**3GPP TSG RAN WG1 #110bis-e R1-220XXXX**

**e-Meeting, October 10th – 19th, 2022**

**Agenda item:** 8.1

**Source:** Moderator (ZTE)

**Title:** Moderator Summary for Rel.17 NR FeMIMO maintenance: multi-beam

**Document for:** Discussion and Decision

1. Introduction

The moderator summary of the maintenance-related issues raised in the submitted contributions for Rel.17 NR\_FeMIMO maintenance is given below.

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 companies’ views checking for further discussion in the upcoming weeks.

* *High priority (H):* this includes high-priority item (essential, pending issues, broken spec components) and proposed editorial changes that either enhance the clarity of the specs or correct mistakes
* *Non-essential (N)*: this includes all other purposes such as spec optimization and low priority issues
* *Editorial (E)*: this includes editorial issues that will be handled as editorial CRs

Company’s comments are requested **before Monday 23:59 UTC.**

* Subject to Mr. Chairman’s discretion, we need to wrap up this phase by end of Day2 (or earlier if possible). Once the issues are identified, additional email threads will be created.
1. Maintenance issues

The issues are summarized in the following table:

**Table 1 Summary**

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| **#** | **Issue (summary of CR proposal)** | **Companies** | **FL assessment**  | **Company inputs (if any)** |
| **Sub-Item 1 – Unified TCI Framework** |
| 1-1 | Clarify that PUSCH-PathlossReferenceRS-Id value being equal to zero is used as PL-RS when a UE is configured with dl-OrJoint-TCIStateList-r17 and the pathlossReferenceRS-Id is absent in the indicated TCIState, or when a UE is configured with dl-OrJoint-TCIStateList-r17 and UL-TCIState and the pathlossReferenceRS-Id is absent in the indicated UL-TCIstate. (R1-2208534, R1-2208535)FL note 1: The above for default PL-RS, if PL-RS is not configured, can be assumed as an optimized solution for a specific case, and whether the update is essential may need to be justified. * BTW, using ‘pathlossReferenceLinking’ for enabling cross-CC PL-RS configuration in R1-2208535 can be handled together with Issue 1-6.

FL note 2: This issue has NOT been discussed. | Spreadtrum | N | Lenovo: We understand that *pathlossReferenceRS-Id* should always be configured in the indicated *TCIState* or *UL-TCIstate*.MediaTek: Same understanding as Lenovo that a PL-RS should be always provided in each TCI state, as agreed in RAN1#105.Agreement from RAN1#105On path-loss measurement for Rel.17 unified TCI framework, a PL-RS (configured for path-loss calculation) is either included in UL TCI state or (if applicable) joint TCI state or associated with UL TCI state or (if applicable) joint TCI state.QC: PL RS should always be in TCI as agreedSpreadtrum: As we mentioned in cover sheet: In 38.331, as the parameter *pathlossReferenceRS-Id* is **optionally configured** in *TCIState* or *UL-TCIstat*e. UE does not know which RS resource is used for downlink pathloss estimate for PUSCH/PUCCH/SRS when *pathlossReferenceRS-Id* is absent in joint TCI state or UL TCI state.We are fine with the understanding on always configuration for the parameter *pathlossReferenceRS-Id*. While a conclusion is preferred if the majority share the same common understanding for this issue to avoid potential misalignment or misunderstanding with 38.331.TCI-State ::= SEQUENCE { tci-StateId TCI-StateId, qcl-Type1 QCL-Info, qcl-Type2 QCL-Info OPTIONAL, -- Need R ..., [[ additionalPCI-r17 AdditionalPCIIndex-r17 OPTIONAL, -- Need R pathlossReferenceRS-Id-r17 PUSCH-PathlossReferenceRS-Id OPTIONAL, -- Cond JointTCI ul-powerControl-r17 Uplink-powerControlId-r17 OPTIONAL -- Cond JointTCI  ]]}TCI-UL-State-r17 ::= SEQUENCE { tci-UL-State-Id-r17 TCI-UL-State-Id-r17, servingCellId-r17 ServCellIndex OPTIONAL, -- Need R bwp-Id-r17 BWP-Id OPTIONAL, -- Cond CSI-RSorSRS-Indicated referenceSignal-r17 CHOICE { ssb-Index-r17 SSB-Index, csi-RS-Index-r17 NZP-CSI-RS-ResourceId, srs-r17 SRS-ResourceId }, additionalPCI-r17 AdditionalPCIIndex-r17 OPTIONAL, -- Need R ul-powerControl-r17 Uplink-powerControlId-r17 OPTIONAL, -- Need R pathlossReferenceRS-Id-r17 PUSCH-PathlossReferenceRS-Id-r17 OPTIONAL, -- Need R ... }LG: Fine with the FL’s assessmentGoogle: Agree with QCEricsson: not needed |
| 1-2 | In earlier versions of 38.331 used the name DLorJoint-TCIState for the new TCI state introduced in Rel-17, but this was merged into legacy RRC parameter of TCI state. Similar issue for ‘*TCI-UL-State*’.Although we already made some update for those issues, based on the latest 38.331, some further alignment seems to be necessary. (R1-2208751, R1-2210079, R1-2210081, R1-2210088, R1-2210089, R1-2210216)FL note 1: The issue identified in the problem may be valid and editorial, but some of them may be incorrect. Combo CR(s) for above seem necessary. FL note 2: This issue has been discussed for one meeting. | Lenovo, E///, ASUSTeK, Huawei | E | Lenovo: SupportMediaTek: Okay to discuss these alignmentsQC: Fine to discussSpreadtrum: OK to discuss.LG: Fine to discussGoogle: OK with the alignmentsEricsson: OK |
| 1-3 | Clarify that, for non-codebook based transmission, when the UE is configured *dl-OrJoint-TCIStateList* or *UL-TCIState*, the UEdoes not expect to be configured with both *TCIState* or *UL*-*TCIState* for SRS resource and *associatedCSI-RS* in *SRS-ResourceSet* for SRS resource set, and does not except to be configured with both *followUnifiedTCIstateSRS* for SRS resource set and *associatedCSI-RS* in *SRS-ResourceSet* for SRS resource set. (R1-2208753) FL note 1: Technically speaking, the above clarification is valid in unified TCI framework. But considering that it may be up to gNB implementation, whether the update is essential may need to be justified. FL note 2: This issue has been discussed for one meeting. | Lenovo | N | Lenovo: We think it should be ‘H’ since the same principle was clearly stated in Rel-15 specification for the UE to have clear behavior. Without this description, a UE may be configured with an SRS resource set for nCB with both *UL-TCIState* and *associatedCSI-RS*, which may lead to a unclear UE behaviour. MediaTek: Fine to discussQC: Not critical. gNB can handle the issue.OPPO: It is good clarification to be madeSpreadtrum: Agree with QC.LG: Fine with the FL’s assessmentGoogle: Support to discuss.Ericsson: this is editorial, and should be captured |
| 1-4 | Change the reference of MAC CE for beam indication of SRS resource from 6.1.3.47 to 6.1.3.59 or 6.1.3.60 on unified TCI framework. (R1-2208754)FL note 1: The issue identified in the problem may be valid and editorial.FL note 2: This issue has NOT been discussed. | Lenovo | E | Lenovo: SupportMediaTek: OK to the correctionQC: Fine to discussSpreadtrum: OK to discuss.LG: Fine to discussGoogle: Agree with FLEricsson: OK |
| 1-5 | To capture the agreement on power control parameters (i.e., PL-RS, P0, alpha, closed loop index) for calculating Type 1 power headroom based on a reference PUSCH (R1-2208756)FL note 1: It is to capture the already agreement in RAN1#109, and last meeting the above CR was quite stable.**Agreement**To calculate the Type 1 power headroom based on a reference PUSCH, the UE uses the PUSCH power control parameters (i.e., PL-RS, P0, alpha, closed loop index) associated with the indicated joint/UL-TCI state.FL note 2: This issue has been discussed for one meeting. | Lenovo | H | Lenovo: SupportMediaTek: SupportQC: Fine to discussOPPO: okSpreadtrum: OK to discuss.LG: Fine to discussGoogle: We do not think this is necessary, but we are fine with majority’s view.Ericsson: ok to discuss. Note that there is no RRC IE *DLorJoint-TCIState* |
| 1-6 | To clarify that the CC of PL-RS for an indicated TCI state can be the CC on which the indicated TCI state is configured, or, if provided, on a CC indicated by a value of *pathlossReferenceLinking*. (R1-2208761, R1-2208535)FL note 1: The issue identified in the problem is valid, otherwise cross-CC PL-RS indication may be precluded in unified TCI framework.FL note 2: This issue has been discussed for one meeting. | Spreadtrum, ZTE | H | Lenovo: Fine to discuss.QC: Seems no need. To our understanding, the current linking description in 213 is in parallel to the general PL RS description and hence is applicable to unified TCI as well. where the RS resource is either on serving cell c or, if provided, on a serving cell indicated by a value of pathlossReferenceLinkingOPPO: ok to discuss. We see this is an issue but not because of cross-CC indication, but it is the TCI state of reference BWP/CC. Spreadtrum: Support to discuss. For unified TCI framework in CA case, if the *TCIState* or *UL-TCIState* configurations are absent in a BWP of the CC, the UE can apply the *TCIState* or *UL-TCIState* configurations from a reference BWP of a reference CC. This means that PL-RS ID is obtained by the *TCIState* or *UL-TCIState* from a reference BWP of a reference CC. However, it needs to be clarified which serving cell the PL-RS is on. In current spec, the ambiguity is whether the serving cell for this PL-RS is indicated by the parameter pathlossReferenceLinking configured on the reference CC or the parameter pathlossReferenceLinking configured on the CC applying the indicated TCI state. As a unified understanding, we prefer that the parameter pathlossReferenceLinking to be determined from the reference CC together with the PL-RS ID.ZTE: support to discuss. I am afraid that we cannot agree with QC that the current linking description is applicable to unified TCI as well. It is obvious that PL-RS for unified TCI is described at the beginning of section 7 in 38.213, and can be interpreted separately from legacy scheme. Google: OK to discuss.Ericsson: not needed |
| 1-7 | To clarify that a parameter closedLoopIndex-r17 indicates a shared closed loop power control for PUSCH with index of 0 or 1 for value of i0 or i1, and then an absence of the parameter closedLoopIndex-r17 indicates a separate SRS closed loop power control. (R1-2208762)FL note 1: The issue identified in the problem is valid. For SRS, 3 closed loop state(s) should be supported as in Rel-15/16: one separate SRS closed loop power control and two shared closed power control with PUSCH. But, how to interpret the following RRC parameter for SRS closed loop indication is unclear.P0AlphaSet-r17 ::= SEQUENCE {p0-r17 INTEGER (-16..15) OPTIONAL, -- Need Ralpha-r17 Alpha OPTIONAL, -- Need RclosedLoopIndex-r17 ENUMERATED { i0, i1 }}FL note 2: This issue has NOT been discussed. | ZTE | H | Lenovo: It’s not clear why 3 closed loop states should be supported for SRS in Rel-15/16. According to Rel-15, SRS always share the PUSCH power control state.QC: Seems not critical. The benefit of separate closed loop for SRS is unclear. The agreed 2 loops for all channels should be sufficient and simplify UE implementation. Also, the change requires more or less RRC impactZTE: **Separate CL-PC for SRS transmission has been supported since LTE, NR also reuse such scheme,** for at least the following cases:* Case1: No PUSCH/PUCCH is configured on a BWP/CC, then no shared CL-PC with PUSCH can be used. See 7.3.1.3.4 in 38.212.
* Case 2: SRS resource set with usage of beam-management also needs separate CL-PC.

Section 7.3.1 in 38.213 clearly describes that there are 3 SRS CL-PC modes: separate SRS CL-PC, shared PUSCH CL-PC with closed-loop index 0 or 1. BTW. If we only need shared CL-PC for SRS, DCI format 2\_2 is enough, why do we need DCI format 2\_3?Regarding NR R17 unified TCI, there are two types of SRS: * first type SRS which follows unified TCI,
* second type SRS which does not follow unified TCI, i.e., legacy SRS.

It was agreed that a legacy TCI state/spatial scheme cannot be configured with R17 unified TCI scheme in a same band. And legacy SRS in a CC with R17 unified TCI framework is thus configured with R17 TCI state, and power control parameter is determined by R17 TCI state (although not unified/indicated TCI state). Therefore, **separate SRS CL-PC at least for legacy SRS must be supported in NR R17 when unified TCI scheme is enabled**. Otherwise, legacy SRS with separate CL-PC cannot work in R17. LG: Similar view with QualcommGoogle: OK to discuss.Ericsson: Don’t understand. Is there an ambiguity how the UE calculates its Tx power? |
| 1-8 | Clarify that, for common TCI state ID update/activation for CA case, if the TCIState or UL-TCIState configurations is absent in a BWP of the CC, power control parameters associated with or included in the indicated TCIState or UL-TCIState from a reference BWP of a reference CC are used. (R1-2208889)FL note 1: It seems no consensus based on previous discussion (some opponents challenged the necessity of this CR).FL note 2: This issue has been discussed for **TWO meetings**. | LGE | N | Google: Agree with FLEricsson: Agree with FL |
| 1-9 | In section 5.1.5 of TS 38.214, *complement the “per BWP”* description in the largest number of configured TCI states for Rel-17 unified TCI. (R1-2208918)FL note 1: The issue identified in the problem may be valid and editorial.FL note 2: This issue has NOT been discussed. | CATT | E | QC: Fine to discussSpreadtrum: OK to discuss.Google: OK to discussEricsson: Not needed. Note that the PDSCH-Config is inside a BWP. Also, the list provided can actually provide QCL also in other BWPs/CCs |
| 1-10 | Replace *simultaneousTCI-UpdateList1-r17, simultaneousTCI-UpdateList2-r17, simultaneousTCI-UpdateList3-r17,* and *simultaneousTCI-UpdateList4-r17* with *simultaneousU-TCI-UpdateList1-r17, simultaneousU-TCI-UpdateList2-r17, simultaneousU-TCI-UpdateList3-r17,* and *simultaneousU-TCI-UpdateList4-r17* respectively. (R1-2209539)FL note 1: The issue identified in the problem is editorial.FL note 2: This issue has NOT been discussed. | Google | E | Lenovo: SupportQC: Fine to discussSpreadtrum: OK to discuss.Google: SupportEricsson: Support |
| 1-11 | To clarify that the same TCI state is expected on PUSCH and SRS resource for codebook-based or non-codebook based PUSCH transmission in unified TCI framework. (R1-2208791, R1-2209559)FL note 1: It seems no consensus based on previous discussion.FL note 2: This issue has been discussed for **TWO meetings**. | OPPO, Apple | N | Lenovo: Fine to discuss MediaTek: Not essentialQC: Prefer no further discussionOPPO: would like to hear why this is not essential? If different TCI states are configured to PUSCH and SRS resource for CB or NCB, then what is the UE behavior? Google: Support to discussEricsson: Prefer no further discussion |
| 1-12 | Clarify the behaviour of UE when the spatial domain transmit filter provided by TCI-State configurations is mismatched with the spatial domain filter of the SRS resource indicated by SRI.( R1-2209824)FL note 1: It seems no consensus based on previous discussion.FL note 2: This issue has been discussed for **TWO meetings**. | Huawei | N | Lenovo: Seems it can be discussed together with issue 1-11.MediaTek: Not essentialQC: Prefer no further discussionSpreadtrum: Not essentialGoogle: discuss it together with 1-11.Ericsson: Prefer no further discussion |
| 1-13 | Clarify that #1, for configured grant PUSCH, P0-PUSCH-AlphaSet associated with the configuredGrantConfig is used for CG PUSCH transmission, #2 ul-powerControl in BWP-UplinkDedicated is used, in case that ul-powerControl is not configured for UL TCI state or joint TCI state of the serving cell. (R1-2209825)FL note 1: Technically speaking, #1 has been discussed last meeting but several opponent companies challenged that reusing PC associating with TCI state is sufficient as in the spec. Let’s see whether some situations change. #2 several companies challenged that the corresponding spec changes are not essential. Let’s see whether companies change their views this meeting.FL note 2: This issue has been discussed for one meeting. | Huawei | N? | Lenovo: Not necessary.MediaTek: Not essentialQC: For 1st issue, seems not critical. gNB can choose PC parameters accordingly if CG is URLLC. The case with both URLLC and heavy eMBB is rare to our understanding. For 2nd issue, fine to clarify simply based on the agreement. The CR seems mixed both issues together. Google: Agree with FLEricsson: It is sufficient that this is captured in 38.331 |
| 1-14 | Specify to use the indicated TCI for a cross-carrier scheduled CC as the corresponding default beam, regardless the indicated TCI is associated with non-serving PCI or not (R1-2209937)FL note 1: The issue identified in the problem may be valid and some further discussion seems to be needed.FL note 2: This issue has been discussed for one meeting. | QC | H | Lenovo: Fine to discuss.MediaTek: Okay to discussQC: Support to discuss. Good to clarify UE behavior for this scenario. OPPO: not essential.Spreadtrum: OK to discuss.LG: Fine to discussGoogle: OK to discussEricsson: Ok to discuss |
| 1-15 | Clarify that for R17 unified TCI state, UE expects same power control parameters for the two SRS resource sets configured by srs-ResourceSetToAddModList and srs-ResourceSetToAddModListDCI-0-2 if at least one SRS resource set does not follow the indicated unified TCI state. (R1-2209938)* Note: the two SRS resource sets mentioned above are for sTRP operation, not for mTRP operation, and hence it is a R17 issue.

FL note 1: It seems no consensus based on previous discussion.FL note 2: This issue has been discussed for **TWO meetings**. | QC | N | Lenovo: Not necessary.QC: Support to discuss. The main solid technical reason “SRS resource set for DCI 0-2 is a subset of the first SRS resource set for DCI overhead reduction. No such issue” in final summary (R1-2208052) seems not valid. Because the lowest SRS source IDs can still be different in the two sets. If the issue is left to gNB implementation to ensure, can we at least have a conclusion? Don’t see any company saying the PC parameters should be different.Conclusion:For R17 unified TCI state, UE expects same power control parameters for the two SRS resource sets configured by srs-ResourceSetToAddModList and srs-ResourceSetToAddModListDCI-0-2 if at least one SRS resource set does not follow the indicated unified TCI state.Spreadtrum: OK to clarify that the PC parameters of the two SRS resource sets are the same.Google: Agree with FL’s assessmentEricsson: Should be discussed |
| 1-16 | For PUSCH power control with unified TCI, UE also resets the accumulation of power control adjustment state for the closed loop index whose associated p0 or alpha is reconfigured by NW (R1-2209939)FL note 1: Technically speaking, the current spec seems fine, considering that $P\_{O\\_UE\\_PUSCH,b,f,c}\left(j\right)$ and $α\_{b,f,c}\left(j\right)$ are provided by corresponding parameters of UE-specific P0 and alpha, respectively, as clarified in the very beginning of Section 7.A UE resets accumulation of a PUSCH power control adjustment state $l$ for active UL BWP $b$ of carrier $f$ of serving cell $c$ to $f\_{b,f,c}\left(k,l\right)=0, k=0,1,…,i$- If a configuration for a corresponding $P\_{O\\_UE\\_PUSCH,b,f,c}\left(j\right)$ value is provided by higher layers- If a configuration for a corresponding $α\_{b,f,c}\left(j\right)$ value is provided by higher layersFL note 2: This issue has NOT been discussed. | QC | N? | Lenovo: Not necessary.QC: Support to discuss the issue. We think current close loop index determination may not be applicable to unified TCI, so at least good to clarify this in redA UE resets accumulation of a PUSCH power control adjustment state $l$ for active UL BWP $b$ of carrier $f$ of serving cell $c$ to $f\_{b,f,c}\left(k,l\right)=0, k=0,1,…,i$[…]where $l$, if ul-powerControl-r17 is not provided by higher layers, is determined from the value of $j$ as - If j>1 and the UE is provided higher SRI-PUSCH-PowerControl, l is the sri-PUSCH-ClosedLoopIndex value(s) configured in any SRI-PUSCH-PowerControl with the sri-P0-PUSCH-AlphaSetId value corresponding to j - […]Google: Agree with FL’s assessmentEricsson: this looks like a reasonable solution, but it is hardly essential |
| 1-17 | In the unified TCI framework, all channels configured with followUnifiedTCIState follow the TCI state that is indicated at the point in time when that signal is transmitted. In 38.213, there are a few paragraphs that indicate that the TCI state of the PDSCH is the same as the TCI state of the scheduling PDCCH.Statements that state the TCI state of the PDSCH is the same as the TCI state of the scheduling PDCCH are removed. (R1-2210090)FL note 1: The following highlighted paragraph is drafted according to the previous agreement if my understanding is correct. Then, if removing them, UE behavior of PDSCH following unified TCI or not may become much more unclear.For a CORESET with index 0, - if the UE is provided *TCIState* and if *followUnifiedTCIstate* = '*enabled*' for the CORESET, the UE assumes that a DM-RS antenna port for PDCCH receptions in the CORESET and a DM-RS antenna port for PDSCH receptions scheduled by DCI formats provided by PDCCH receptions in the CORESET are quasi co-located with the reference signals provided by the indicated *TCIState* [6, TS 38.214]FL note 2: This issue has NOT been discussed. | E/// | N | Lenovo: Not necessaryMediaTek: No need to removeQC: Seems clearer to keepSpreadtrum: Not necessaryGoogle: OK to discussEricsson: the current specification indicates that the TCI state of the PDSCH is the same as the scheduling PDCCH. This is incorrect: the PDSCH follows the indicated TCI |
| 1-18 | The indicated TCI state provided by DCI format 1\_1/1\_2 could be 1 DL TCI state and 1 UL TCI state according to MAC CE. However, text in current TS 38.214 merely cover 1 indicated DL TCI state or 1 indicated UL TCI state, and does not cover 1 indicated DL TCI state and 1 indicated UL TCI state. (R1-2210083)FL note 1: The issue identified in the problem is valid and editorial.FL note 2: This issue has NOT been discussed. | ASUSTeK | E | Lenovo: OKMediaTek: Okay to the correctionQC: Fine to discussSpreadtrum: OK to discuss.Google: OK to discussEricsson: OK to discuss |
| 1-19 | *TCI-State* is changed to *tci-StatesToAddModList* in two occasions in Clause 5.1.5 of 38.214 to clarify the actual intention of the spec that Rel-17 unified TCI state and the legacy TCI state cannot be simultanuously configured in the same band. (R1-2210215)FL note 1: The issue identified in the problem is valid and editorial.FL note 2: This issue has NOT been discussed. | Huawei | E | Lenovo: OKMediaTek: Prefer to correctQC: Fine to discussSpreadtrum: OK to discuss.LG: Fine to discussGoogle: OK to discussEricsson: Support |
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| Sub-Item 2 – L1/L2 Centric Inter-Cell Mobility |
| 2-1 | To handle ambiguity in current specification for PDSCH reception scheduled by CORSET with *followUnifiedTCIstate* not enabled regarding whether to consider it is an error case when there is an indication with TCI state associated with PCI different from serving cell PCI. (R1-2208588, R1-2208589)FL note 1: Generally speaking, PDSCH reception scheduled by CORESET with *followUnifiedTCIstate* not enabled should follow the legacy Rel-15/16 behavior (i.e., it is an error case when the PDSCH is indicated with TCI with PCI different from serving cell PCI). Then, whether a CR or a conclusion is needed should be justified. FL note 2: This issue has NOT been discussed. | vivo | N? | Lenovo: Fine to have a conclusion that it’s an error case.MediaTek: OK to discussQC: Seems not an issue. The concern seems that non-UE-dedicated PDSCH may follow a TCI state associated with a non-serving PCI (R1-2208589). To our understanding, the CORESET not sharing the unified TCI must associate with CSS except Type3. As in 38.213->10.1, when such CORESET schedule non-UE-dedicated PDSCH in CSS except Type2, it has to use fallback DCI format 1-0, which has no TCI field. So the non-UE-dedicated PDSCH has to follow the CORESET QCL based on legacy rule, and will not follow the indicated TCI with non-serving PCISpreadtrum: OK to discuss.Google: Agree with FL |
|  | Clarify that, for the rate match pattern for PDSCH, in FR1, it should take all of the SSB for inter-cell beam measurement into account (R1-2208590，R1-2208591).FL note 1: In RAN1#109, we had the following WA and sent an LS to RAN4, and then receiving the reply LS from RAN4 R4-2215029. Therefore, concluding this issue (e.g., to confirming WA or not, and corresponding CR or not) seems essential.**Working assumption**On inter-cell beam management, the PDCCH /PDSCH should be rate matched around the SSBs indicated by ssb-PositionsInBurst-r17 for the same PCI as that associated with TCI state of the PDSCH /PDCCH Send LS to RAN4 on whether there is requirements in RAN4 that assumes UE to measure SSB for L1-RSRP measurement and receiving PDSCH /PDCCH on the same RE in FR1. Revisit this issue after there is RAN4 feedback.* The LS to RAN4 on SSB measurement for L1-RSRP on inter-cell BM is endorsed in R1-2205640.

FL note 2: This issue has NOT been discussed. | vivo | H | Lenovo: Prefer to confirm the WAMediaTek: Okay to confirm the WAQC: No need. This is already in spec (only PDSCH is copied below)Furthermore, the UE assumes SS/PBCH block transmission according to ssb-PositionsInBurst if the PDSCH resource allocation overlaps with PRBs containing SS/PBCH block transmission resources, and the UE shall assume that the PRBs containing SS/PBCH block transmission resources are not available for PDSCH in the OFDM symbols where SS/PBCH block associated with the same PCI is transmitted.Google: OK to discussEricsson: Agree with QC |
| 2-3 | While in current TS 38.214, only the case of SS/PBCH having a PCI different from the PCI of the serving cell is described, in other words, the case of SS/PBCH from the serving cell is missed. Some corresponding clarification is needed (R1-2209228)FL note 1: The issue identified in the problem may be valid and editorial.FL note 2: This issue has NOT been discussed. | NEC | E | Lenovo: Fine.MediaTek: It is clear that w/o the additional description “have a PCI different from the PCI of the serving cell”, an SSB in spec should be the one from serving cell. It is not be necessary to further clarify. Otherwise, we may not to change every spec that includes SSB.QC: Prefer no change. The 1st SSB in the paragraph with change refers to the serving cell SSB to my understanding.Spreadtrum: Agree with MediaTek.Google: OK to discussEricsson: Agree with MTek. “where SS/PBCH block may have a PCI different from the PCI of the serving cell” does not mean that the PCI must be different. |
| 2-4 | To capture the existing agreement that TCI state for CORESET B (CSS only) when DCI indicates unifiedTCIstate associated with cell with different PCI than serving cell and CORESET is configured with CSS. (R1-2210056)FL note 1: The issue identified in the problem is valid. But, based on input from last meeting, companies’ views are diverged.FL note 2: This issue has been discussed for one meeting.

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| QC: Seems no issue. The current spec follows the following agreement (#107e), which does not differentiate intra or inter-cell BM. We think this should work. gNB can configure whether to follow or not to follow for intra or inter-cell BM, respectively.• For any PDCCH reception on a ‘CORESET B’ and the respective PDSCH reception, whether or not UE to apply the indicated Rel-17 TCI state associated with the serving cell is determined per CORESET by RRCGoogle: Agree with QC.MTK: Okay to discussvivo: Seems no issue, since it has been specified in TS38.213 that a UE is not required to monitor PDCCH candidates for a Type0/0A/1/2-PDCCH CSS set when the active TCI state for a corresponding CORESET is not associated with *physCellId* in *ServingCellConfigCommon*.Nokia: Should be captured for inter-cell case. B can be configured to follow in intra-cell BM but not in inter-cell BM.OPPO: whether it is inter-cell BM or not is configured in RRC. If it is inter-cell BM, then DCI-indicated TCI state will not be applied to CORESETB, which is in the agreement. Do not see the necessaty to discuss this issue.Docomo: Ok to discuss.Lenovo: Agree with QC.Apple: Ok to discuss. Spreadtrum: Not sure if it’s necessary. The issue can be avoided by gNB implementation, e.g. configure CORESET B not to follow common TCI.CATT: Ok to discuss. For inter-cell BM, CORESETB can not follow the indicated TCI state.Huawei, HiSi: We tend to agree with QC’s comment.Ericsson: agree with QCSS: Agree to discuss |

 | Nokia | N | MediaTek: Still fine to discussQC: Not critical. gNB can avoid such issueSpreadtrum: Not necessary. The issue can be avoided by gNB implementation, e.g. configure CORESET B not to follow the indicated TCI state.Google: OK to discussEricsson. Not needed. We already have A UE is not required to monitor PDCCH candidates for a Type0/0A/1/2-PDCCH CSS set when the active TCI state for a corresponding CORESET is not associated with physCellId in ServingCellConfigCommon. |
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| Sub-Item 3 – Dynamic TCI Update Signalling |
| 3-1 | To clarify that the DCI in CORESET not configured to follow the indicated Rel-17 TCI state does not indicate a Rel-17 TCI state so that the agreement is implemented in the specification. (R1-2208789)FL note 1: The issue identified in the problem is valid, otherwise we may experience the error case that the ‘non-UE-dedicated DCI scheduling PDSCH’ or, alternatively, ‘DCI in CORESET with *followUnifiedTCIstate* not enabled’ can update/indicate the unified TCI as well.FL note 2: This issue has been discussed for one meeting. | OPPO | H | Lenovo: We understand that when a CORESET if not configured to follow the indicated Rel-17 TCI state only means that the UE shall receive the PDCCH associated with this CORESET by the TCI state determined by legacy MAC-CE/RRC/RACH signalling mechanism, does not mean this DCI cannot not be used to indicate unified TCI state.MediaTek: We don’t see why NW cannot use a CORESET not following unified TCI state to update unified TCI state, which should be up to NW implementation.QC: Seems no issue. If the concern is that non-UE-dedicated PDSCH may follow non-serving TCI, then pls check our comment to 2-1.OPPO: Question to companies thinking that is not an issue: take one example, a DCI 1\_1 in PDCCH of CORESET#0 and CORESET#0 not following the unified TCI. Then the TCI state indicated by TCI field in this DCI 1\_1 shall be applied to which one of the PDSCH:* The PDSCH scheduled by this DCI 1\_1?
* or all the PSCH scheduled by UE-specific PDCCH?

Per RAN1 previous agreement, the TCI state indicated here follows the legacy signalling method and it is only applied to the scheduled PDSCH. Without this correction, the spec is broken.Spreadtrum: OK to discuss.LG: Similar understanding with MediaTekGoogle: OK to discussEricsson: Not needed. The paragraph in the CR describes how and when the TCI state is applied. What channels follow the indicated TCI is another issue.  |
| 3-2 | To clarify that in Rel-17 unified TCI framework, the indicated TCI state(s) is based on the activated TCI states in the slot with TCI state indication DCI.(R1-2208790)FL note 1: Based on previous discussion, companies have the same understanding: the indicated TCI state(s) is based on the activated TCI states in the slot of scheduled PDSCH. Pls review companies inputs last meeting

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| QC: Seems no ambiguity. To our understanding, both the activated and indicated TCI application times are well defined. UE just checks the corresponding definitions at beginning per slot. Google: Open to discuss. It seems there is an agreement that the timing for TCI activation follows what is defined in R16.MTK: Okay to discuss, but we tend to agree with QC that current spec may be sufficient to avoid the ambiguityvivo: Agree with “H”.Nokia: we do not see ambiguity hereOPPO: agree with the assessment of FLDocomo: OK to discuss.Lenovo: Fine to discuss.Apple: Ok to discuss. But tend to agree with QC’s assessment. LG: Agree with FL’s assessmentSpreadtrum: Not sure if it’s necessary. Agree with QC’s assessment.CATT: Agree with QC. It seems no ambiguity.Huawei, HiSi: We don’t see any ambiguityEricsson: agree with QCSamsung: Not criticalIntel: Don’t think there is any ambiguity |

FL note 2: This issue has been discussed for **TWO meetings**. | OPPO | N | Lenovo: Seems no ambiguity.MediaTek: Current spec is sufficient to avoid the ambiguityQC: Spec seems clearOPPO: please explain what is the UE behavior when the DCI first indicate {DL TCI state A, UL TCI state B} and then later on DCI indicates {DL TCI state C} if the spec has no ambiguity.Google: OK to discussEricsson: Spec seems clear. For the example, it would be DL TCI state-3. |
| 3-3 | In section 5.1.5 of 38.214 it should be clarified that the UE applies the Indicated TCI state carried in the latest-in-time DCI for which the UE sends HARQ-ACK. (R1-2210057)FL note 1: The issue identified in the problem is valid.FL note 2: This issue has been discussed for one meeting. | Nokia  | H? | Lenovo: FineQC: Fine to discussSpreadtrum: OK to discuss.LG: Fine to discussGoogle: OK to discussEricsson: OK to discuss |
| 3-4 | To clarify the active BWP to determine the BAT based on one of the following options (R1-2208871)* Option 1: The active BWP is determined based on the active BWP with the smallest SCS among the active BWP(s) from the applying CCs in the slot with the TCI indication
* Option 2: The active BWP is determined based on the active BWP with the smallest SCS among the active BWP(s) from the applying CCs in the slot with the HARQ-ACK for the TCI indication

FL note 1: The issue identified in the problem may be valid and essential.FL note 2: This issue has NOT been discussed. | Google | H | Lenovo: Fine to discussMediaTek: Okay to clarifyQC: Fine to discussSpreadtrum: OK to discuss.Google: SupportEricsson: OK to discuss |
| 3-5 | To capture the following conclusion in current spec (R1-2210202)**Conclusion**On Rel-17 unified TCI framework, if a UE is configured with CrossCarrierSchedulingConfig for a serving cell the value of the DCI field ‘carrier indicator’ corresponds to the value indicated by CrossCarrierSchedulingConfig. * The codepoint indicated by the DCI field ‘Transmission Configuration Indicator’ is applied to the carrier indicated by the DCI field ‘carrier indicator’ and all CCs configured in a same CC list as that carrier, and corresponds to indicated TCI state configured and activated for that carrier and all CCs, respectively.

FL note 1: As a compromise, we had the above conclusion instead of an agreement, and then it seems that we do not need to further discuss this concluded issue again.FL note 2: This issue has been discussed for one meeting. | Huawei | N | Lenovo: Support FL assessment.MediaTek: Agree with FL assessment.QC: Agree with FLSpreadtrum: Agree with FL assessment.Google: Agree with FLEricsson: We prefer that this is captured in the spec. |
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| Sub-Item 4 – MP-UE |
| 4-1 | Define the behaviour under which the UE selects ‘SRS resource indicator’ and ‘precoding information and number of layers’ associated to a capability value set index corresponding to the indicated UL or joint TCI state. This assumes that multiple ‘SRS resource indicator’ and ‘precoding information and number of layers’ are configured (per CG Type 1 configuration), each associated to a capability value set index via RRC. (R1-2207537)FL note 1: The issue identified in the problem is controversial (it seems that as a basic assumption, the further enhancement on parameter update in MP-UE is precluded), but anyway let’s check other companies’ views.FL note 2: This issue has been discussed for one meeting. | Nokia | N | MediaTek: Agree with FL assessment.QC: Agreed with FLSpreadtrum: Agree with FL assessment.Google: Agree with FLEricsson: Agree with FL |
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| Sub-Item 5 – MPE |
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1. Observation

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

# References

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| 1 | [**R1-2208534**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2208534.zip) | Draft CR on PL-RS for unified TCI framework | Spreadtrum Communications |
| 2 | [**R1-2208535**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2208535.zip) | Draft CR on PL-RS determination for CA case | Spreadtrum Communications |
| 3 | [**R1-2208588**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2208588.zip) | Discussion on the QCL assumption of the PDSCH not following the indicated TCI state | vivo |
| 4 | [**R1-2208589**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2208589.zip) | Draft CR on the QCL assumption of the PDSCH not following the indicated TCI state | vivo |
| 5 | [**R1-2208590**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2208590.zip) | Draft CR on the rate match mechanism for PDSCH for inter-cell beam measurement | vivo |
| 6 | [**R1-2208591**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2208591.zip) | Draft CR on the UE behavior when PDCCH candidate overlaps with SSBs for inter-cell beam measurement in the same Res | vivo |
| 7 | [**R1-2208751**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2208751.zip) | Draft CR on beam indication of SRS resource on unified TCI framework to TS38.214 | Lenovo |
| 8 | [**R1-2208753**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2208753.zip) | Draft CR on noncodebook SRS resource on unified TCI framework to TS38.214 | Lenovo |
| 9 | [**R1-2208754**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2208754.zip) | Draft CR on reference of MAC CE in TS38.321 for SRS resource on unified TCI framework to TS38.214 | Lenovo |
| 10 | [**R1-2208756**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2208756.zip) | Draft CR on PHR with unified TCI in TS 38.213 | Lenovo |
| 11 | [**R1-2208761**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2208761.zip) | Draft CR on cross CC power control for unified TCI in TS 38.213 | ZTE |
| 12 | [**R1-2208762**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2208762.zip) | Draft CR on SRS closed loop power control shared with PUSCH in TS 38.213 | ZTE |
| 13 | [**R1-2208789**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2208789.zip) | Corrections on TCI indication of CORESET not following unified TCI state | OPPO |
| 14 | [**R1-2208790**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2208790.zip) | Corrections on activated TCI state in Unified TCI framework | OPPO |
| 15 | [**R1-2208791**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2208791.zip) | Corrections on TCI indication of SRS in Unified TCI framework | OPPO |
| 16 | [**R1-2208871**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2208871.zip) | Clarification on active BWP for beam application time | Google |
| 17 | [**R1-2208889**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2208889.zip) | Draft CR on UL PC with common TCI state pool for CA | LG Electronics |
| 18 | [**R1-2208918**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2208918.zip) | On joint DL/UL TCI state update in unified TCI framework | CATT |
| 19 | [**R1-2209228**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2209228.zip) | Draft CR on QCL source for CSI-RS | NEC |
| 20 | [**R1-2209539**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2209539.zip) | Correction on beam activation and update for multiple CCs | Google |
| 21 | [**R1-2209559**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2209559.zip) | Maintenance on Further enhancements on MIMO for NR | Apple |
| 22 | [**R1-2209824**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2209824.zip) | Correction on conflict resolution for PUSCH TCI-state | Huawei, HiSilicon |
| 23 | [**R1-2209825**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2209825.zip) | Correction on default power control parameters | Huawei, HiSilicon |
| 24 | [**R1-2209937**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2209937.zip) | Draft CR on default beam with unified TCI for cross-carrier scheduling | Qualcomm Incorporated |
| 25 | [**R1-2209938**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2209938.zip) | Draft CR on SRS power control parameters with unified TCI | Qualcomm Incorporated |
| 26 | [**R1-2209939**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2209939.zip) | Draft CR on reset accumulation of TPC adjustment state for unified TCI | Qualcomm Incorporated |
| 27 | [**R1-2210056**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2210056.zip) | Draft CR 38.213 Rel-17 CORESET Configured with CSS and Follow Unified TCI State | Nokia, Nokia Shanghai Bell |
| 28 | [**R1-2210057**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2210057.zip) | Draft CR 38.214 Rel-17 multi-beam enhancements\_beam switch HARQ | Nokia, Nokia Shanghai Bell |
| 29 | [**R1-2210058**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2210058.zip) | Draft CR 38.214 Rel-17 multi-beam enhancements\_CG PUSCH type 1 | Nokia, Nokia Shanghai Bell |
| 30 | [**R1-2210079**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2210079.zip) | Draft CR for TCI state parameter name alignment in TS 38.213 | ASUSTeK |
| 31 | [**R1-2210081**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2210081.zip) | Draft CR for TCI state parameter name alignment in TS 38.214 | ASUSTeK |
| 32 | [**R1-2210083**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2210083.zip) | Correction on indicated TCI state | ASUSTeK |
| 33 | [**R1-2210088**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2210088.zip) | Draft CR to 38.213 on UL TCI state parameter naming | Ericsson |
| 34 | [**R1-2210089**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2210089.zip) | Draft CR to 38.214 on UL TCI state parameter naming | Ericsson |
| 35 | [**R1-2210090**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2210090.zip) | Draft CR to 38.213 on unified TCI for PDSCH | Ericsson |
| 36 | [**R1-2210202**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2210202.zip) | Correction on DCI based TCI indication for cross carrier scheduling | Huawei, HiSilicon |
| 37 | [**R1-2210215**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2210215.zip) | Clarifying the ambiguous usage of TCI-State | Huawei, HiSilicon |
| 38 | [**R1-2210216**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_110b-e/Docs/R1-2210216.zip) | UL TCI state parameter name alignment | Huawei, HiSilicon |
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