**3GPP TSG-RAN WG1 Meeting #108-e R1-220xxxx**

**e-Meeting, February 21st – March 3rd, 2022**

**Agenda item:** 8.1

**Source:** Moderator (Ericsson)

**Title:** Moderator summary for LS reply to RAN2 on feMIMO RRC parameters

**Document for:** Discussion and Decision

## Introduction

This summary includes the discussion of LS reply to the LSs from RAN2 R1-2200887 LS on feMIMO RRC parameters.

It is the understanding of the moderator that there are no RAN1 agreements for question 1.7, 1.13, 1.13-2 and 1.16 and RAN1 need to make swift agreements.

For the other issues, the moderator has provided initial answer proposals to stimulate discussion.

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1. Proposed LS reply to the question in the LSs from RAN2 R2-2200887

## MULTIBEAM: CORESET to follow Unified TCI state

RAN2 has discussed the per CORESET RRC based indication based on RAN1 agreements.

* *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 RRC*

RAN2 understands that the 1 bit RRC indication “followUnifiedTCI-State” would be needed for CORESET type “B”. RAN2 understanding is that it seems to indicate how the CORESET behaves with respect to the TCI state of PDSCH depending on the type (i.e. CSS or USS) of the SearchSpace that is linked to that CORESET. However, as in RRC there is no types of CORESETs RAN2 would like to ask RAN1 to clarify the intention of the indication in more details.

* **Question 1.1:** What is the intent behind this indication and why was it put to CORESET but not per SearchSpace?
* **Question 1.2:** Are there any limitation or conditions needs to specified for the "followUnifiedTCI-State" parameter?
* **Question 1.3:** How are the “DM-RS for non-UE dedicated PDCCH” in parameter "applyTCI-State-DL-List-r17" and the CORESET B “followUnifiedTCI-State” related?

Table 1 Companies’ inputs on the proposed LS answer to Question 1.1

|  |  |
| --- | --- |
| **Company** | **Input** |
| Question | What is the intent behind this indication and why was it put to CORESET but not per SearchSpace? |
| Mod V0 proposal for reply answer | RAN1 introduced the terms CORESET ‘A’, ‘B’ and ‘C’ for discussion purposes only, and RAN1 has no intention to introduce CORESET types in specification. The 1-bit indication was put in the CORESET to mimic legacy. RAN1 will describe in RAN1 specifications how the UE should interpret this 1- bit indication. |
| MediaTek | We are fine with the Mod’s answer, but one small change as follows:  RAN1 introduced the terms CORESET ‘A’, ‘B’ and ‘C’ for discussion purposes only, and RAN1 has no intention to introduce CORESET types in specification. The 1-bit indication was put in the CORESET to mimic legacy. RAN1 will describe in RAN1 specifications how the UE should expect/interpret this 1- bit indication. |
| Samsung | We are fine with the moderator’s answer and update from MediaTek. |
| Apple | OK with the update from MTK |
| LG | We are fine with the moderator’s answer |
| ZTE | We can support the update from MediaTek. |

Table 2 Companies’ inputs on the proposed LS answer to Question 1.2

|  |  |
| --- | --- |
| **Company** | **Input** |
| Question | Are there any limitation or conditions needs to specified for the "followUnifiedTCI-State" parameter? |
| Mod V0 proposal for reply answer | So far, RAN1 has not identified any additional rules. If RAN1 identified any additional rules, RAN1 will update RAN2. |
| MediaTek | From our understanding to the RAN1 agreements so far, the parameter "*followUnifiedTCI*-State" is not expected to be configured to any CORESET if any of the configured TCI states is associated with a cell with PCI different from that of serving cell (i.e., inter-cell BM case). This restriction can be specified in TS 38.331. |
| Samsung | The parameter “*followUnifiedTCI-State*” is not expected to be configured for a CORESET associated with a CSS set [, other than Type3-PDCCH CSS set,] in case of inter-cell beam management. This description can be included in TS 38.331. |
| Apple | We suggest the following reply:  **So far RAN1 has not identified additional limitations in addition to the case that CORESET A should always follow the indicated unified TCI state.** |
| LG | The conditions such as inter-/intra-cell and CSS/USS are under discussion currently so we suggest modifying the answer as below.  The limitations or conditions are currently under discussion in RAN1. RAN1 will inform this information to RAN2 as early as possible.  The answer can be updated according to RAN1’s progress in the second reply LS next week or even later since the conditions may not have ASN.1 impact. |
| ZTE | In our views, the "followUnifiedTCI-State" parameter only can be configured for CORESET B, which has been defined as ‘a CORESET other than CORESET#0 associated with only non-UE-dedicated reception on PDCCH in a CC, comprising CORESETs in association with [CSS or CSS other than Type 3]’. Then, regarding the bracket, we expect that we can make quick decision right now. From ZTE perspective, we support ‘CSS other than Type3’. |

Table 3 Companies’ inputs on the proposed LS answer to Question 1.3

|  |  |
| --- | --- |
| **Company** | **Input** |
| Question | How are the “DM-RS for non-UE dedicated PDCCH” in parameter "applyTCI-State-DL-List-r17" and the CORESET B “followUnifiedTCI-State” related? |
| Mod V0 proposal for reply answer | Whether or not a CORESET, and consequently the corresponding DM-RS, is configured to follow the unified TCI state is determined by “followUnifiedTCI-State”. The parameter "applyTCI-State-DL-List-r17" is redundant and not needed for DM-RS associated with a CORESET. |
| MediaTek | Fine with the Mod’s proposal |
| Samsung | We agree with the moderator’s answer. |
| Apple | In our understanding, "*applyTCI-State-DL-List-r17*” can indicate whether aperiodic CSI-RS for BM/CSI follows the indicated TCI or not in addition to the indication for CORESET B. |
| LG | Ok with the Mod’s proposal |
| ZTE | Support the above reply from the moderator. |

## 2.2 MULTIBEAM: Parameter applyTCI-StateDL-List-r17CORESET to follow Unified TCI state

RAN2 notes there is discrepancy with the description and comment related to applyTCI-State-DL-List-r17. RAN2 has baseline implementation for this functionality where 1 bit “followUnifiedTCI-State" indication is added to “AssociatedReportConfigInfo” IE where QCL per an aperiodic resource set is currently configured i.e. all resource within NZP-CSI-RS resource set follow unified TCI state in DCI.

* **Question 1.4:** Is this RRC parameter implementation is according to intended functionality or should the indication be placed per NZP-CSI-RS resource set or resource. Note that these NZP-CSI-RS resource sets and resource configurations are not specific to AP?

Note that it will be RAN2 signalling design whether supporting this functionality is 1 bit indication per field X, or by maintaining lists of field X.

Table 4 Companies’ inputs on the proposed LS answer to Question 1.4

|  |  |
| --- | --- |
| **Company** | **Input** |
| Question | Is this RRC parameter implementation is according to intended functionality or should the indication be placed per NZP-CSI-RS resource set or resource. Note that these NZP-CSI-RS resource sets and resource configurations are not specific to AP? |
| Mod V0 proposal for reply answer | RAN1 has agreed that aperiodic CSI-RS for beam management and aperiodic CSI-RS for CSI acquisition can follow the unified TCI state.  On the other hand, RAN1 has not agreed that periodic CSI-RS, semi-persistent CSI-RS or CSI-RS for tracking can follow the unified TCI, which can all be configured using CSI-AssociatedReportConfigInfo.  Provided that these restrictions are captured in the field description of followUnifiedTCI-State in CSI-AssociatedReportConfigInfo, the proposed RRC implementation would be fine. |
| MediaTek | We are fine in principle, however, current wording is a bit unclear. We suggest the following changes:  RAN1 has agreed that only aperiodic CSI-RS for beam management and aperiodic CSI-RS for CSI acquisition can follow the unified TCI state, which can all be configured using CSI-AssociatedReportConfigInfo. On the other hand, RAN1 has not agreed that periodic CSI-RS, semi-persistent CSI-RS or CSI-RS for tracking can follow the unified TCI. Provided that these restrictions are captured in the field description of followUnifiedTCI-State in CSI-AssociatedReportConfigInfo, the proposed RRC implementation would be fine. |
| Samsung | Agree with update provided by MediaTek. |
| Apple | We think we should firstly mention that current RRC parameter implementation is not fully aligned with the intended functionality. We suggest we add the following sentence at the beginning of the reply.  It is not fully aligned with the intended functionality. |
| LG | We prefer to configure this parameter per CSI-RS resource not for all resources since it can kill major functionality of CSI/beam reporting with multiple CSI-RS resources. If QCL source RS of all resources are same, this would mean that all the resources are transmitted with same Tx beam from same TRP. Only use case for this configuration is for UE Rx beam refinement and this configuration cannot be used for other major use cases such as gNB Tx beam selection for BM and CRI reporting for CSI acquisition. |
| ZTE | Support the version from MediaTek, but the question of ‘should the indication be placed per NZP-CSI-RS resource set or resource’ is not replied. In our views, it should be per NZP-CSI-RS resource set. So, only a single indication can be provided per CSI resource set in CSI-AssociatedReportConfigInfo. |

## 2.3 MULTIBEAM: Parameter ApplyTCI-State-r17forSRS

RAN2 intends to add the parameter “followUnifiedTCI-State-r17” (ApplyTCI-State-r17forSRS in RAN1 RRC parameter list) to SRS-ResourceSet IE according to RAN1 guidance.

* **Question 1.5:** Are the stated restrictions indicated in the L1 parameter excel (i.e. “This applies to the following: 1) Aperiodic SRS for BM, 2) SRS (of any time-domain behavior) for codebook, non-codebook, and antenna switching “) should be placed in TS 38.331 or these will be specified by RAN1? If they should be specified in RAN2, are there any additional restrictions that have not yet been communicated?
* **Question 1.6:** RAN2 would also like to confirm whether also semi-persistent SRS (as RAN1 mentioned “of any time-domain behaviour) will follow unified TCI state in DCI or some coordination between RRC signalling, MAC CE and DCI is needed?

Table 5 Companies’ inputs on the proposed LS answer to Question 1.5

|  |  |
| --- | --- |
| **Company** | **Input** |
| Question | Are the stated restrictions indicated in the L1 parameter excel (i.e. “This applies to the following: 1) Aperiodic SRS for BM, 2) SRS (of any time-domain behavior) for codebook, non-codebook, and antenna switching “) should be placed in TS 38.331 or these will be specified by RAN1? If they should be specified in RAN2, are there any additional restrictions that have not yet been communicated? |
| Mod V0 proposal for reply answer | RAN1 is okay to implement the stated restrictions in TS 38.331, and there are no additional restrictions. |
| MediaTek | Fine with the Mod’s proposal |
| Samsung | We agree with the moderator’s answer |
| Apple | In our view, there should be one additional restriction as follows, which is aligned with R15/R16 restriction for SRS for NCB.  **additional restriction is that for SRS for non-codebook with associated CSI-RS configured, the “*followUnifiedTCI-State-r17*” should be disabled.** |
| LG | Support the Mod’s proposal |
| ZTE | We can support the moderator’s reply |

Table 6 Companies’ inputs on the proposed LS answer to Question 1.6

|  |  |
| --- | --- |
| **Company** | **Input** |
| Question | RAN2 would also like to confirm whether also semi-persistent SRS (as RAN1 mentioned “of any time-domain behaviour) will follow unified TCI state in DCI or some coordination between RRC signalling, MAC CE and DCI is needed? |
| Mod V0 proposal for reply answer | For AP/SP/P SRS for codebook/non-codebook/antenna switching, it can also be configured by RRC on whether to follow Rel-17 indicated TCI.  Regarding to SRS for BM, only AP SRS for BM can be configured by RRC on whether to follow Rel-17 indicated TCI. Thus, if the parameter “followUnifiedTCI-State-r17” is used, then the restriction should be captured by RAN2 that it cannot be configured or applied when the SRS for BM is transmitted in SP/P manner. |
| MediaTek | Fine with the Mod’s proposal |
| Samsung | We are fine with the moderator’s answer. |
| Apple | OK with moderator’s answer |
| LG | Fine with the Mod’s proposal |
| ZTE | We are fine with moderator’s proposal in general. Meanwhile, as replies to Q1.4, we also need to make decision that the configuration is per set or per resource. Similarly, we prefer to ‘per set’. |

## 2.4 MULTIBEAM: MPE

In RAN2#116, RAN2 agreed the following

* + *4: Rel-17 MPE configuration can be included in PHR-Config. Will ask R1 whether MPE information can apply to both ICBM and mTRP*

This will impact at least the corresponding MAC CE design but potentially also configuration. Further, the parameter excel has TBD on the range for configuring the MPE resource pool. RAN2 understanding is that the MPE-ResourcePool may be a list of SSB or CSI-RS resources, which will be configured by RRC but for which RAN1 has not yet indicated maximum number. RAN2 would need to know this to derive the number of bits needed for the resource IDs in the MPE resource pool.

* **Question 1.7:** Please clarify the structure of the *mpe-ResourcePool*: Is it a list of SSB or CSI-RS resources (i.e. SSBRI or CRI), and what is the maximum number of resources configured in the pool?

RAN2 was also not clear on whether the MPE reporting would apply for the mTRP PHR and whether configuration *mpe-Reporting-FR2* can apply to both BM case and mTRP case to activate the reporting, so RAN2 would like RAN1 to clarify this.

* **Question 1.8:** Does the enhanced MPE reporting applies also to mTRP operation, and, if it does, will this be configured by *mpe-Reporting-FR2* or is another RRC configuration needed?
* **Question 1.9:** RAN1 to confirm whether the RAN2 should keep the MPE-Config-FR2-r17 in the PHR-Config IE, which is per cell group, or move it to (per-cell) per BWP level as indicated in L1 parameter excel?
* **Question 1.10:** Is reporting of PCMax,f,c needed for MPE information and if it is, should it be included per indicated SSBRI/CRI value or is it cell-specific?

Table 7 Companies’ inputs on the proposed LS answer to Question 1.7

|  |  |
| --- | --- |
| **Company** | **Input** |
| Question | Please clarify the structure of the *mpe-ResourcePool*: Is it a list of SSB or CSI-RS resources (i.e. SSBRI or CRI), and what is the maximum number of resources configured in the pool? |
| Mod V0 proposal and comment. RAN1 agreement needed | It should be a list of SSB or CSI-RS resources index.  There is no RAN1 agreement, on the maximum number of resources in the pool. The moderator proposal is that maximum number of resources is 64. |
| MediaTek | To our understanding, the candidate resource pool corresponds to a CSI-RS/SSB resource set, i.e., *NZP-CSI-RS-ResourceSet* and *CSI-SSB-ResourceSet* according to the following RAN1 agreement, and the maximum number of resources configured in the pool can just follow maxNrofNZP-CSI-RS-ResourcesPerSet.  **Agreement from RAN1#106bis**  On Rel.17 enhancements to facilitate MPE mitigation, the candidate resource pool corresponds to a CSI-RS/SSB resource set configured via RRC (details up to RAN2)  It should be a list of SSB or CSI-RS resources index. RAN1 doesn't preclude to reuse the existing IE(s), e.g., *NZP-CSI-RS-ResourceSet* and *CSI-SSB-ResourceSet*, to provide the list. |
| Samsung | It should be a list of SSB or CSI-RS resources index. Such a list can be configured via IE *CSI-ResourceConfig, reusing existing IEs as much as possible such as NZP-CSI-RS-ResourceSet, CSI-SSB-ResourceSet, and CSI-ResourceConfig*.  Support the moderator’s proposal that the maximum number of resources is 64.. |
| Apple | We think the maximum number of resources should be 8, which is aligned with maximum number of active TCI states. It is challenging for UE to measure P-MPR for many beams. |
| LG | We are ok with the Mod’s answer. We are also open for reusing the existing IE. |
| ZTE | We can NOT agree with MediaTek and Samsung’s suggestion, e.g., reuse ‘NZP-CSI-RS-ResourceSet’ or ‘CSI-SSB-ResourceSet’. From our perspective, the individual configuration like new candidate RS in BFR can be provided per CC straightforwardly. So, we support the moderator’s proposal, and up to 64 is reasonable. Please review the following update.  It should be a list of SSB or CSI-RS resources index per CC.  In such case, the maximum number of resources is 64 |

Table 8 Companies’ inputs on the proposed LS answer to Question 1.8

|  |  |
| --- | --- |
| **Company** | **Input** |
| Question | Does the enhanced MPE reporting applies also to mTRP operation, and, if it does, will this be configured by *mpe-Reporting-FR2* or is another RRC configuration needed? |
| Mod V0 proposal for reply answer | Note that enhanced MPE reporting and the multi-TRP PHR enhancement are two different features in Rel-17. Hence, the enhanced MPE reporting cannot be combined with the multi-TRP PHR specified in Rel-17. |
| MediaTek | Fine with the Mod’s proposal |
| Samsung | We are fine with moderator’s answer. |
| Apple | In our view, mTRP is not precluded for MPE reporting, since MPE reporting is a general feature for beam report. |
| LG | Support the Mod’s proposal. |
| ZTE | Not support. We can support that MPE report can apply to mTRP operation. One more question is that there seems to be some parallel discussion on reply LS to MPE. |

Table 9 Companies’ inputs on the proposed LS answer to Question 1.9

|  |  |
| --- | --- |
| **Company** | **Input** |
| Question | RAN1 to confirm whether the RAN2 should keep the MPE-Config-FR2-r17 in the PHR-Config IE, which is per cell group, or move it to (per-cell) per BWP level as indicated in L1 parameter excel? |
| Mod V0 proposal for reply answer | The enhanced MPE reporting doesn't impact how the PHR-Config is provided, and RAN2 can keep the MPE-Config-FR2-r17 in the PHR-Config IE, which is per cell group |
| MediaTek | Fine with the Mod’s proposal |
| Samsung | Fine with the moderator’s answer. |
| Apple | OK with the moderator’s answer. |
| LG | Support the Mod’s proposal. |
| ZTE | Fine with the mod’s proposal, but we need to clarify that mpe-ResourcePool should be provide for each of CC. |

Table 10 Companies’ inputs on the proposed LS answer to Question 1.10

|  |  |
| --- | --- |
| **Company** | **Input** |
| Question | Is reporting of PCMax,f,c needed for MPE information and if it is, should it be included per indicated SSBRI/CRI value or is it cell-specific? |
| Mod V0 proposal for reply answer | The enhanced MPE reporting doesn't impact the reporting of PCMax,f,c, which should remain as in legacy. |
| MediaTek | Fine with the Mod’s proposal |
| Samsung | PCMax,f,c is cell specific |
| Apple | We think it is better to provide a clear answer that Pcmax should be reported, which is cell-specific. |
| LG | We suggest to discuss this further in 8.1.1 since we think that it is better to report multiple sets of {Pcmax, MPE} for MPUE from both technical and MAC-CE design perspective |
| ZTE | Support |

## 2.5 MULTIBEAM: BeamAppTime value range

RAN2 has been discussing on what level the BAT parameter should be configured. RAN2 has found guidance for per CCs per CSC “with the common TCI state ID update”. However, it is not clear what “common TCI state ID update” means or exactly what is the correct level for configuring the parameter.

* **Question 1.11:** RAN2 would like to further confirm whether this parameter is per-UE (i.e. applicable to all cell groups per SCS), per cell group (i.e. within the same cell group, all cells use the same values per SCS), per cell (i.e. different cells may use different value per SCS), or something else?
* **Question 1.12:** Is it correct understanding that the common TCI state ID update is when the same TCI state list is configured for multiple CCs with reference BWP/CC?
* **Question 1.13:** Please indicate what should be the value range for parameter *beamAppTime-r17?*

Table 11 Companies’ inputs on the proposed LS answer to Question 1.11

|  |  |
| --- | --- |
| **Company** | **Input** |
| Question | RAN2 would like to further confirm whether this parameter is per-UE (i.e. applicable to all cell groups per SCS), per cell group (i.e. within the same cell group, all cells use the same values per SCS), per cell (i.e. different cells may use different value per SCS), or something else? |
| Mod V0 proposal for reply answer | The BAT is the same for all the CCs configured with the common TCI state ID update |
| MediaTek | This issue is still under discussion in RAN1. Thus, RAN1 may not be able to provide the answer before RAN1 concludes on this issue. Thus, we can answer the following at least for now:  RAN1 only has agreed that the BAT shall be the same for all the CCs configured with the common TCI state ID update. However, how to provide the BAT (i.e., per cll, per cell group, …) is still under discussion in RAN1. |
| Samsung | Discussion is still ongoing in RAN1 whether the BAT can be configured per cell. As a restriction, cells with the same SCS and that are configured to use the same TCI state ID, should be configured the same BAT |
| Apple | OK with moderator’s answer |
| LG | Although we don’t disagree with Mod’s answer, what really matters to RAN2 is the configuration granularity, e.g. per cell, per UE, etc. Considering the case that the common TCI state ID update is not configured to some CCs, it is better to configure this per CC. |
| ZTE | In our views, the beam application time (BAT) for a given SCS is configured for all the CCs configured with the common TCI state ID update, and thus the BAT parameter should be provided per cell group. |

Table 12 Companies’ inputs on the proposed LS answer to Question 1.12

|  |  |
| --- | --- |
| **Company** | **Input** |
| Question | Is it correct understanding that the common TCI state ID update is when the same TCI state list is configured for multiple CCs with reference BWP/CC? |
| Mod V0 proposal for reply answer | The understanding is not correct. Common TCI state ID update can be configured not only when the same TCI state list is configured for multiple BWPs/CCs with reference BWP/CC, but also when TCI state list is provided for each BWP/CC as in Rel-15/16 |
| MediaTek | Fine with the Mod’s proposal |
| Samsung | Fine with moderator’s answer |
| Apple | OK with the moderator’s answer |
| LG | Support the Mod’s proposal. |
| ZTE | Support the moderator’s reply. |

Table 13 Companies’ inputs on the proposed LS answer to Question 1.13

|  |  |
| --- | --- |
| **Company** | **Input** |
| Question | Please indicate what should be the value range for parameter *beamAppTime-r17?* |
| Mod V0 proposal and comment. RAN1 agreement needed | There is no RAN1 agreement on this. The moderator proposal is that the value range of beamAppTime-r17 is (7, 14, 28, 42, 56, 70, 84, 98, 112 ,224 ,336) symbols, which is the union of all submitted proposals. |
| MediaTek | Fine with the Mod’s proposal |
| Samsung | This is under RAN1 discussion. Let’s wait until we have a RAN1 agreement before providing values |
| Apple | We think candidate value of {14, 28, 42} should be sufficient, anyway, this needs some discussion in RAN1. |
| LG | Prefer to discuss this in 8.1.1 since we are not convinced on the usage of very large values. |
| ZTE | We share the same views with Samsung. |

## 2.6 MULTIBEAM: CSI-SSB-ResourceSet

* **Question 1.13 [sic!]:** Should it be possible for different SSB indexes in the same *CSI-SSB-ResourceSet* to be associated with different *additionalPCI*?

Table 14 Companies’ inputs on the proposed LS answer to Question 1.13-2

|  |  |
| --- | --- |
| **Company** | **Input** |
| Question | Should it be possible for different SSB indexes in the same CSI-SSB-ResourceSet to be associated with different additionalPCI? |
| Mod V0 proposal and comment. RAN1 agreement needed | There is no RAN1 agreement on this.  The moderator proposal is ‘no’: this is not necessary.  RAN1 has agreed that in one reporting instance, depending on NW configuration, beam(s) associated with a non-serving cell can be mixed with that associated with serving-cell. Since one reporting instance can contain measurements on several CSI-SSB-ResourceSet, the functionality agreed by RAN1 can be supported even when all SSB indices in one CSI-SSB-ResourceSet are associated with the same additionalPCI. |
| MediaTek | To our understanding, this should be possible according to the following RAN1 agreement.  **Agreement**  On Rel-17 enhancements for inter-cell beam management and inter-cell mTRP, a CSI-SSB-ResourceSet configured for L1-RSRP measurement/reporting includes at least a set of SSB indices where PCI indices are associated with the set of SSB indices, respectively. The PCI indices refer to PCIs within the set of PCIs configured for inter-cell beam management or inter-cell multi-TRP.   * The additionalInfo associated with SSB(s) with PCI(s) different from the serving cell agreed in RAN1 Agenda Item 8.1.2.2 is also applicable to inter-cell BM * Detailed signaling design is up to RAN2 * FFS (to be concluded in RAN1#107-e): Whether the above L1-RSRP measurement/reporting also includes group-based beam report for inter-cell mTRP   However, we are also fine with the Mod’s proposal if majority believe it is not necessary. |
| Samsung | We think that this is possible. The details can be left for RAN2 design. |
| Apple | We think the answer should be “Yes” |
| LG | We support the Mod’s proposal. |
| ZTE | It should be possible, according to the endorsed RAN1 spec and above agreement raised by MediaTek, the CSI-SSB-ResourceSet can include one or more sets of SSB indices where different additionalPCI(s) are associated with the sets of SSB indices, respectively. |

## 2.7 MULTIBEAM: Simultaneous usage of different operation for different serving cells

RAN2 understanding is that all channels and RS in one serving cell have to follow one TCI state framework, either Rel-17 or Rel 15/16.

* **Question 1.14:** Please confirm whether above RAN2 understanding is correct.
* **Question 1.15:** can different serving cells in a cell group use different TCI framework (Rel-16 or Rel-17)?
* **Question 1.16**: can different serving cells in a cell group use different TCI mode (joint or separate) if Rel-17 unified TCI framework is configured?

Table 15 Companies’ inputs on the proposed LS answer to Question 1.14

|  |  |
| --- | --- |
| **Company** | **Input** |
| Question | Please confirm whether above RAN2 understanding is correct. |
| Mod V0 proposal for reply answer | RAN1 confirms this understanding. |
| MediaTek | Fine with the Mod’s proposal |
| Samsung | Agree with moderator’s answer. |
| Apple | OK with moderator’s answer |
| LG | Support the Mod’s answer. |
| ZTE | Support |

Table 16 Companies’ inputs on the proposed LS answer to Question 1.15

|  |  |
| --- | --- |
| **Company** | **Input** |
| Question | can different serving cells in a cell group use different TCI framework (Rel-16 or Rel-17)? |
| Mod V0 proposal for reply answer | All serving cells in the same band need to use the same TCI framework, but serving cells in different bands may use different TCI frameworks, even if they are in the same cell group. |
| MediaTek | Even the corresponding WA need to be confirmed by RAN1, we are fine with the Mod’s proposal |
| Samsung | Agree with moderator’s answer. |
| Apple | OK with moderator’s answer |
| LG | We prefer not to mention same/different band related condition unless it needs to be specified by RAN2. Suggest to simplify the answer as below:  Yes, different serving cells in a cell group can use different TCI framework. |
| ZTE | Support |

Table 17 Companies’ inputs on the proposed LS answer to Question 1.16

|  |  |
| --- | --- |
| **Company** | **Input** |
| Question | can different serving cells in a cell group use different TCI mode (joint or separate) if Rel-17 unified TCI framework is configured? |
| Mod V0 proposal and comment. RAN1 agreement needed | There is no RAN1 agreement on this. The moderator proposal is that all serving cells in the same band need to use the same TCI mode, but serving cells in different bands may use different TCI mode, even if they are in the same cell group. |
| MediaTek | We are open to the Mod’s proposal. |
| Samsung | We think that is better to say “There is no RAN1 agreement on this. More RAN1 discussion is needed” |
| Apple | We think the answer should be “Yes”. |
| LG | To our understanding, the answer is clear from RAN2 signaling design perspective.  Yes, different serving cells in a cell group can use different TCI mode (joint or separate). |
| ZTE | Some further discussion is needed. We are generally fine with Moderator’s reply. |

## 2.8 MULTIBEAM: BM power control configuration

In current running RRC CR the PO set(P0, alpha, closed loop index) is encoded in both UL TCI state as well in BWP-UL-Dedicated (that is outside of UL TCI state) and different values are enabled for each UL channel PUSCH, PUCCH, SRS. UE receives the UL pc configuration in either UL TCI states or in BWP UL-dedicated.

* Question 1.15 [sic!]: Is it correct understanding that network may provide UE the UL pc configuration in either UL TCI states or in BWP-UL-dedicated or should RAN2 choose one? If UL PC configuration is signalled in BWP-UL-dedicated only, how can the specific PC configuration (actually applied) be decided in PHY layer?

Table 18 Companies’ inputs on the proposed LS answer to Question 1.15-2

|  |  |
| --- | --- |
| **Company** | **Input** |
| Question | Is it correct understanding that network may provide UE the UL pc configuration in either UL TCI states or in BWP-UL-dedicated or should RAN2 choose one? If UL PC configuration is signalled in BWP-UL-dedicated only, how can the specific PC configuration (actually applied) be decided in PHY layer? |
| Mod V0 proposal for reply answer | RAN1 made the following agreement:  **Agreement**  On the setting of UL PC parameters except for PL-RS (P0, alpha, closed loop index) for Rel.17 unified TCI framework,   * For each of PUSCH and PUCCH, the setting of (P0, alpha, closed loop index) can be associated with UL or (if applicable) joint TCI state per BWP.   + In this case, multiple settings are configured. Each setting can be associated with at least one TCI state, and, for a given TCI state, only one setting for PUSCH and only one setting for PUCCH can be associated at a time.   (Working Assumption) In this case, for each of the PUSCH and PUCCH, each of the activated UL or (if applicable) joint TCI states is associated with one of the settings.   * If not associated, for each of the PUSCH and PUCCH, the setting(s) of (P0, alpha, closed loop index) per channel/signal per BWP is independent of the UL or (if applicable) joint TCI states * FFS: If the setting of (P0, alpha, closed loop index) for SRS can also be associated with UL or (if applicable) joint TCI state. * FFS: (to be decided in RAN1#106-e) whether to configure the same setting of (P0, alpha, closed loop index) per TCI state across channels and apply a channel dependent component, or configure a channel dependent setting of (P0, alpha, closed loop index) per TCI state   This agreement means that it should be possible to associate the UL pc configuration with a TCI state, and one way of associating the UL pc configuration with a TCI state is to include (P0, alpha, closed loop index) in the TCI state.  However, the agreement also states that it should be possible to not configure any association, meaning that irrespective of which TCI state is currently indicated, the same set of PC parameters should be used. Implementing the possibility to configure the UL PC configuration in both the UL TCI state or the UL BWP provides the desired functionality. In the field descriptions, it could be stated that the NW configures the PC parameters in either the TCI states or in the UL BWP. |
| MediaTek | We are fine with the Mod’s proposal |
| Samsung | Fine with the moderator’s reply. |
| Apple | OK with moderator’s reply |
| LG | Fine with the moderator’s reply. |
| ZTE | Not support. The above reply seems to imply that the PC parameter only applies to UL TCI state, which is incorrect. Both joint and UL TCI state should be treated equally. So we have the following update:  ,,,  This agreement means that it should be possible to associate the UL pc configuration with a UL or joint TCI state, and one way of associating the UL pc configuration with a UL or joint TCI state is to include (P0, alpha, closed loop index) in the TCI state.  However, the agreement also states that it should be possible to not configure any association, meaning that irrespective of which a UL or joint TCI state is currently indicated, the same set of PC parameters should be used. Implementing the possibility to configure the UL PC configuration in both the UL TCI state/joint TCI state or the UL BWP provides the desired functionality. In the field descriptions, it could be stated that the NW configures the PC parameters in either the UL or joint TCI states or in the UL BWP. |

## 2.9 mTRP (PUCCH, PDCCH)

For mTRP PUCCH, RAN2 has agreed to add a new IE for power control for mTRP FR1 operation. However, RAN2 would need information on the number of power control sets to be configured with respect to the each TRP and then in relation to the corresponding MAC CE.

* **Question 2.1:** How many power control sets needs to be configured with respect to the each TRP and then in relation to the corresponding MAC CE per UE/cell/BWP?

For mTRP PDCCH, RAN1 indicates that parameter *searchSpaceLinking* is suppposed to link two SearchSpace sets by RRC configuration with various limitations. However, it was not clarified whether the linking should be applied to all SearchSpaces set under Rel-15 and Rel-16 configurations.

* **Question 2.2:** Should the *searchSpaceLinking* be applied to all or selected set of SearchSpaces under Rel-15 and Rel-16 configurations?

RAN2 agreed to have separate MAC CEs for PUSCH pathloss reference RS update:

* [060] To revise the legacy PUSCH Pathloss Reference RS Update MAC CE with additional field(s) to differentiate the TRP for mTRP PUSCH repetition, replace the Reserve bit (‘R’) to a TRP index field (‘T’) so that the MAC CE can indicate which TRP the PUSCH pathloss reference RS update can apply for.
* **Question 2.3:** How is the "TRP identity" defined for this MAC CE or other potential per TRP MAC CEs?- is it based on *SRS-ResourceSet* ID, BFD RS SET ID or something else? Note that current ASN1 does not have yet BFD RS SETs implemented.

The L1 parameter excel does not have input on how to implement beam failure detection RS sets for mTRP. There is also not information on what is the maximum number of detection resources to be configured per UE per cell or per TRP. There is also not information on what is the maximum number of recovery resources to be configured per UE per cell or per TRP.

* **Question 2.4:** Please inform how to implement beam failure detection RS sets for mTRP. Also what is the maximum number of detection resources to be configured per UE per cell or per TRP? What is the maximum number of recovery resources to be configured per UE per cell or per TRP?

Table 19 Companies’ inputs on the proposed LS answer to Question 2.1

|  |  |
| --- | --- |
| **Company** | **Input** |
| Question | How many power control sets needs to be configured with respect to the each TRP and then in relation to the corresponding MAC CE per UE/cell/BWP? |
| Mod V0 proposal for reply answer | The maximum number of power control sets can be the same as maxNrofPUCCH-P0-PerSet (i.e., 8). The power control sets can be configured per BWP. MAC can then activate up to two power control sets. |
| Samsung | Support the Moderator proposal with adding “-CE” after MAC. |
| Apple | We think the maximum number should be 2 sets to support 2 TRP for mTRP operation |
| LG | Fine with Mod’s proposal with the editorial change by Samsung |
| ZTE | Support the moderator proposal with Samsung’s update. |

Table 20 Companies’ inputs on the proposed LS answer to Question 2.2

|  |  |
| --- | --- |
| **Company** | **Input** |
| Question | Should the *searchSpaceLinking* be applied to all or selected set of SearchSpaces under Rel-15 and Rel-16 configurations? |
| Mod V0 proposal for reply answer | In NR Rel-17, searchSpaceLinking is supported for search space sets configured in PDCCH-Config. For Rel-15 SearchSpace configuration, searchSpaceLinking should be supported for the following:  • Search spaces with searchSpaceType ‘ue-specific’, and  • Search spaces with searchSpaceType ‘common’ in which UE monitors for PDCCH candidates with DCI formats 2-0, 2-1, 2-2, and 2-3.  For Rel-16 SearchSpace configuration, searchSpaceLinking should be supported for search spaces with searchSpaceType ‘common’ in which UE monitors for PDCCH candidates with DCI formats 2-4, 2-5, and 2-6. |
| Samsung | Support in principle. For RAN2’s convenience, could we capture relevant agreements as follows together?  Agreement in RAN1#106-e  SS set configured by *recoverySearchSpaceId* cannot be linked to another SS set for PDCCH repetition.  Agreement in RAN1#106b-e  The following SS sets cannot be linked with another SS set for PDCCH repetition: SS set 0, *searchSpaceSIB1, searchSpaceOtherSystemInformation, pagingSearchSpace, ra-SearchSpace*.  Also, in AI 8.1.2.1, some kinds of search space sets introduced in Rel-17 (i.e., searchSpaceBroadcast, peiSearchSpace, and sdt-SearchSpace) are being discussed. After finalizing the discussion, capturing this together can be helpful. |
| Apple | We think the agreements mentioned by Samsung should be provided to RAN2. |
| LG | Fine with Mod’s proposal |
| ZTE | Agree with Samsung to add agreements in the LS. Then, we can say:  RAN1 thinks the searchSpaceLinking is applicable to all SearchSpace sets under Rel-15 and Rel-16 configurations except the cases included in the following agreements.  Furthermore, RAN2’s question is not so crystal. They seemed to also wonder if a linking is applied to all SearchSpace sets together or can be applied some SearchSpace sets. To clarify, we think it is better to further add:  To clarify, some pairs of search space sets can be linked via the searchSpaceLinking parameter and then the remaining search space sets are individual. |

Table 21 Companies’ inputs on the proposed LS answer to Question 2.3

|  |  |
| --- | --- |
| **Company** | **Input** |
| Question | How is the "TRP identity" defined for this MAC CE or other potential per TRP MAC CEs?- is it based on *SRS-ResourceSet* ID, BFD RS SET ID or something else? Note that current ASN1 does not have yet BFD RS SETs implemented. |
| Mod V0 proposal for reply answer | RAN1 specifications do not capture the terms ‘TRP’ or ‘TRP identity’.. Hence, these terms should be avoided in the relevant MAC CE field descriptions. RAN1 specifications use the SRS resource set to represent the TRP in case of mTRP operation for CB and NCB based PUSCH transmission. Hence, ‘SRS-ResourceSet ID’ should be used in the above MAC CE. |
| Samsung | Support the Moderator proposal. |
| Apple | OK with moderator’s answer. |
| LG | Agree with the Mod’s answer for PUSCH PL RS update MAC CE. For enhanced BFR MAC CE used to report mTRP BFR status by UE, BFD RS set ID represents the TRP. This information may be required for RAN2 in addition to the information provided by the proposed answer. |
| ZTE | For the case of MTRP PUSCH repetition, we agree with the moderator proposal. For other cases, e.g. MTRP PUCCH repetition, MTRP inter-cell operation, MTRP HST-SFN and MTRP BFR, the indicator of ‘TRP identity’ is defined respectively. Considering RAN2 may need to define other potential per TRP MAC CE for Rel-17 MTRP in the future, it is better to state the indicator of ‘TRP’ or ‘TRP identity’ in each Rel-17 MTRP scheme for RAN2’s reference. Hence we suggest:  RAN1 specifications do not capture the terms ‘TRP’ or ‘TRP identity’.. Hence, these terms should be avoided in the relevant MAC CE field descriptions. RAN1 specifications use the following indicators to define ‘TRP identity’ in different MTRP shcemes:   * SRS resource set is used to represent the TRP in case of mTRP operation for CB and NCB based PUSCH transmission. Hence, ‘SRS-ResourceSet ID’ should be used in the above MAC CE. * PUCCH power control set of one PUCCH resource activated with two power control sets is used to represent the TRP in case of mTRP operation for PUCCH transmission in FR1. * PUCCH spatial relation info of one PUCCH resource activated with two spatial relation info is used to represent the TRP in case of mTRP operation for PUCCH transmission in FR1. * *CORESETPoolIndex* associated with either serving cell PCI or PCI different from the serving cell is used to represent the TRP in case of mTRP inter-cell operation. * TCI state of one CORESET activated with two TCI states is used to represent the TRP in case of mTRP SFN PDSCH scheme. * TCI state of one codepoint of the DCI *Transmission configuration indication* field indicated with two TCI states is used to represent the TRP in case of mTRP SFN PDSCH scheme. * BFD RS SET is used to represent the TRP in case of mTRP BFR. |

Table 22 Companies’ inputs on the proposed LS answer to Question 2.4

|  |  |
| --- | --- |
| **Company** | **Input** |
| Question | Please inform how to implement beam failure detection RS sets for mTRP. Also what is the maximum number of detection resources to be configured per UE per cell or per TRP? What is the maximum number of recovery resources to be configured per UE per cell or per TRP? |
| Mod V0 proposal for reply answer | RAN1 agreed to support both explicit and implicit beam failure detection (BFD) RS sets configurations for mTRP, and the implicit BFD RS sets can only be configured for mDCI based mTRP (i.e., when *PDCCH-Config* contains two different values of coresetPoolIndex). The two beam failure detection RS sets are to be configured per DL BWP (BWP-DonwlinkDedicated).  Specifically, for explicit configuration, the UE can be provided two BFD RS sets of periodic CSI-RS resource configuration indexes.  For implicit configuration, the UE determines the two BFD RS sets including periodic CSI-RS resource configuration indexes having the same values as the source RS indexes in the TCI states for the CORESETs associated with respective pool indexes 0 and 1.  The maximum number of detection resources per set is still being discussed in UE feature group 23-5-2, and the maximum number of recover resources per set is being discussed in UE feature group 23-1-2. |
| Samsung | Support the Moderator proposal. |
| Apple | In our view, details on explicit configuration are still under discussion in RAN1. We can provide details after we reach agreement. |
| LG | For the last sentence, FG 23-1-2 is for ICBM which is not relevant to this feature (correct me if I missed something). Modification is suggested as below.  The maximum number of detection resources per set and across two sets are reported by respective UE capabilities and their value ranges are ~~is~~ still being discussed in UE feature group 23-5-2~~, and the maximum number of recover resources per set is being discussed in UE feature group 23-1-2.~~  We are fine with the other parts of the Mod’s answer |

## 2.10 CSI mTRP

For mTRP CSI, RAN2 was instructed to configure two codebook subset restrictions (CBSRs) per CodebookConfig, and two RI restrictions per CodebookConfig. However, it is not clear which CBSRs are intended to be used and whether there are specific restrictions to be applied for the RRC configuration.

* **Question 3.1:** Which CBSRs are intended to be used and whether there are specific restrictions to be applied for the RRC configuration? Also whether is it introduced for both typeI-SinglePanel1 and typeI-SinglePanel2 and also for both 2Tx and more than 2Tx?

Table 23 Companies’ inputs on the proposed LS answer to Question 3.1

|  |  |
| --- | --- |
| **Company** | **Input** |
| Question | Which CBSRs are intended to be used and whether there are specific restrictions to be applied for the RRC con-figuration? Also whether is it introduced for both typeI-SinglePanel1 and typeI-SinglePanel2 and also for both 2Tx and more than 2Tx? |
| Mod V0 proposal for reply answer | RAN1 agreed that ‘typeI -SinglePanel’ codebook is supported for mTRP CSI; hence, there is no further restriction that needs to be introduced. The mth (m=0,1) CBSR is to be used when computing the PMI corresponding to the NZP CSI-RS resource for channel measurement from the mth Resource group. The two CBSRs can be introduced for both 2Tx and more than 2Tx. |
| Samsung | Support the Moderator proposal. |
| Apple | We suggest the following answer:  Two CBSRs are intended to be used for mTRP CSI measurement. Each CBSR corresponds to one TRP. From the specification perspective, one CBSR is applied to one CMR (Channel Measurement Resource) group in a CMR resource set (i.e., *resourcesForChannelMeasurement* in *CSI-ReportConfig*), respectively   * It should be configured for both 2Tx and more than 2Tx, i.e., corresponding to the *twoTX-CodebookSubsetRestriction* and *typeI-SinglePanel-codebookSubsetRestriction-i2* in the current specification. * mTRP CSI only applies to typeI-SinglePanel codebook, hence the new per TRP CBSR only applies to typeI-SinglePanel. Not aware of “both typeI-SinglePanel1 and typeI-SinglePanel2” |
| LG | Regarding restriction for the RRC configuration, both CBSRs should assume the same number of ports. |
| ZTE | We are fine with moderator proposal. However, after checking with our RAN2 colleague, typeI-SinglePanel1 and typeI-SinglePanel2 (not agreed yet) actually was newly introduced by RAN2 for typeI-SinglePanel in an intermediate discussion. Their motivation was to introduce two sets of CBSR and RI restrictions for two TRPs respectively. But in RAN1, two CBSRs are for two TRP(resource groups) respectively, two RIs are not. Actually, **one RI restriction is applied to all Single-TRP measurement hypotheses (up to the maximal rank of 8) and another one is applied to all NCJT measurement hypotheses (up to 4 rank combinations).** We suggest further clarify the RI restriction to make RAN2 clearer. Here is our suggestion:   * RAN1 agreed two CBSRs are used for two CSI-RS resource groups respectively where the *nrOfAntennaPorts* should be the same for two CBSRs. It is applicable for both 2Tx and more than 2Tx. However, two RI restrictions are shared for two CSI-RS resource groups whereas one RI restriction is applied to all Single-TRP measurement hypotheses (up to the maximal rank of 8) and another one is applied to all NCJT measurement hypotheses (up to 4 rank combinations). * Regarding the question ’Also whether is it introduced for both typeI-SinglePanel1 and typeI-SinglePanel2’, RAN1 is not fully clear what typeI-SinglePanel1 and typeI-SinglePanel2 refer to. RAN1 thinks it is up to RAN2’s design as long as two CBSRs and two RI restriction are supported per *CodebookConfig.* |

## 2.11 SRS

RAN2 also noted that the parameter *startPosition* was not included in the indicated Rel-17 *resourceMapping* for SRS, but it was not clear if this was intentionally or accidentally omitted from the Rel-17 SRS configuration.

* **Question 4.1:** Should the parameter *startPosition* should be included in *resourceMapping* also for Rel-17 (similarly as it was there in Rel15 and Rel 16 configurations)?

Table 24 Companies’ inputs on the proposed LS answer to Question 4.1

|  |  |
| --- | --- |
| **Company** | **Input** |
| Question | Should the parameter *startPosition* should be included in *resourceMapping* also for Rel-17 (similarly as it was there in Rel15 and Rel 16 configurations)? |
| Mod V0 proposal for reply answer | The startPosition should be included in resourceMapping for Rel-17 which can be all symbol locations within a slot (i.e., INTEGER (0,…,13), which is same as startPosition-r16). |
| Samsung | Support the Moderator proposal. |
| Apple | OK with moderator’s answer |
| LG | Fine with the Mod’s proposal |
| ZTE | Support the moderator proposal. |

## Submitted tdocs

The following input Tdocs were submitted:

|  |  |  |
| --- | --- | --- |
| [**R1-2200887**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_108-e/Docs/R1-2200887.zip) | LS on feMIMO RRC parameters | RAN2, Ericsson |
| [**R1-2201050**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_108-e/Docs/R1-2201050.zip) | Draft LS reply on feMIMO RRC parameters | vivo |
| [**R1-2201204**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_108-e/Docs/R1-2201204.zip) | Draft reply LS on feMIMO RRC parameters | ZTE |
| [**R1-2201237**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_108-e/Docs/R1-2201237.zip) | Discussion on LS on feMIMO RRC parameters | OPPO |
| [**R1-2201306**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_108-e/Docs/R1-2201306.zip) | Draft reply LS on feMIMO RRC parameters | CATT |
| [**R1-2201307**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_108-e/Docs/R1-2201307.zip) | Discussion on feMIMO RRC parameters | CATT |
| [**R1-2201455**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_108-e/Docs/R1-2201455.zip) | [Draft] Reply LS on feMIMO RRC parameters | Lenovo, Motorola Mobility |
| [**R1-2201565**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_108-e/Docs/R1-2201565.zip) | Draft reply LS on feMIMO RRC parameters | LG Electronics |
| [**R1-2201628**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_108-e/Docs/R1-2201628.zip) | Draft reply LS on feMIMO RRC parameters | Ericsson |
| [**R1-2201629**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_108-e/Docs/R1-2201629.zip) | Discussion related to LS on feMIMO RRC parameters | Ericsson |
| [**R1-2201676**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_108-e/Docs/R1-2201676.zip) | Discussion on LS reply on RRC parameters for feMIMO | Intel Corporation |
| [**R1-2201748**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_108-e/Docs/R1-2201748.zip) | Draft reply LS on FeMIMO RRC Parameters | Apple |
| [**R1-2201833**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_108-e/Docs/R1-2201833.zip) | Discussion on RAN2 LS on feMIMO RRC parameters | CMCC |
| [**R1-2201980**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_108-e/Docs/R1-2201980.zip) | Draft Reply LS on feMIMO RRC parameters | Samsung |
| [**R1-2202056**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_108-e/Docs/R1-2202056.zip) | Discussion on RAN2 LS on feMIMO RRC parameters (MultiBeam) | MediaTek Inc. |
| [**R1-2202096**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_108-e/Docs/R1-2202096.zip) | Draft Reply LS to RAN2 on feMIMO RRC parameters | Qualcomm Incorporated |
| [**R1-2202309**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_108-e/Docs/R1-2202309.zip) | Draft LS reply on feMIMO RRC parameters | Nokia, Nokia Shanghai Bell |
| [**R1-2202470**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_108-e/Docs/R1-2202470.zip) | Views on feMIMO RRC parameters | Huawei, HiSilicon |