Companies are to share their inputs on the excel spreadsheet in /tsg\_ran/WG1\_RL1/TSGR1\_106-e/Inbox/drafts/8.1.1/RRC/ herein.

## Inputs on initial version

Please share your inputs, if any, in the following table

Table 1 Inputs: Initial version

|  |  |
| --- | --- |
| **Company** | **Input** |
| Apple | **For QCL-Info\_r17, we suggest we add some clarification for SRI*** **SRS ResourceId (SRS for beam management, only applicable for UL TCI)**

**We are not sure whether the following PC parameters are needed, but it seems we can reuse legacy prameters?*** **p0\_Alpha\_CLIdPUSCHSet**
* **p0\_Alpha\_CLIdPUCCHSet**
* **p0\_Alpha\_CLIdSRSSet**
* **p0\_Alpha\_CLIdSetId**

**We are not sure whether we need to introduce the following parameters. It seems legacy CSI report framework already cover the following aspects*** **InterCellBeamMetrics**
* **InterCellMeasurementRS**
* **InterCellReportType**

**Regarding the change of CORESET TCI list, we think some discussion is needed. Currently unified TCI is applied for multiple channels, and it should be selected from the TCI state pool in PDSCH-Config instead of the pool in CORESET*** **ControlResourceSet**

**Regarding the following parameters, we are not sure whether we need to create a new structure for Rel-17 or not (It seems this is a RAN2 problem?). But what we need seems to be numberOfN only. In addition, we think it is not necessary to introduce numberOfM.*** **mpe-Reporting-FR2-r17**
* **MPE-Config-FR2-r17**
* **mpe-ProhibitTimer-r17**
* **mpe-Threshold-r17**
* **numberOfN**
* **numberOfM**
 |
| OPPO | In “TCI-State\_r17”: suggest to add one parameter to indicate the ul tx filer, instead of mixing the ul tx spatial filter in QCL-TypeD. Because apparently, in UL TCI state, there is no QCL information:* ul-Tx-SpatialFilter: to indicate UL Tx spatial filter for UL

In “QCL-Info\_r17”: sugges to clarify that SRS is used for UL Tx spatial filter only, similar to comments by Apple.The following 3 RRC parameters for inter-cell beam measurement are not needed because in current CSI report framework, we only need to introduce SSB asscoaited other PCI in CSI configuraiton:* InterCellBeamMetrics
* InterCellMeasurementRS
* InterCellReportType

About the “ControlResourceSet”: our understanding is we do not need update it. The current RRC parameter tci-StatesPDCCH-ToAddlist is for per-CORESET-MAC CE-based beam indication method in rel15/16. In rel17 unfied TCI, we do not need this RRC any more.Regarding the MPE issue:* The following RRC parameters are not needed because the current RRC parameter can be reused:
	+ mpe-Reporting-FR2-r17
	+ MPE-Config-FR2-r17
	+ mpe-ProhibitTimer-r17
	+ mpe-Threshold-r17
* The RRC parameter “numberOfM” is not needed, at least for current moment.
 |
| MediaTek | Regarding “tci-StateType”, not sure why this parameter is needed? If it is used to differentiate contents of the “referenceSignal” in “QCL-Info\_r17”, it seems we can directly introduce two papameters (e.g., DL\_Joint\_TCI\_state and UL\_TCI\_state) under the “referenceSignal” of “QCL-Info\_r17”, and remove “tci-StateType”.Regarding the QCL types and source RS types supported by “TCI-State\_r17”, according the following agreement, all types of DL RSs can be configured as a target DL RS of TCI-State\_r17, even they don't share the same the same indicated Rel-17 TCI state(s) as UE-dedicated reception on PDSCH and for UE-dedicated reception on all or subset of CORESETs in a CC. Therefore, we see all possible QCL types and source RS types still need to be supported in by “TCI-State\_r17”. For example, for a TRS, TCI-State\_r17 needs to provide an SSB with as source RS with QCL-TypeC. The QCL restrictions or usages can be captured in the corresponding notes.**Agreement**The following working assumption is confirmed with revision in RED.On Rel.17 unified TCI framework, for any DL RS that does not share the same indicated Rel-17 TCI state(s) as UE-dedicated reception on PDSCH and for UE-dedicated reception on all or subset of CORESETs in a CC, but can be configured as a target DL RS of a Rel-17 DL TCI (hence the Rel-17 DL TCI state pool), Rel-17 mechanism(s) which reuse the Rel-15/16 TCI state update signaling/configuration design(s) are used to update/configure such DL RS(s) with Rel-17 TCI state(s).* Applies for both intra-cell and inter-cell beam indication

In summary, we suggest the followings:

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| --- | --- |
| TCI-State\_r17 | Release 17 TCI state includes the following fields:**tci-StateId\_r17****~~tci-StateType~~****qcl-Type1** of type QCL-Info\_r17 for QCL Type D for DL or UL Tx spatial filter for UL**qcl-Type2** of type QCL-Info\_r17 for QCL Type A ~~[~~or QCL-TypeB~~]~~ or QCL-TypeC for DL |
| tci-StateId\_r17 | Release 17 TCI state ID |
| ~~tci-StateType~~ | ~~Type of TCI state: DL only, or UL only, or Joint (note: DL only+UL only is only a matter of indication, not type)~~ |
| QCL-Info\_r17 | Release 17 QCL info for the unified TCI framework. Includes the following fields**cell****bwp-Id****referenceSignal** choice of { **DL\_Joint\_TCI\_state** { NZP-CSI-RS-ResourceId ~~(CSI-RS for beam management or CSI-RS for tracking)~~ SSB-Index } **UL\_TCI\_state** { NZP-CSI-RS-ResourceId ~~(CSI-RS for beam management or CSI-RS for tracking)~~ SSB-Index SRS ResourceId ~~(SRS for beam management)~~}**qcl-Type** ENUMERATED{typeA, ~~[~~typeB~~]~~, typeC, typeD}[**pathloss RS** - if included in TCI state - for UL TCI state or Joint TCI state choice ofSSB-IndexNZP-CSI-RS (periodic CSI-RS)]Note for DL\_Joint\_TCI\_state: For a TCI-State\_r17 indicated at least for UE-dedicated reception on PDSCH and for UE-dedicated reception on all or subset of CORESETs in a CC, only CSI-RS for beam management or CSI-RS for tracking can be configured as source with QCL-TypeD.Note for UL\_TCI\_state: This can be configured only for UL TCI for determining UL TX spatial filter, and only CSI-RS for beam management, CSI-RS for tracking, SRS for beam management, or SSB can be configured as the source RS**.** |

 Regarding “p0\_Alpha\_CLIdPUCCHSet”, it seems we don't need alpha for PUCCH?Regarding the change in “ControlResourceSet”, share same view with Apple and OPPO. |
| NTT Docomo | Regarding “tci-StateType”, we agree with MediaTek’s modification.Regarding to TCI-State\_r17, based on TS38.214, the current spec. implies qcl-Type2 is QCL type D, because it says (if configured). *The quasi co-location relationship is configured by the higher layer parameter qcl-Type1 for the first DL RS, and qcl-Type2 for the second DL RS (if configured).*Hence, the following texts are not correct. Also, there is no need to mention which qcl-Type is QCL-Type D in TS38.331, and hence we suggest to remove the following text (same as Rel.15).qcl-Type1 of type QCL-Info\_r17 ~~for QCL Type D for DL or UL Tx spatial filter for UL~~qcl-Type2 of type QCL-Info\_r17 ~~for QCL Type A [or QCL-TypeB] for DL~~Regarding the QCL types and source RS types, we agree with MediaTek that QCL type C and B should be added.Regarding the MPE issue* share same view with Apple and OPPO that “numberOfM” is not needed

even if numberOfM is remained this note need to be revised “Note: TBD whether this field may be removed, e.g. when M=1 ~~N=M~~. Because according to the working assumption, M is the number of SSBRI/CRI for each P-MPR value, and N is the number of P-MPR value. |
| Ericsson | We don’t understand the “per TRP” – suggest to remove. Many of the parameters should be “per BWP”.We prefer to define a separate RRC IE for UL TCI states. This will reduce the size of the fields in MAC CE. With this, the tci-State-Type is unnecessary, and the resulting parameter structures become cleaner. For example:TCI-State\_r17:tci-StateId\_r17qcl-Type2 of type QCL-Info\_r17 for QCL Type D for DL or UL Tx spatial filter for ULqcl-Type1 of type QCL-Info\_r17 for QCL Type A [or QCL-TypeB] or typeC for DL"pathloss RS - choice ofSSB-IndexNZP-CSI-RS (periodic CSI-RS) TCI-State\_Ul\_r17:tci-StateId\_ul\_r17referenceSignal choice of NZP-CSI-RS-ResourceId SSB-Index SRS ResourceIdpathloss RS - choice ofSSB-IndexNZP-CSI-RS (periodic CSI-RS)Qcl-Type2 should include also “typeC”, since the R17 TCI states can be used in cases where “common beam” is not applicable. Remember that unified TCI works also in FR1, so it would make more sense that qcl-Type1 provides ‘typeA’,’typeB’,’typeC’Can we consider using one parameter for all the PC parameter sets (p0\_Alpha\_CLIdPUSCHSet, p0\_Alpha\_CLIdPUCCHSet, p0\_Alpha\_CLIdSRSSet)? The unique identifier will identify the set.InterCellBeamMetrics can be configured using the existing parameter *nrofReportedRS*InterCellReportType this can be configured using the CSI frameworkInterCellMeasurementRS, InterCellMeasurementPCI: it is cleaner to add a new field in *CSI-SSB-ResourceSet:*csi-SSB-ResourceList \_r17 SEQUENCE (SIZE(1..maxNrofCSI-SSB-ResourcePerSet)) OF SSB-Index\_r17where SSB-Index\_r17 contains (PCI,SSB-index)TCI-StateIndicationType: it is unclear how this will be used – it would seem that this RRC parameter would change the interpretation of a MAC CE, and that is something that RAN2 should handle.We share the view of Apple, Oppo and MediaTek that ControlResourceSet does not need to be updated.We think that new mpe parameters are needed – RAN1 cannot change the interpretation of a parameter introduced by RAN4. Potentially we can make a comment that it may be possible to reuse the R16 parametersWe think there is a need for a new parameter: maxNrofTCI-States\_r17. We have not yet discussed this, but it would seem premature to agree that it should be the same as in legacy.In the PDSCH-Config, suggest using the naming Reference\_Scell – since it will be of that type. There is also a need to add a reference BWP. |
| Qualcomm | The association between UL/joint TCI and PUCCH/PUSCH/SRS PC parameter set may need a new RRC parameter, which seems missing. Otherwise, pls clarify how the association is done. For the following three parameters, we may also need 3 default sets used when no PC set is associated with a TCI. p0\_Alpha\_CLIdPUSCHSetp0\_Alpha\_CLIdPUCCHSetp0\_Alpha\_CLIdSRSSetPls clarify the usage of p0\_Alpha\_CLIdSetId. Otherwise, suggest to removeInterCellAdditionalPCI may not be needed, given that it can be derived from InterCellMeasurementRSControlResourceSet may not be needed, given the unified TCI is configured under PDSCH-ConfigThe following parameters seem not agreed yet. Suggest to remove, or state that first 3 parameters reuse those for R16 MPE reportMPE-Config-FR2-r17mpe-ProhibitTimer-r17mpe-Threshold-r17numberOfM |
| ZTE | Regarding ‘TCI-State\_r17’, ‘tci-StateId\_r17’, ‘tci-StateType’, and ‘QCL-Info\_r17’, we are generally fine with MTK’s update. But, considering the consistency that qcl-Type2 is QCL type D in current spec, we suggest to change the order between qcl-Type1 and qcl-Type2. Then, we can not accept the separate TCI state pool for DL and UL (considering RRC overhead and unified solution for re-numbering TCI state ID for subsequent MAC-CE/DCI command), but are open to make conclusion in this email thread or next meeting.

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| --- | --- |
| TCI-State\_r17 | Release 17 TCI state includes the following fields:**tci-StateId\_r17****~~tci-StateType~~****qcl-Type~~1~~**2 of type QCL-Info\_r17 for QCL Type D for DL or UL Tx spatial filter for UL**qcl-Type~~2~~1** of type QCL-Info\_r17 for QCL Type A ~~[~~or QCL-TypeB~~]~~ or QCL-TypeC for DL |

Regarding ‘p0\_Alpha\_CLIdPUSCHSet’, ‘p0\_Alpha\_CLIdPUCCHSet’, ‘p0\_Alpha\_CLIdSRSSet’, ‘p0\_Alpha\_CLIdSetId’, considering that we already have sets of candidate parameters corresponding P0/alpha for PUSCH, PUCCH and SRS, we can directly reuse the legacy parameter set. Also, we only need to introduce a function of mapping above PC parameters and unified TCI state ID. That is similar to already RRC parameter ‘SRI-PUSCH-PowerControl’.* Notes that, considering that we only have a PL-RS for all types of channel/RS, we can choose one ID from either one of PUSCH/PUCCH/SRS-PL-RS pool or explicitly provide the corresponding PL-RS ID. In the following example, we use the latter one.

|  |  |
| --- | --- |
| TCI-State-PUSCH-PUCCH-SRS-PowerControl | TCI-State-PUSCH-PUCCH-SRS-PowerControl includes the following fields:**tci-StateId\_r17****P0-PUSCH-AlphaSetId****PUSCH-ClosedLoopIndex** ENUMERATED { i0, i1 }**P0-PUCCH-Id****PUCCH-ClosedLoopIndex** ENUMERATED { i0, i1 }**Alpha-SRS****P0-SRS****srs-PowerControlAdjustmentStates** ENUMERATED { sameAsFci2, separateClosedLoop}**pathloss RS** - choice of {SSB-Index, NZP-CSI-RS (periodic CSI-RS)} |

Regarding ‘InterCellMeasurementRS’and ‘InterCellAdditionalPCI’, we are generally fine with E///’s suggestion. But, we need to have a clear discussion on whether we can directly add PCI into ‘SSB-Index\_r17’, or we have a new IE that contains 1 or X candidate PCI and add the new IE into ‘SSB-Index\_r17’. It may be relevant to inter-cell mTRP discussion.Then, we agree that ‘InterCellBeamMetrics’ and ‘InterCellReportType’ may NOT be needed and can be configured by using the existing CSI framework.Regarding QCL-Info\_NeighbourCell, we slightly prefer to use the above rel-17 TCI state to achieve this function directly. As we mentioned before, we have some concerns about directly adding PCI into this IE. Based on inter-cell mTRP discussion, it is up to RAN2 and may be achieved by a new IE that contains 1 or X candidate PCI.Finally, we share the same views that the following three parameters are not stable for now, especially for ‘numberOfM’. mpe-ProhibitTimer-r17mpe-Threshold-r17numberOfM Meanwhile, we need to consider another new IE about candidateRsSet-MPE based on the following WA.**Agreement**On Rel.17 enhancements to facilitate MPE mitigation, support the following enhancement on the Rel-16 event-triggered P-MPR-based reporting (included in the PHR report when a threshold is reached, reported via MAC-CE):* In addition to the existing field in the PHR MAC-CE, N≥1 P-MPR values can be reported
	+ The N P-MPR values are reported together with the following:
		- (Working Assumption) For each P-MPR value, up to M SSBRI(s)/CRI(s), where the SSBRI(s)/CRI(s) is selected by the UE from a candidate SSB/CSI-RS resource pool (FFS: how to perform the selection)
			* FFS: The supported value(s) of M

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| CATT | Regarding “tci-StateType”, there is no need to distinguish TCI state type. As joint TCI and separate TCI can be distinguished by RRC configuration. Separate UL TCI and DL TCI can be distinguished by “qcl-type” in TCI-state, i.e. type A/B/C is at least included for DL TCI state, but not for UL TCI state. So we propose to delete this parameter:Regarding “ControlResourceSet”, we share similar view with Apple.Regarding “QCL-Info\_r17”, according to the agreement, whether pathloss RS is included in or associated with the TCI state is decided by RAN2, so the bracket on pathloss RS should be remained. And we have simiar view with MTK that type B/C should also be included in the qcl-Type.qcl-Type ENUMERATED{typeA, typeB, type C, typeD}[pathloss RS - if included in TCI state - for UL TCI state or Joint TCI state choice ofSSB-IndexNZP-CSI-RS (periodic CSI-RS)] Regarding “p0\_Alpha\_CLIdPUCCHSet”, Alpha is not needed as in Rel-15/16.Regarding “PDSCH-Config”, as there is an FFS on the number of reference CC, we propose to revise the following sentence as:reference CCId(s) of CC containing TCI state ID list if TCI-State\_r17 is misisng in PDSCH configRegarding the MPE issue，we share the same view with OPPO. |
| Futurewei | Regarding “tci-StateType”, this is related to the issue of TCI state pool for separate DL and UL TCI state update (beam indication). For the case with separate TCI state pools for DL and UL, this “tci-StateType” is not needed, and the existing MAC CE design can be reused since the number of TCI states in each of the separate TCI state pools can be kept under the current limit of 128. We suggest removing this parameter and RAN1 to have further discussions and make a decision on this issue.Regarding “QCL-Info\_r17”, we share the same view as CATT that according to the previous agreement, whether “pathloss RS” is ‘included in’ or ‘associated with’ UL TCI state or joint TCI state is up to RAN2. We suggest keeping the bracket on “pathloss RS” and add the following note: whether “pathloss RS” is ‘included in’ or ‘associated with’ UL TCI state or joint TCI state is up to RAN2.[pathloss RS - if included in TCI state - for UL TCI state or Joint TCI state choice ofSSB-IndexNZP-CSI-RS (periodic CSI-RS)]Note: whether “pathloss RS” is ‘included in’ or ‘associated with’ UL TCI state or joint TCI state is up to RAN2In addition, according to the following agreements, for intra-cell beam indication, aperiodic CSI-RS resources for CSI, aperiodic CSI-RS resources for BM, and aperiodic SRS resources or resources sets for BM, as well as DMRS(s) associated with non-UE-dedicated reception on CORESET(s) and the associated PDSCH can share the same indicated Rel-17 TCI state as UE-dedicated reception on PDSCH and for UE-dedicated reception on all or subset of CORESETs in a CC. Since the TCI state sharing is not mandatory, we think there is a need for a new parameter to configure a list of RS(s) which share the same indicated Rel-17 TCI state as UE-dedicated reception on PDSCH and for UE-dedicated reception on all or subset of CORESETs in a CC. For example, a new parameter “TCI-StateSharingList” comprises a list of the resource and/or resource set ID of the RS(s) which share the same indicated Rel-17 TCI state as UE-dedicated reception on PDSCH and for UE-dedicated reception on all or subset of CORESETs in a CC.**Agreement**On Rel.17 unified TCI framework, the following DL RSs can share the same indicated Rel-17 TCI state as UE-dedicated reception on PDSCH and for UE-dedicated reception on all or subset of CORESETs in a CC* Aperiodic CSI-RS resources for CSI
	+ FFS: Discuss if further restriction or further case is necessary
* Aperiodic CSI-RS resources for BM
	+ FFS: Discuss if further restriction or further case is necessary
* FFS: Other CSI-RS time-domain behaviors and/or restriction(s)

 **Agreement**On Rel.17 unified TCI framework:* Aperiodic SRS resources or resource sets for BM can share the same indicated Rel-17 TCI state as dynamic-grant/configured-grant based PUSCH, all or subset of dedicated PUCCH resources in a CC
	+ FFS: Discuss if/which restriction is necessary, e.g. only for aperiodic, apply to all resources in a set
	+ Note: This doesn’t imply that all time-domain behaviors are automatically supported

**Agreement**On Rel.17 unified TCI framework, for intra-cell beam indication, the following DL RSs can share the same indicated Rel-17 TCI state as UE-dedicated reception on PDSCH and for UE-dedicated reception on all or subset of CORESETs in a CC: * DMRS(s) associated with non-UE-dedicated reception on CORESET(s) and the associated PDSCH
* FFS (to be concluded in RAN1#106bis-e): Non-UE-dedicated PUCCH and non-UE-dedicated PUSCH
 |
| LG | Regarding ‘TCI-State\_r17’, as other companies commented, the spatial relation RS does not belong to QCL type so we suggest to revise ‘qcl\_Type’ to ‘sourceRS\_Type’ to cover both QCL source RS and spatial relation RS. For joint TCI, this source RS acts as both QCL Type D RS and UL spatial relation RS so it would be clearer to say ‘and/or’ instead of ‘or’. To over DL TCI, UL TCI, and joint TCI, sourceRStype for type1 can be differentiated to QCL-typeD (for DL TCI), UL-spatialrelation (for UL TCI), and QCL-typeDandUL-spatialrelation (for joint TCI). Moreover, for ‘qcl-Type2’, all the QCL types (e.g. A/B/C) can be supported as in Rel-16 since it would be applicable not only in FR2 but also in FR1. In addition, SSB-Index seems missing as source RS for DL/joint TCI.IE: TCI-State\_r17**tci-StateType****sourceRS~~qcl~~-Type1** of type sourceRS~~QCL~~-Info\_r17 for QCL Type D for DL and/or UL Tx spatial filter for UL**sourceRS~~qcl~~ -Type2** of type sourceRS~~QCL~~-Info\_r17 for QCL Type A ~~[~~or QCL-TypeB~~]~~ or QCL-TypeC for DLIE: sourceRS~~QCL~~-Info\_r17 Release 17 sourceRS~~QCL~~ info for the unified TCI framework. Includes the following fields**cell****bwp-Id****referenceSignal** choice offor DL or Joint TCI state NZP-CSI-RS-ResourceId (CSI-RS for beam management or CSI-RS for tracking)SSB-Indexfor UL TCI NZP-CSI-RS-ResourceId (CSI-RS for beam management or CSI-RS for tracking) SSB-Index SRS ResourceId (SRS for beam management)**sourceRS~~qcl~~ -Type** ENUMERATED{QCL-typeA, QCL- ~~[~~typeB~~]~~, QCL-typeC, QCL-typeD, UL-spatialrelation, QCL-typeDandUL-spatialrelation}[**pathloss RS** - if included in TCI state - for UL TCI state or Joint TCI state choice ofSSB-IndexNZP-CSI-RS (periodic CSI-RS)]Regading ‘InterCellBeamMetrics’, the clarification is required for newly-added RRC parameter instead of using existing parameter ‘*nrofreportedRS*’ since K is up to 4 as in Rel-16. |
| vivo | Regarding ‘tci-StateType’, we agree with CATT view and delete this parameter.DL TCI state and UL TCI state can be activated and indicated based on network implementation from a R17 TCI pool. The TCI state with SRS used as spatial source RS is activated or indicated as UL TCI state. UL spatial filter is derived from the QCL-TypeD RS. Regarding ‘qcl-Type’, agree with ZTE. The QCL-TypeB, QCL-TypeC also need to be included.For R17 TCI state of SRS, the following agreement in RAN1 #102-e shows that the application of R17 TCI state for SRS is optional. For example, new parameter ‘ApplyTCI-State-r17forSRS’ is added.• Optionally, this UL TX spatial filter can also apply to all SRS resources in resource set(s) configured for antenna switching/codebook-based/non-codebook-based UL transmissionsRegarding ‘InterCellReportType’, it can be configured using the exsiting parameter in CSI framework.Regarding ‘InterCellMeasurementRS’ and ‘ InterCellAdditionalPCI’, we are generally fine with E///’s suggestion. But whether to directly adding PCI into ‘SSB-Index\_r17’ or to add a new IE to indicate the non-serving cell information the SSB resource associates with can be further discussed. This is also related to TCI state association with non-serving cell information. |
| Huawei, HiSilicon | 1. Our understanding is regardless of how RRC parameters are structured, the allowed QCL indciations are still bounded by RAN1 agreements, which will be explicitly captured in RAN1 specs (as in R15). It would be appreciated if the moderator can confirm if this is the correct understandinbg.
2. We share simiar view as LG that for joint TCI indication, it would be clearer to allow one source RS to act as both QCL Type D RS and UL spatial relation RS, which can be defined as QCL-typeE for simpler description.
3. Since details on association between PC parameters to TCI state is left to RAN2, we are not sure if “p0\_Alpha\_CLIdSetId” is needed here and prefer to keep it in bracket for now.
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## Inputs on version 01

Please share your inputs, if any, in the following table

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