-2008436) propose to clarify whether sub-slot based HARQ-ACK feedback can be used in M-DCI mTRP   FL note: non-essential | Support: Apple, vivo, Futurewei  No: LG, Nokia/NSB, Ericsson, NEC | N | Apple: We also proposed to clarify whether two HARQ-ACK codebooks with different priorities can be used with MDCI MTRP.  This is high priority for us.  There are commercial interest of deploying MDCI MTRP, so the UE may support MDCI MTRP.  On the other side, the UE may also choose to support some Rel-16 eURLLC HARQ-ACK PUCCH enhancement including (1) sub-slot based HARQ-ACK PUCCH (2) two HARQ-ACK codebook with different priorities  There has not been any discussion in terms of the interaction between eURLLC enhancement and MDCI MTRP. It has UE implementation impact.  We propose this to be “H”, replacing UL.2 together with MT.13  LG: Agree with FL’s assessment  Nokia: sub-slot based HARQ-ACK already supported with multi-TRP. No additional specification or UE capability discussions are essential at this stage.  vivo: we also find the conflicts in 38.213 for sub-slot support and separate HARQ-ACK feedback. We agree to resolve this issue.  FUTUREWEI: Ok to discuss.  Ericsson: Similar view as Nokia. No need to discuss additional specification or UE capability.  NEC: discuss in Rel-17. |
| MT.18 | The issue of BFR in mTRP:   * Qualcomm (R1-2008610) proposed to specify that for S-DCI mTRP, after BFR, the UE reset all the TCI state point to the qnew.   FL note: rel17 is discussing BFR in mTRP now. | Support: Qualcomm  No: LG, Nokia/NSB, Futurewei | N | Qualcomm: What is being discussed in Rel. 17 is per-TRP BFR. The issue mentioned in MT. 18 is not related to Rel. 17. Our understanding is that this issue is critical and should be assigned high priority. The issue is that in current spec, there is no way for UE and gNB to communicate after BFR in certain cases for single-DCI based mTRP.  LG: Agree with FL’s assessment  Nokia: This should be considered in rel17 that considers the mTRP BFR.  FUTUREWEI: This is part of R17 discussion already. |
| MT.19 | The issue of NR-DC and M-DCI based mTRP   * Qualcomm (R1-2008610) proposed to clarify BD/CC limit in the presence of NR-DC in M-DCI based mTRP system   FL note: optimization | Support: Qualcomm  No: LG, Nokia/NSB, Futurewei | N | Qualcomm: We suggest to remove the FL note as the issue is not an optimization. NR-DC is a basic feature, and excluding it for mTRP does not make sense to us. If there is no time in this meeting, the issue should be discussed in the next meeting. If we decide to address issue MT. 9, it can be bundled with this issue.  LG: Agree with FL’s assessment  Nokia: not an essential correction.  FUTUREWEI: not essential |
| MT.20 | Quectel (R1-2008569) proposed a TP to delete redundant text:    FL note: It looks like that the text does not have redundancy. | Support: Quectel  No: LG, Nokia/NSB, Futurewei | N | LG: Agree with FL’s assessment  Nokia: agree with FL.  FUTUREWEI: agree with FL |
|  | | | | |
| UL.1 | Port coherence assumption in UL full power Mode1  FL note: This has been discussed for several meetings | Support: ZTE  No: Qualcomm, LG, vivo, Futurewei, Ericsson, Intel, IDC | N | Qualcomm: this is non-essential issue.  LG: Agree with FL’s assessment  ZTE: We believe this issue should be High priority (H), and which is essential to enhance the clarity of the current specifications.   * When the UE implements codebook based PUSCH transmission with full power Mode 1, the NW will assume that the relative phase indicated by additional allowed TPMIs can be ensured and the Tx power should be 23dBm. Correspondingly, the NW will configure the parameters of  (the number of RBs) and  (related to MCS level) based on the Tx power with 23dBm. However, in practice, the non-coherent and partial-coherent UEs cannot ensure the relative phase indicated by the additional allowed TPMIs of Mode 1, that means the actual Tx power is not equal to the full power in Mode 1. From the perspective of specifications, in order to keep the alignment of UE and NW that the relative phase among non-coherent Tx ports is random/uncontrolled, this issue should be addressed.   vivo: this has been discussed in several meetings, agree with FL’s assessment  FUTUREWEI: no need to discuss  Ericsson: Think this can be H3 in principle, but following the feature lead guidance regarding adding ‘H’s, we are OK to discuss in a later meeting. We agree with ZTE that port coherence should be clarified for Mode 1, but this issue does not seem as important to tackle at this meeting as UL.2 and UL.4.  Intel: It’s not necessary.  IDC: Agree with FL’s assessment |
| UL.2 | PTRS port assumption in the case of rank-1 full coherent TPMI and 2 PTRS ports  FL note: This has been discussed in last meeting. | Support: CATT, Huawei/HiSi (R1-2008796), LG, Intel, Futurewei, Ericsson, MediaTek, Samsung  No: Apple, Qualcomm, ZTE, vivo | H | Apple: We do not need to discuss this. It has been discussed in the last meeting and the UE behavior is clear. Or we can clarify it with “H2”  Qualcomm: this issue should be non-essential. Actually, based on our study which was already shared in last meeting, this is even not an issue. There is no problem in current spec for PTRS port association in this case. There is no need to discuss this not-existing “issue”.  LG: Fine to further discuss this  ZTE: We think this issue should be Non-essential (N).   * As we have discussed of this issue in last meeting, from the perspectives of specifications and implementation, the number of configured PT-RS ports of non-coherent and partial-coherent UE in Mode 1 is correct and clear.   vivo: this has been discussed in last meeting, and looking at comments above there is no consensus,  Huawei, HiSilicon: The mapping between 2 port TRS and coherent TPMIs are not defined for Mode-1. *Please note that in Rel-15, only one port PTRS port can be used for full coherent TPMIs. (see the detailed discussion in R1-2008796)* So, we need to clarify whether support 2 port PTRS for Mode-1 and how to support, otherwise the spec is ambiguity for Mode-1.  FUTUREWEI: Ok to discuss.  Ericsson: Ok to discuss at this meeting, and think it is ‘H2’.  MediaTek: okay to discuss  CATT: Our understanding is that 38.211 does not support the case of a single layer transmission with two PTRS ports, so the UE behavior is missing for mode 1 when coherent TPMI of rnak-1 is scheduled.  Intel: Agree to put it as H. We think the PTRS port assumption should be clarified for full power Mode 1 operation. |
| UL.3 | UL full power and single port SRS configuration  FL note: This has been discussed for several meetings. | Support: Spreadtrum, Intel  No: Qualcomm, LG, vivo, Futurewei, Ericsson, MediaTek, IDC | N | Qualcomm: this issue is not essential.  LG: Agree with FL’s assessment  vivo: Agree with FL’s assessment  FUTUREWEI: No need to discuss  Ericsson: As discussed in last meeting, while we think that proponents have a point, there does not seem to be a need to define single port operation for Mode 1. Therefore, we do not think this is an essential correction.  MediaTek: Agree with FL’s assessment  Spreadtrum: Indeed, it seems to be common understanding that there is no need to support higher layer parameter ul-FullPowerTransmission-r16 set to ‘fullpowerMode1’ and SRS-ResourceSet with usage set to ‘codebook’ with single port SRS resource for one UE are configured simultaneously. But if we check the current specification, we will find that Current TS38.214 g30 still allows UE to be configured with single port SRS resource with usage as codebook and fullpowerMode1 simultaneously. But current TS38.213 g30 has not provided solution to power scaling for fullpowerMode1 for the case where single port SRS resource with usage as codebook is configured. Thus, the UE behavior is not clear when single port SRS resource with usage as codebook and fullpowerMode1 are configured simultaneously.  Thus, we think at least one clarification is needed. That the issue treated as H2 is ok for us.  Intel: It’s not essential. But we are fine to have the clarification text.  IDC: Agree with FL’s assessment |
| UL.4 | To capture TPMI groups in spec. (Samsung proposes to capture in 38.214, LG proposes to capture in 38.306) | Support: Samsung (214), LG (306), Apple, Qualcomm (306), vivo (306), Huawei/HiSi, OPPO (306), Futurewei, Ericsson, MediaTek (306), Intel (306), IDC (306) | H2 (in 38.306) | Apple: Okay  Qualcomm: This issue is not essential. This is just about where to capture existing agreement. RAN1 should spend time on more important issues in Rel-16 MIMO maintenance. Regarding where to capture the agreement, we think it should be captured in 38.306 because this is about UE capability reporting.  LG: Support  vivo: maybe 38.306 is better place to capture  Huawei, HiSilicon: Need to be discussed.  OPPO: Agree with Qualcomm. No needed to discussion in RAN1. The TPMI groups are related to UE capability. Therefore, it should be captured in TS 38.306  FUTUREWEI: Agree to discuss  Ericsson: Agree with ‘H’ designation; this is a hole in the specs. Would like to further discuss which specs it should be captured in.  Samsung: Support  MediaTek: 38.306 will be better.  Intel: It could be H2 (assuming 38.306). The TPMI groups should be captured in 38.306 since it is related with UE capability.  IDC: Support.  We are not sure why 38.214 is suggested. If the intention is not to include such details in 38.306, we could capture them in 38.211 (6.3.1.5). |

1. Discussion and proposal

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

* The following 2 issues can be handled as E (a part of editorial CR): MB.3, MB.12
* The following 3 issues can be designated as H2 (editorial TPs that can be agreed without further email discussion, including capturing previous agreements): MB.4, MB.8, MT.1, UL.4
  + On UL.4, per the (super) majority view, the TP will be prepared for TS38.306 (instead of TS38.214)
* The following 7 issues can be designated as H (requiring discussion and additional agreements/conclusions): MB.1, MB.10, MB.13, MB.14, MT.2, UL.2
  + On the WA on mixed IMR in MB.10, the existence of bracketed text in the spec needs definite resolution. This matter entails whether the WA on mixed IMR should be confirmed as an agreement or reverted (hence removed).
  + The following issues appear small and can be combined with other issues within the same FL-ship: MB.1, MB.7, MB.13, MB.14
  + Although initially rated H, it was pointed out that MB.7 would result in ASN.1 impact.

In light of the above observations, the moderator makes the following **proposals**:

* On E-rated issues (MB.3, MB.12), prepare draft CRs in Appendix A (to be finalized by Monday 10/26/2020 and merged with the indicated threads for final endorsement)
  + No need for discussion except for minor editorial/format matters
* On H2-rated issues (MB.4, MB.8, MT.1, UL.4), prepare draft CRs in Appendix B (to be finalized by Monday 10/26/2020 and merged with the indicated threads for final endorsement)
  + No need for discussion except for minor editorial/format matters
* On H-rated issues (MB.1, MB.7, MB.10, MB.13, MB.14), continue discussion on 4 threads:
  + Thread 1 (moderator Jiwon) Maintenance and TPs for Multi-beam 1: MB.1 (plus E-rated MB.3, H2-rated MB.4)
  + Thread 2 (moderator Yushu) Maintenance and TPs for Multi-beam 1: MB.10+MB.13+MB.14 (plus E-rated MB.12, H2-rated MB.8)
    - As MB.13 has been discussed in several meetings before, if there is no consensus reached in RAN1#103-e, this issue will not be discussed anymore in future RAN1 meetings
  + Thread 3 (moderator Li) Maintenance and TPs for Multi-TRP: MT.2 (plus H2-rated MT.1)
  + Thread 4 (moderator Rakesh) Maintenance and TPs for UL Full-Power: UL.2 (plus H2-rated UL.4)

# Appendix A: Draft CRs for E-rated issues

Draft CR MB.3

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| **Text proposal for TS 38.214 v16.3.0**  6.2.1 UE sounding procedure  < Unchanged parts are omitted >  When a *spatialRelationInfo* is activated/updated for a semi-persistent or aperiodic SRS resource configured by the higher layer parameter *SRS-Resource* by a MAC CE for a set of CCs/BWPs, where the applicable list of CCs is indicated by higher layer parameter *simultaneousSpatial-UpdateList1-r16* or *simultaneousSpatial-UpdateList2-r16*, the *spatialRelationInfo* is applied for the semi-persistent or aperiodic SRS resource(s) with the same SRS resource ID for all the BWPs in the indicated CCs.  < Unchanged parts are omitted >  **Text proposal for TS 38.213 v16.3.0**  10.1 UE procedure for determining physical downlink control channel assignment  < Unchanged parts are omitted >  - if the UE is provided by *simultaneousTCI-UpdateList1-r16* or *simultaneousTCI-UpdateList2-r16* up to two lists of cells for simultaneous TCI state activation, the UE applies the antenna port quasi co-location provided by *TCI-States* with same activated *tci-StateID* value to CORESETs with index in all configured DL BWPs of all configured cells in a list determined from a serving cell index provided by a MAC CE command  < Unchanged parts are omitted >  4.1 Cell search  For operation with shared spectrum channel access, a UE assumes that SS/PBCH blocks in a serving cell that are within a same discovery burst transmission window or across discovery burst transmission windows are quasi co-located with respect to average gain, quasi-colocation ’typeA’, and ’typeD’ properties, when applicable [6, TS 38.214], if a value of is same among the SS/PBCH blocks. is an index of a DM-RS sequence transmitted in a PBCH of a corresponding SS/PBCH block, and is either provided by *ssb-PositionQCL-r16* or, if *ssb-PositionQCL-r16* is not provided,obtained from a *MIB* provided by a SS/PBCH block according to Table 4.1-1 with [4, TS 38.211]. *subCarrierSpacingCommon* indicates SCS of RMSI only for the case of operation without shared spectrum channel access. The UE can determine an SS/PBCH block index according to , or according to where is the candidate SS/PBCH block index. The UE assumes that within a discovery burst transmission window, a number of transmitted SS/PBCH blocks on a serving cell is not larger than and a number of transmitted SS/PBCH blocks with a same SS/PBCH block index is not larger than one.  < Unchanged parts are omitted >  5 Radio link monitoring  The downlink radio link quality of the primary cell is monitored by a UE for the purpose of indicating out-of-sync/in-sync status to higher layers. The UE is not required to monitor the downlink radio link quality in DL BWPs other than the active DL BWP, as described in Clause 12, on the primary cell. If the active DL BWP is the initial DL BWP and for SS/PBCH block and CORESET multiplexing pattern 2 or 3, as described in Clause 13, the UE is expected to perform RLM using the associated SS/PBCH block when the associated SS/PBCH block index is provided by *RadioLinkMonitoringRS*.  If the UE is configured with a SCG, as described in [12, TS 38.331], and the parameter *rlf-TimersAndConstants* is provided by higher layers and is not set to release, the downlink radio link quality of the PSCell of the SCG is monitored by the UE for the purpose of indicating out-of-sync/in-sync status to higher layers. The UE is not required to monitor the downlink radio link quality in DL BWPs other than the active DL BWP on the PSCell.  A UE can be configured for each DL BWP of a SpCell [11, TS 38.321] with a set of resource indexes, through a corresponding set of *RadioLinkMonitoringRS*, for radio link monitoring by *failureDetectionResources*. The UE is provided either a CSI-RS resource configuration index, by *csi-RS-Index*, or a SS/PBCH block index, by *ssb-Index*. The UE can be configured with up to  *RadioLinkMonitoringRS* for link recovery procedures, as described in Clause 6, and for radio link monitoring. From the  *RadioLinkMonitoringRS*, up to  *RadioLinkMonitoringRS* can be used for radio link monitoring depending on as described in Table 5-1, wherein is as defined in Clause 4.1, and up to two *RadioLinkMonitoringRS* can be used for link recovery procedures.  For operation with shared spectrum channel access, when a UE is provided a SS/PBCH block index by *ssb-Index*, the UE is expected to perform radio link monitoring using SS/PBCH block(s) in the discovery burst transmission window as described in Clause 4.1, where the SS/PBCH block(s) have candidate SS/PBCH block index(es) corresponding to SS/PBCH block index provided by *ssb-Index*.  If the UE is not provided *RadioLinkMonitoringRS* and the UE is provided for PDCCH receptions TCI states that include one or more of a CSI-RS  - the UE uses for radio link monitoring the RS provided for the active TCI state for PDCCH reception if the active TCI state for PDCCH reception includes only one RS  - if the active TCI state for PDCCH reception includes two RS, the UE expects that one RS is configured with *qcl-Type* set to ’typeD’ [6, TS 38.214] and the UE uses the RS configured with *qcl-Type* set to ’typeD’ for radio link monitoring; the UE does not expect both RS to be configured with *qcl-Type* set to ’typeD’.  - the UE is not required to use for radio link monitoring an aperiodic or semi-persistent RS  - For , the UE selects the  RS provided for active TCI states for PDCCH receptions in CORESETs associated with the search space sets in an order from the shortest monitoring periodicity. If more than one CORESETs are associated with search space sets having same monitoring periodicity, the UE determines the order of the CORESET from the highest CORESET index as described in Clause 10.1.  < Unchanged parts are omitted >  6 Link recovery procedures  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 configured with *qcl-Type* set to ’typeD’ 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 .  The thresholds Qout,LR and Qin,LR correspond to the default value of *rlmInSyncOutOfSyncThreshold*, as described in [10, TS 38.133] for Qout, and to the value provided by *rsrp-ThresholdSSB* or *rsrp-ThresholdBFR-r16*, respectively.  < Unchanged parts are omitted >  7.1.1 UE behaviour  < Unchanged parts are omitted >  - If  - the PUSCH transmission is scheduled by DCI format 0\_0 and the UE is not provided a spatial setting for a PUCCH transmission, or  - the PUSCH transmission is not scheduled by DCI format 0\_0 that does not include an SRI field, or  - *SRI-PUSCH-PowerControl* is not provided to the UE,  the UE determines a RS resource index with a respective *PUSCH-PathlossReferenceRS-Id* value being equal to zero where the RS resource is either on serving cell or, if provided, on a serving cell indicated by a value of *pathlossReferenceLinking*  - If  - the PUSCH transmission is scheduled by DCI format 0\_0 on serving cell ,  - the UE is not provided PUCCH resources for the active UL BWP of serving cell , and  - the UE is provided *enableDefaultBeamPL-ForPUSCH0-r16*  the UE determines a RS resource index providing a periodic RS resource configured with *qcl-Type* set to ’typeD’ in the TCI state or the QCL assumption of a CORESET with the lowest index in the active DL BWP of the serving cell  - If  - the PUSCH transmission is scheduled by DCI format 0\_0 on serving cell ,  - the UE is not provided a spatial setting for PUCCH resources on the active UL BWP of the primary cell [11, TS 38.321], and  - the UE is provided *enableDefaultBeamPL-ForPUSCH0-r16*  the UE determines a RS resource index providing a periodic RS resource configured with *qcl-Type* set to ’typeD’ in the TCI state or the QCL assumption of a CORESET with the lowest index in the active DL BWP of serving cell  < Unchanged parts are omitted >  7.3.1 UE behaviour  < Unchanged parts are omitted >  - If the UE  - is not provided *pathlossReferenceRS* or *SRS-PathlossReferenceRS*,  - is not provided *spatialRelationInfo*, and  - is provided *enableDefaultBeamPL-ForSRS-r16*, and  - is not provided *CORESETPoolIndex* value of 1 for any CORESET, or is provided *CORESETPoolIndex* value of 1 for all CORESETs, in *ControlResourceSet* and no codepoint of a TCI field, if any, in a DCI format of any search space set maps to two TCI states [5, TS 38.212]  the UE determines a RS resource index  providing a periodic RS resource configured with *qcl-Type* set to ’typeD’ in  - the TCI state or the QCL assumption of a CORESET with the lowest index in the active DL BWP, if CORESETs are provided in the active DL BWP of serving cell  - the active PDSCH TCI state with lowest ID [6, TS 38.214] in the active DL BWP, if CORESETs are not provided in the active DL BWP of serving cell  < Unchanged parts are omitted >  7.4 Physical random access channel  A UE determines a transmission power for a physical random access channel (PRACH), , on active UL BWP  of carrier  of serving cell  based on DL RS for serving cell  in transmission occasion  as  [dBm],  where  is the UE configured maximum output power defined in [8-1, TS 38.101-1], [8-2, TS 38.101-2] and [8-3, TS 38.101-3] for carrier  of serving cell  within transmission occasion ,  is the PRACH target reception power *PREAMBLE\_RECEIVED\_TARGET\_POWER* provided by higher layers [11, TS 38.321] for the active UL BWP  of carrier  of serving cell , and  is a pathloss for the active UL BWP  of carrier  based on the DL RS associated with the PRACH transmission on the active DL BWP of serving cell  and calculated by the UE in dB as *referenceSignalPower* – higher layer filtered RSRP in dBm, where RSRP is defined in [7, TS 38.215] and the higher layer filter configuration is defined in [12, TS 38.331]. If the active DL BWP is the initial DL BWP and for SS/PBCH block and CORESET multiplexing pattern 2 or 3, as described in Clause 13, the UE determines  based on the SS/PBCH block associated with the PRACH transmission.  If a PRACH transmission from a UE is not in response to a detection of a PDCCH order by the UE, or is in response to a detection of a PDCCH order by the UE that triggers a contention based random access procedure, or is associated with a link recovery procedure where a corresponding index  is associated with a SS/PBCH block, as described in Clause 6, *referenceSignalPower* is provided by *ss-PBCH-BlockPower*.  If a PRACH transmission from a UE is in response to a detection of a PDCCH order by the UE that triggers a contention-free random access procedure and depending on the DL RS that the DM-RS of the PDCCH order is quasi-collocated with as described in Clause 10.1, *referenceSignalPower* is provided by *ss-PBCH-BlockPower* or, if the UE is configured resources for a periodic CSI-RS reception or the PRACH transmission is associated with a link recovery procedure where a corresponding index  is associated with a periodic CSI-RS configuration as described in Clause 6, *referenceSignalPower* is obtained by *ss-PBCH-BlockPower* and *powerControlOffsetSS* where *powerControlOffsetSS* provides an offset of CSI-RS transmission power relative to SS/PBCH block transmission power [6, TS 38.214]. If *powerControlOffsetSS* is not provided to the UE, the UE assumes an offset of 0 dB. If the active TCI state for the PDCCH that provides the PDCCH order includes two RS, the UE expects that one RS is configured with *qcl-Type* set to ’typeD’ and the UE uses the one RS when applying a value provided by *powerControlOffsetSS*.  < Unchanged parts are omitted >  10.1 UE procedure for determining physical downlink control channel assignment  < Unchanged parts are omitted >  If a UE monitors PDCCH candidates for DCI formats with CRC scrambled by a C-RNTI and the UE is provided a non-zero value for *searchSpaceID* in *PDCCH-ConfigCommon* for a Type0/0A/2-PDCCH CSS set, the UE determines monitoring occasions for PDCCH candidates of the Type0/0A/2-PDCCH CSS set based on the search space set associated with the value of *searchSpaceID*.  The UE may assume that the DM-RS antenna port associated with PDCCH receptions in the CORESET configured by *pdcch-ConfigSIB1* in *MIB*, the DM-RS antenna port associated with corresponding PDSCH receptions, and the corresponding SS/PBCH block are quasi co-located with respect to average gain, quasi-colocation ’typeA’, and ’typeD’ properties, when applicable [6, TS 38.214], if the UE is not provided a TCI state indicating quasi co-location information of the DM-RS antenna port for PDCCH reception in the CORESET. The value for the DM-RS scrambling sequence initialization is the cell ID. A SCS is provided by *subCarrierSpacingCommon* in *MIB*.  For single cell operation or for operation with carrier aggregation in a same frequency band, a UE does not expect to monitor a PDCCH in a Type0/0A/2/3-PDCCH CSS set or in a USS set if a DM-RS for monitoring a PDCCH in a Type1-PDCCH CSS set is not configured with the same *qcl-Type* set to ’typeD’ properties [6, TS 38.214] with a DM-RS for monitoring the PDCCH in the Type0/0A/2/3-PDCCH CSS set or in the USS set, and if the PDCCH or an associated PDSCH overlaps in at least one symbol with a PDCCH the UE monitors in a Type1-PDCCH CSS set or with an associated PDSCH.  < Unchanged parts are omitted >  For a CORESET other than a CORESET with index 0, if a UE is provided a single TCI state for a CORESET, or if the UE receives a MAC CE activation command for one of the provided TCI states for a CORESET, the UE assumes that the DM-RS antenna port associated with PDCCH receptions in the CORESET is quasi co-located with the one or more DL RS configured by the TCI state. For a CORESET with index 0, the UE expects that a CSI-RS configured with *qcl-Type* set to ‘typeD’ in a TCI state indicated by a MAC CE activation command for the CORESET is provided by a SS/PBCH block  - if the UE receives a MAC CE activation command for one of the TCI states, the UE applies the activation command in the first slot that is after slot where is the slot where the UE would transmit a PUCCH with HARQ-ACK information for the PDSCH providing the activation command and is the SCS configuration for the PUCCH. The active BWP is defined as the active BWP in the slot when the activation command is applied.  < Unchanged parts are omitted >  If a UE  - is configured for single cell operation or for operation with carrier aggregation in a same frequency band, and  - monitors PDCCH candidates in overlapping PDCCH monitoring occasions in multiple CORESETs that have been configured with the same or different *qcl-Type* set to ’typeD’ properties on active DL BWP(s) of one or more cells  the UE monitors PDCCHs only in a CORESET, and in any other CORESET from the multiple CORESETs having being configured with *qcl-Type* set to same ’typeD’ properties as the CORESET, on the active DL BWP of a cell from the one or more cells  - the CORESET corresponds to the CSS set with the lowest index in the cell with the lowest index containing CSS, if any; otherwise, to the USS set with the lowest index in the cell with lowest index  - the lowest USS set index is determined over all USS sets with at least one PDCCH candidate in overlapping PDCCH monitoring occasions  - for the purpose of determining the CORESET, a SS/PBCH block is considered to have different QCL ’typeD’ properties than a CSI-RS  - for the purpose of determining the CORESET, a first CSI-RS associated with a SS/PBCH block in a first cell and a second CSI-RS in a second cell that is also associated with the SS/PBCH block are assumed to have same QCL ’typeD’ properties  - the allocation of non-overlapping CCEs and of PDCCH candidates for PDCCH monitoring is according to all search space sets associated with the multiple CORESETs on the active DL BWP(s) of the one or more cells  - the number of active TCI states is determined from the multiple CORESETs  If a UE  - is configured for single cell operation or for operation with carrier aggregation in a same frequency band, and  - monitors PDCCH candidates in overlapping PDCCH monitoring occasions in multiple CORESETs where none of the CORESETs has TCI-states configured with *qcl-Type* set to’typeD’,  the UE is required to monitor PDCCH candidates in overlapping PDCCH monitoring occasions for search space sets associated with different CORESETs.  <omitted text>  13 UE procedure for monitoring Type0-PDCCH CSS sets  < Unchanged parts are omitted >  For operation with shared spectrum channel access and for the SS/PBCH block and CORESET multiplexing pattern 1, a UE monitors PDCCH in the Type0-PDCCH CSS set over slots that include Type0-PDCCH monitoring occasions associated with SS/PBCH blocks that are quasi co-located with the SS/PBCH block that provides a CORESET for Type0-PDCCH CSS set with respect to average gain, quasi-colocation ’typeA’, and ’typeD’ properties, when applicable [6, TS 38.214]. For a candidate SS/PBCH block index , where , two consecutive slots starting from slot include the associated Type0-PDCCH monitoring occasions. The UE determines an index of slot as that is in a frame with system frame number (SFN) satisfying if , or in a frame with SFN satisfying if . and are provided by Table 13-11, and based on the SCS for PDCCH receptions in the CORESET [4, TS 38.211]. The index for the first symbol of the CORESET in slots and is the first symbol index provided by Table 13-11. The UE does not expect to be configured with , or with , when .  < Unchanged parts are omitted > |

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| **Text proposal for 38.214 v16.3.0** **5.2.1.4.2 Report Quantity Configurations** <omitted text>  If the UE is configured with a *CSI-ReportConfig* with the higher layer parameter *reportQuantity* set to 'cri-SINR' or 'ssb-Index-SINR',  - if the UE is configured with the higher layer parameter *groupBasedBeamReporting* set to 'disabled', the UE shall report in a single report *nrofReportedRS* (higher layer configured) different CRI or SSBRI for each report setting.  - if the UE is configured with the higher layer parameter *groupBasedBeamReporting* set to 'enabled', the UE shall report in a single reporting instance two different CRI or SSBRI for each report setting, where CSI-RS and/or SSB resources can be received simultaneously by the UE.  <omitted text> **5.2.1.4.4 L1-SINR Reporting** For L1-SINR computation, for channel measurement the UE may be configured with NZP CSI-RS resources and/or SS/PBCH Block resources, for interference measurement the UE may be configured with NZP CSI-RS or CSI-IM resources.  - for channel measurement, the UE may be configured with CSI-RS resource setting with up to 16 resource sets, with a total of up to 64 CSI-RS resources or up to 64 SS/PBCH Block resources.  For L1-SINR reporting, if the higher layer parameter *nrofReportedRS* in *CSI-ReportConfig* is configured to be one, the reported L1-SINR value is defined by a 7-bit value in the range [-23, 40] dB with 0.5 dB step size, and if the higher layer parameter *nrofReportedRS* is configured to be larger than one, or if the higher layer parameter *groupBasedBeamReporting* is configured as 'enabled', the UE shall use differential L1-SINR based reporting, where the largest measured value of L1-SINR is quantized to a 7-bit value in the range [-23, 40] dB with 0.5 dB step size, and the differential L1-SINR is quantized to a 4-bit value. The differential L1-SINR is computed with 1 dB step size with a reference to the largest measured L1-SINR value which is part of the same L1-SINR reporting instance. When NZP CSI-RS is configured for channel measurement and/or interference measurement, the reported L1-SINR values should not be compensated by the power offset(s) given by higher layer parameter *powerControOffsetSS* or *powerControlOffset*.  <omitted text> |

# Appendix B: Draft CRs for H2-rated issues

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| **Text proposal for TS 38.213 v16.3.0**  7.1.1 UE behavior  < Unchanged parts are omitted >  - If  - the PUSCH transmission is scheduled by DCI format 0\_0 and the UE is not provided a spatial setting for a PUCCH transmission, or  - the PUSCH transmission is scheduled by DCI format 0\_1 or DCI format 0\_2 that does not include an SRI field, or  - *SRI-PUSCH-PowerControl* is not provided to the UE,  the UE determines a RS resource index with a respective *PUSCH-PathlossReferenceRS-Id* value being equal to zero where the RS resource is either on serving cell or, if provided, on a serving cell indicated by a value of *pathlossReferenceLinking*  < Unchanged parts are omitted > |

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| **Text proposal for TS 38.214 V16.3.0** 5.2.1.5.1 Aperiodic CSI Reporting/Aperiodic CSI-RS when the triggering PDCCH and the CSI-RS have the same numerology < Unchanged parts are omitted >  - For each aperiodic CSI-RS resource in a CSI-RS resource set associated with each CSI triggering state, the UE is indicated the quasi co-location configuration of quasi co-location RS source(s) and quasi co-location type(s), as described in Clause 5.1.5, through higher layer signaling of *qcl-info* which contains a list of references to *TCI-State's* for the aperiodic CSI-RS resources associated with the CSI triggering state. If a *State* referred toin the list is configured with a reference to an RS associated with '*QCL-TypeD*', that RS may be an SS/PBCH block located in the same or different CC/DL BWP or a CSI-RS resource configured as periodic or semi-persistent located in the same or different CC/DL BWP.  - If the scheduling offset between the last symbol of the PDCCH carrying the triggering DCI and the first symbol of the aperiodic CSI-RS resources in a *NZP-CSI-RS-ResourceSet* configured without higher layer parameter *trs-Info* is smaller than the UE reported threshold *beamSwitchTiming,* as defined in [13, TS 38.306], when the reported value is one of the values of {14, 28, 48} and *enableBeamSwitchTiming-r16* is not provided, or is smaller than 48 when the reported value of *beamSwitchTiming-r16* is one of the values of {224, 336} and *enableBeamSwitchTiming-r16* is provided.  - If a UE is configured with *enableDefaultTCIStatePerCoresetPoolIndex* and the UE is configured by higher layer parameter *PDCCH-Config* that contains two different values of *CORESETPoolIndex* in *ControlResourceSet*  - if there is any other DL signal with an indicated TCI state in the same symbols as the CSI-RS, the UE applies the QCL assumption of the other DL signal also when receiving the aperiodic CSI-RS. The other DL signal refers to PDSCH scheduled by a PDCCH associated with the same *CORESETPoolIndex*  as the PDCCH triggering the AP CSI-RS and scheduled with offset larger than or equal to the threshold *timeDurationForQCL,* as defined in [13, TS 38.306], aperiodic CSI-RS triggered by a PDCCH associated with the same *CORESETPoolIndex*  as the PDCCH triggering the AP CSI-RS and scheduled with offset larger than or equal to the UE reported threshold *beamSwitchTiming* when the reported value is one of the values {14,28,48} and *enableBeamSwitchTiming-r16* is not provided, aperiodic CSI-RS triggered by a PDCCH associated with the same *CORESETPoolIndex*  as the PDCCH triggering the AP CSI-RS and scheduled with offset larger than or equal to 48 when the reported value of *beamSwitchTiming-r16* is one of the values {224, 336} and *enableBeamSwitchTiming-r16* is provided, periodic CSI-RS, semi-persistent CSI-RS;  - else, the UE applies the QCL parameter(s) of the CORESET associated with a monitored search space with the lowest *controlResourceSetId* among CORESETs , which are configured with the same value of *CORESETPoolIndex* as the PDCCH triggering that AP CSI-RS, in the latest slot in which one or more CORESETs associated with the same value of *CORESETPoolIndex* as the PDCCH triggering that AP CSI-RS  - else if a UE is configured with *enableTwoDefaultTCIStates* and at least one TCI codepoint indicates two TCI states  - if there is any other DL signal with an indicated TCI state in the same symbols as the CSI-RS, the UE applies the QCL assumption of the other DL signal also when receiving the aperiodic CSI-RS. The other DL signal refers to PDSCH scheduled with offset larger than or equal to the threshold *timeDurationForQCL,* as defined in [13, TS 38.306], aperiodic CSI-RS scheduled with offset larger than or equal to the UE reported threshold *beamSwitchTiming* when the reported value is one of the values {14,28,48} and *enableBeamSwitchTiming-r16* is not provided, aperiodic CSI-RS scheduled with offset larger than or equal to 48 when the reported value of *beamSwitchTiming-r16* is one of the values {224, 336} and *enableBeamSwitchTiming-r16* is provided, periodic CSI-RS, semi-persistent CSI-RS. If there is a PDSCH indicated with two TCI states in the same symbols as the CSI-RS, the UE applies the first TCI state of the two TCI states when receiving the aperiodic CSI-RS.  - else, the UE applies the first one of two TCI states corresponding to the lowest DCI codepoint among those mapped to two TCI states and applicable to the PDSCH within the active BWP of the cell in which the CSI-RS is to be received when receiving the aperiodic CSI-RS.  - else if there is any other DL signal with an indicated TCI state in the same symbols as the CSI-RS, the UE applies the QCL assumption of the other DL signal also when receiving the aperiodic CSI-RS. The other DL signal refers to PDSCH scheduled with offset larger than or equal to the threshold *timeDurationForQCL,* as defined in [13, TS 38.306], aperiodic CSI-RS scheduled with offset larger than or equal to the UE reported threshold *beamSwitchTiming* when the reported value is one of the values {14,28,48} and *enableBeamSwitchTiming-r16* is not provided, aperiodic CSI-RS scheduled with offset larger than or equal to 48 when the reported value of *beamSwitchTiming-r16* is one of the values {224, 336} and *enableBeamSwitchTiming-r16* is provided, periodic CSI-RS, semi-persistent CSI-RS;  - else if at least one CORESET is configured for the BWP in which the aperiodic CSI-RS is received, when receiving the aperiodic CSI-RS, the UE applies the QCL assumption used for the CORESET associated with a monitored search space with the lowest *controlResourceSetId* in the latest slot in which one or more CORESETs within the active BWP of the serving cell are monitored;  - else if the UE is configured with [*enableDefaultBeamForCCS*] and when receiving the aperiodic CSI-RS, the UE applies the QCL assumption of the lowest-ID activated TCI state applicable to the PDSCH within the active BWP of the cell in which the CSI-RS is to be received.  - If the scheduling offset between the last symbol of the PDCCH carrying the triggering DCI and the first symbol of the aperiodic CSI-RS resources is equal to or greater than the UE reported threshold *beamSwitchTiming* when the reported value is one of the values of {14,28,48} and *enableBeamSwitchTiming-r16* is not provided, or is equal to or greater than 48 when the reported value of *beamSwitchTiming-r16* is one of the values of {224, 336} and *enableBeamSwitchTiming-r16* is provided, the UE is expected to apply the QCL assumptions in the indicated TCI states for the aperiodic CSI-RS resources in the CSI triggering state indicated by the CSI trigger field in DCI.  - The UE is not expected to receive aperiodic CSI-RS and PDSCH/aperiodic CSI-RS associated with different values of *CORESETPoolIndex* in overlapped symbol(s). The UE is not expected to receive aperiodic CSI-RS and semi-persistent/periodic CSI-RS with different ‘QCL-type D’ in overlapped symbol(s).  - A non-zero codepoint of the CSI request field in the DCI is mapped to a CSI triggering state according to the order of the associated positions of the up to trigger states in *CSI-AperiodicTriggerStateList* with codepoint '1' mapped to the triggering state in the first position.  < Unchanged parts are omitted > |

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# References

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| 1 | [R1-2007748](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2007748.zip) | Maintenance of multi-beam operation | ZTE |
| 2 | [R1-2007749](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2007749.zip) | Draft CR on UL full power transmission Mode 1 | ZTE |
| 3 | [R1-2007750](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2007750.zip) | Maintenance of Multi-TRP enhancements | ZTE |
| 4 | [R1-2007818](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2007818.zip) | Discussion on remaining issues of multi-TRP/panel transmission | CATT |
| 5 | [R1-2007819](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2007819.zip) | Correction on PTRS for UL full power transmission | CATT |
| 6 | R1-2007820 | Remaining Issues on multi-beam operation enhancement | CATT |
| 7 | [R1-2007909](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2007909.zip) | Correction on L1-SINR Resource Setting | FUTUREWEI |
| 8 | [R1-2007938](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2007938.zip) | Corrections to multi TRP | Intel Corporation |
| 9 | [R1-2008093](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2008093.zip) | Discussion on remaining issues for multi-TRP operation | Spreadtrum Communications |
| 10 | [R1-2008094](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2008094.zip) | Discussion on remaining issues on full TX power for UL transmission | Spreadtrum Communications |
| 11 | [R1-2008139](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2008139.zip) | On maintenance of Rel.16 multi-beam operation | Samsung |
| 12 | R1-2008140 | Summary for Rel.16 NR eMIMO maintenance | Moderator (Samsung) |
| 13 | [R1-2008141](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2008141.zip) | On Rel.16 multi-TRP/panel transmission | Samsung |
| 14 | [R1-2008142](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2008142.zip) | On UL full power transmission | Samsung |
| 15 | [R1-2008211](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2008211.zip) | Text proposals for enhancements on multi-TRP and panel Transmission | OPPO |
| 16 | [R1-2008212](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2008212.zip) | Correction for default TCI state of AP CSI-RS for M-TRP | OPPO |
| 17 | [R1-2008213](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2008213.zip) | Text Proposals for Multi-beam Operation Enhancement | OPPO |
| 18 | [R1-2008293](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2008293.zip) | Maintenance on multi-TRP operation | Lenovo, Motorola Mobility |
| 19 | [R1-2008324](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2008324.zip) | Correction on L1-SINR reporting | Huawei, HiSilicon |
| 20 | [R1-2008325](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2008325.zip) | Correction on the maximum number of CORESETs for Multi-DCI Transmission | Huawei, HiSilicon |
| 21 | [R1-2008326](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2008326.zip) | Correction on the index value range of CORESET for Multi-DCI Transmission | Huawei, HiSilicon |
| 22 | R1-2008345 | Remaining issues on multi-beam operation | Sony |
| 23 | [R1-2008436](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2008436.zip) | Remaining issues on Rel-16 Multi-TRP enhancement | Apple |
| 24 | [R1-2008437](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2008437.zip) | Remaining issues on Rel-16 Beam Management | Apple |
| 25 | [R1-2008514](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2008514.zip) | Remaining issues on multi-beam operation | MediaTek Inc. |
| 26 | [R1-2008536](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2008536.zip) | Updated proposal of PUCCH spatial relation after CBRA-BFR in Rel.16 | NTT DOCOMO, INC, Nokia, Nokia Shanghai Bell, InterDigital |
| 27 | [R1-2008569](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2008569.zip) | Corrections on Multi-TRP PDCCH | Quectel |
| 28 | [R1-2008570](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2008570.zip) | Draft CR on multi-TRP/panel transmission | LG Electronics |
| 29 | [R1-2008571](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2008571.zip) | Draft CR on beam management | LG Electronics |
| 30 | [R1-2008572](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2008572.zip) | Text proposals on full Tx power UL transmission | LG Electronics |
| 31 | [R1-2008610](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2008610.zip) | Remaining Issues on Multi-TRP Enhancements | Qualcomm Incorporated |
| 32 | [R1-2008611](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2008611.zip) | Remaining issue on multi-beam operation | Qualcomm Incorporated |
| 33 | [R1-2008635](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2008635.zip) | Draft CR on TCI states for Aperiodic CSI-RS | Ericsson |
| 34 | [R1-2008637](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2008637.zip) | Draft CR on DL SPS based PDSCH repetitions | Ericsson |
| 35 | [R1-2008638](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2008638.zip) | Draft CR on TCI state codepoint mapping for DCI format 1\_2 | Ericsson |
| 36 | [R1-2008640](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2008640.zip) | Draft CR on QCL terminology alignment | Nokia, Nokia Shanghai Bell |
| 37 | [R1-2008641](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2008641.zip) | draft CR on higher layer parameter enabling L1-SINR operation procedures | Nokia, Nokia Shanghai Bell |
| 38 | [R1-2008674](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2008674.zip) | Remaining issues and corrections on multi beam related issues | vivo |
| 39 | [R1-2008675](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2008675.zip) | Corrections on multi TRP related issues | vivo |
| 40 | [R1-2008676](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2008676.zip) | Miscellaneous corrections on power control | vivo |
| 41 | [R1-2008723](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2008723.zip) | Maintenance of Rel-16 Multi-TRP operation | Nokia, Nokia Shanghai Bell |