**3GPP TSG RAN WG1 #117 DRAFT R1-2404351**

**Fukuoka, Japan, May 20th – 24th, 2024**

**Agenda item:**  8.1

**Source:** Moderator (MediaTek Inc.)

**Title:** Moderator summary for maintenance of Rel-18 MIMO on unified TCI extension (Round 0)

**Document for:**  Discussion and Decision

# Introduction and plan

In this summary, the followings are provided based on the contributions from companies [1]-[22],

* Summary of companies’ views on each of maintenance issues raised by interested companies, where the maintenance issues are categorized as follow:
	+ Issue 1 – Maintenance issue on unified TCI extension
	+ Issue 2 – Maintenance issue on UL power control for UL MTRP operation
* Observations/assessments on maintenance issue(s) based on the summary of companies’ views. An assessment as follows is provided to each maintenance issue in this summary, and it can be revised based on further companies’ input to this summary:
	+ Critical (C): this includes high-priority issue (essential, pending issues, broken spec components) or editorial change that either enhances the clarity of the specs or corrects mistakes in the specs
	+ 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
* Text proposal(s) would be provided for maintenance issue(s) with critical (C) and editorial (E)

# Text proposal to be discussed online

Based on the summary of companies’ views in Table 1 and Table 2, the following text proposals are provided for those maintenance issues identified as “C” or “E”. Please provide your comment, if any, to these text proposals to Table 0.

**Text Proposal 1.2**

Adopt the following text proposal to TS 38.214 V18.2.0 Section 6.2.1:

* Reason for change
	+ In TS38.214, it is specified that when two SRS resource sets with higher layer parameter usage in *SRS-ResourceSet* set to 'codebook' or 'nonCodebook' are configured, the UE does not expect that the first indicated *TCI-State* or *TCI-UL-State* is applied to the second SRS resource set and that the second indicated *TCI-State* or *TCI-UL-State* is applied to the first SRS resource set. However, it should be clarified that the number of SRS resource sets should be counted within *srs-ResourceSetToAddModList* or *srs-ResourceSetToAddModListDCI-0-2*, instead of both lists.
	+ The blank space between 'except' and 'that' is missing.
* Summary of change
	+ Correct the error on the condition for the restriction on the configuration of TCI states for SRS.
	+ Change 'exceptthat' to 'except that'.
* Consequences if not approved
	+ The condition for the restriction on the configuration of TCI states for SRS is not correct.
	+ There is an editorial error in the spec.

|  |
| --- |
| 6.2.1 UE sounding procedure-------------------------------------------Unchanged parts are omitted-------------------------------------------- When two SRS resource sets are configured in *srs-ResourceSetToAddModList* or *srs-ResourceSetToAddModListDCI-0-2* with higher layer parameter *usage* in *SRS-ResourceSet* set to 'codebook' or 'nonCodebook' ~~are configured~~, the UE does not expect\_that the first indicated *TCI-State* or *TCI-UL-State* is applied to the second SRS resource set and that the second indicated *TCI-State* or *TCI-UL-State* is applied to the first SRS resource set.-------------------------------------------Unchanged parts are omitted------------------------------------------- |

**Text Proposal 1.5**

Adopt the following text proposal to TS 38.214 V18.2.0:

* Reason for change: In current TS 38.214, there are some places with italic “*TCI-state*” or italic “*TCI-UL-State*” to represent joint/DL TCI state or UL TCI state, while there are some places only mentioning “joint TCI state”, not italic “TCI-state”, or not italic “TCI-UL-States”, leading to non-uniform expression in the specification.
* Summary of change: Update with unified form of italic “*TCI-state*” and “*TCI-UL-State*” to represent joint/DL TCI state and UL TCI state, respectively.
* Consequences if not approved: Non-uniform expression to represent joint/DL TCI state and UL TCI state in the specification.

|  |
| --- |
| 5.1.5 Antenna ports quasi co-location-------------------------------------------Unchanged parts are omitted-------------------------------------------When a UE is configured by higher layer parameter *cjtSchemePDSCH* and *dl-OrJointTCI-StateList* and is indicated with two ~~TCI-States~~ *TCI-States* applied for PDSCH reception and reports [support for two joint TCI states for PDSCH-CJT]:- if the UE is configured with *cjtSchemeA*, the UE assumes that PDSCH DM-RS port(s) are QCLed with the DL RSs of both indicated ~~TCI-States~~ *TCI-States* with respect to QCL-TypeA. - if the UE is configured with *cjtSchemeB*, the UE assumes that PDSCH DM-RS port(s) are QCLed with the DL RSs of both indicated ~~TCI-States~~ *TCI-States* with respect to QCL-TypeA except for QCL parameters {Doppler shift, Doppler spread} of the second indicated ~~joint TCI state~~ *TCI-State*.-------------------------------------------Unchanged parts are omitted-------------------------------------------When a UE is configured with *dl-OrJointTCI-StateList* and is having two indicated ~~TCI-States~~ *TCI-States*, if the UE does not report its capability of *[two default beams for S-DCI based MTRP]* in frequency range 2 and when the offset between the reception of the scheduling/activation DCI format 1\_0/1\_1/1\_2 and the scheduled or activated PDSCH reception is less than *[timeDurationForQCL]* in frequency range 2, the UE shall apply the first indicated ~~TCI-State~~ *TCI-State* to the scheduled or activated PDSCH reception.-------------------------------------------Unchanged parts are omitted-------------------------------------------When a UE is configured with *dl-OrJointTCI-StateList* and is having two indicated ~~TCI-States~~ *TCI-States*:- Regardless of the offset between the reception of the scheduling DCI format 1\_0/1\_1/1\_2 and the scheduled/activated PDSCH reception, if the UE is in frequency range 1, or the UE reports its capability of *[two default beams for S-DCI based MTRP]* in frequency range 2, or- If the UE does not report its capability of *[two default beams for S-DCI based MTRP]*in frequency range 2 and if the scheduling offset between the reception of the scheduling DCI format 1\_0/1\_1/1\_2 and the scheduled/activated PDSCH reception is equal to or larger than [*timeDurationForQCL]*- The UE can be configured by higher layer parameter *applyIndicatedTCIState* to indicate whether the first, the second, or both of the indicated ~~TCI-State(s)~~ *TCI-State(s)* is/are applied to PDSCH reception scheduled or activated by DCI format 1\_0. The UE can be configured with *applyIndicatedTCIState* with value *both* only when the UE is configured with *cjtSchemePDSCH* and the UE reports [*support for two joint TCI states for PDSCH-CJT*] or the UE is configured with *sfnSchemePdsch*. In that case, the UE shall apply both indicated~~TCI-States~~ *TCI-States* to PDSCH reception scheduled or activated by DCI format 1\_0 on a search space other than Type0/0A/2 CSS on CORESET#0. - If the UE is not configured with *applyIndicatedTCIState*, the first indicated ~~TCI-State~~ *TCI-State* is applied to PDSCH reception scheduled or activated by DCI format 1\_0.- When the UE is configured with *tciSelection-PresentInDCI* jointly for both DCI formats 1\_1 and 1\_2 in the same DL BWP,and when the UE receives a DCI format 1\_1/1\_2 that schedules or activates PDSCH reception, the UE shall determine the indicated joint/DL TCI state(s) for the PDSCH reception according to the following:- If the DCI format 1\_1/1\_2 indicates codepoint "00" for the [TCI selection field], the UE shall apply the first one of two indicated joint/DL TCI states to all PDSCH DM-RS port(s) of corresponding PDSCH transmission occasion(s) scheduled or activated by the DCI format 1\_1/1\_2.- If the DCI format 1\_1/1\_2 indicates codepoint "01" for the [TCI selection field], the UE shall apply the second one of two indicated joint/DL TCI states to all PDSCH DM-RS port(s) of corresponding PDSCH transmission occasion(s) scheduled or activated by the DCI format 1\_1/1\_2.- If the DCI format 1\_1/1\_2 indicates codepoint "10" for the [TCI selection field], the UE shall apply both indicated joint/DL TCI states to the PDSCH reception scheduled or activated by the DCI format 1\_1/1\_2.- If the UE is not configured with *tciSelection-PresentInDCI* and when the UE receives a DCI format 1\_1/1\_2 that schedules/activates PDSCH reception, the UE shall apply both indicated ~~TCI-States~~ *TCI-States* to the scheduled or activated PDSCH reception-------------------------------------------Unchanged parts are omitted-------------------------------------------5.2.1.5.1 Aperiodic CSI Reporting/Aperiodic CSI-RS when the triggering PDCCH and the CSI-RS have the same numerology-------------------------------------------Unchanged parts are omitted-------------------------------------------When a UE is configured with *dl-OrJointTCI-StateList* and is having two indicated TCI states, a higher layer configuration can be provided to an aperiodic CSI-RS resource set or a CSI-RS resource in an aperiodic CSI-RS resource set to inform that the UE shall apply the first or the second indicated TCI-State to the aperiodic CSI-RS resource set or to the CSI-RS resource in the aperiodic CSI-RS resource set, if the aperiodic CSI-RS resource set for CSI or BM is configured with *followUnifiedTCI-State* and if the offset between the last symbol of the PDCCH carrying the triggering DCI and the first symbol of the aperiodic CSI-RS resources in the aperiodic CSI-RS resource set is equal to or larger than a threshold.- If the UE is configured by higher layer parameter PDCCH-Config that contains two different values of ~~CORESETPoolIndex~~ *coresetPoolIndex* in different ~~ControlResourceSets~~ *ControlResourceSets*, the first and the second indicated ~~TCI-States~~ *TCI-States* correspond to the indicated ~~TCI-States~~ *TCI-States* specific to coresetPoolIndex value 0 and value 1, respectively.-------------------------------------------Unchanged parts are omitted-------------------------------------------6.1 UE procedure for transmitting the physical uplink shared channel-------------------------------------------Unchanged parts are omitted-------------------------------------------When a UE is configured with *dl-OrJointTCI-StateList* or *TCI-UL-State* and is having two indicated ~~TCI-States~~ *TCI-States* or ~~TCI-UL-States~~ *TCI-UL-States*, - a UE having a PUSCH transmission scheduled or activated by DCI format 0\_0 should apply the first indicated ~~TCI state~~ *TCI-State* or *TCI-UL-State* to the PUSCH transmission, - a UE configured with a PUSCH transmission corresponding to a Type 1 configured grant is expected to be configured with the higher layer parameter *applyIndicatedTCIState* indicating the *first*, the *second* or *both* of the indicated ~~TCI states~~ *TCI-States* or *TCI-UL-States* to be applied for the PUSCH transmission. If 'both' ~~TCI states~~ *TCI-States* or *TCI-UL-States* are indicated, the UE should apply the first indicated ~~TCI state~~ *TCI-State* or *TCI-UL-State* to the PUSCH transmission occasion(s) or the PUSCH antenna port(s) associated with the first SRS resource set for CB/NCB transmission, and the second indicated ~~TCI state~~ *TCI-State* or *TCI-UL-State* to the PUSCH transmission occasion(s) or the PUSCH antenna port(s) associated with the second SRS resource set for CB/NCB transmission; otherwise the UE should apply either the 'first' or 'second' indicated ~~TCI state~~ *TCI-State* or *TCI-UL-State* to all PUSCH transmission occasions.- If the UE is configured by higher layer parameter *PDCCH-Config* that contains two different values of *coresetPoolIndex* in different *ControlResourceSets*, the first and the second indicated ~~TCI states~~ *TCI-States* or *TCI-UL-States* correspond to the indicated ~~TCI-States~~ *TCI-States* or ~~TCI-UL-States~~ *TCI-UL-States* specific to ~~coresetPoolIndex~~ *coresetPoolIndex* value 0 and value 1, respectively, and *applyIndicatedTCIState* does not indicate *both* of the indicated TCI ~~TCI states~~ *TCI-States* or *TCI-UL-States* to be applied for the PUSCH transmission-------------------------------------------Unchanged parts are omitted-------------------------------------------6.1.2.1 Resource allocation in time domain-------------------------------------------Unchanged parts are omitted-------------------------------------------When a UE is configured with *dl-OrJointTCI-StateList* or *TCI-UL-State* and is having two indicated ~~TCI-States~~ *TCI-States* or ~~TCI-UL-States~~ *TCI-UL-States*, and two SRS resource sets are configured in *srs-ResourceSetToAddModList* or *srs-ResourceSetToAddModListDCI-0-2* with higher layer parameter *usage* in *SRS-ResourceSet* set to 'codebook' or 'noncodebook', for PUSCH repetition Type A or Type B as described above, or for PUSCH transmission when the higher layer parameter *multipanelScheme* is set to 'SDMscheme' or 'SFNscheme', the association of the first and second indicated joint/UL TCI states to PUSCH transmission occasions or to corresponding PUSCH antenna ports is determined as follows:- if a DCI format 0\_1 or DCI format 0\_2 indicates codepoint “00” or “01” for the *SRS resource set indicator*, the first or second indicated ~~joint/UL TCI state~~ *TCI-State* or *TCI-UL-State* is applied to all PUSCH transmission occasions, respectively. - if a DCI format 0\_1 or DCI format 0\_2 indicates codepoint “10” or “11” for the *SRS resource set indicator*, and the *multipanelScheme* is not configured,- the first indicated ~~joint/UL TCI state~~ *TCI-State* or *TCI-UL-State* is applied to the PUSCH transmission occasion(s) associated with the first SRS resource set and the second indicated ~~joint/UL TCI state~~ *TCI-State* or *TCI-UL-State* is applied to the PUSCH transmission occasion(s) associated with the second SRS resource set, where the association of PUSCH transmission occasions to SRS resource sets is determined for K = 2 and K > 2, and depending on whether *cyclicMapping* or *sequentialMapping* in *PUSCH-Config* is enabled, based on the above description in this Clause.- if a DCI format 0\_1 or DCI format 0\_2 indicates codepoint “10” for the *SRS resource set indicator* and the higher layer parameters *multipanelScheme* is configured and set to 'SDMscheme' or 'SFNscheme',- the first indicated~~TCI state~~ *TCI-State* or *TCI-UL-State* is applied to the PUSCH antenna port(s), of corresponding PUSCH transmission occasion, associated with the first SRS resource set, and the second indicated ~~TCI state~~ *TCI-State* or *TCI-UL-State* is applied to the PUSCH antenna port(s), of corresponding PUSCH transmission occasion, associated with the second SRS resource set, where the association of PUSCH antenna ports to SRS resource sets is determined according to Clauses 6.1.1.1 and 6.1.1.2.-------------------------------------------Unchanged parts are omitted-------------------------------------------6.2.1 UE sounding procedure-------------------------------------------Unchanged parts are omitted-------------------------------------------When the UE is configured *dl-OrJointTCI-StateList* or *TCI-UL-State* and is having two indicated ~~TCI-States~~ *TCI-States* or ~~TCI-UL-States~~ *TCI-UL-States*, and if the UE is configured with [[*followUnifiedTCI-StateSRS]]* to*,* a periodic, semi-persistent or aperiodic SRS resource set with higher layer parameter *usage* in *SRS-ResourceSet* set to '*codebook*', '*nonCodebook*' or '*antennaSwitching*' or to an aperiodic SRS resource set with higher layer parameter *usage* in *SRS-ResourceSet* set to '*beamManagement*' -------------------------------------------Unchanged parts are omitted------------------------------------------- |

**Text Proposal 1.6**

Adopt the following text proposal to TS 38.214 V18.2.0:

* Reason for change: The following higher layer parameters in TS38.214 are not align with those in TS38.331/TS38.306/TS38.212
	+ [applyIndicatedTCIState]
	+ [two default beams for S-DCI based MTRP]
	+ [support for two joint TCI states for PDSCH-CJT]
	+ applyIndicatedTCIState
	+ cjtSchemePDSCH
	+ [TCI selection field]
	+ [[followUnifiedTCI-StateSRS]]
* Summary of change: Update above parameters in the sections of TS38.214 to align with those in TS38.331/TS38.306/TS38.212
* Consequences if not approved: Higher-layer parameter misalignment between TS38.214 and TS38.331/TS38.306/TS38.212

|  |
| --- |
| 5.1 UE procedure for receiving the physical downlink shared channel-------------------------------------------Unchanged parts are omitted-------------------------------------------When a UE is configured with both *sfnSchemePDSCH* and *sfnSchemePDCCH*, the UE shall expect that *sfnSchemePDSCH* and *sfnSchemePDCCH* are set to the same scheme, either *'*sfnSchemeA*'* or *'*sfnSchemeB*'*.If a UE not configured with *dl-OrJointTCI-StateList* is configured with *sfnSchemePDCCH* set to 'sfnSchemeA' and activated with two TCI states by MAC CE, and the UE does not report its capability of *sfn-SchemeA-PDCCH-only*, the UE is expected to be configured with *sfnSchemePDSCH* set to *'sfnSchemeA'* and indicated with two TCI states in a codepoint of the DCI field *'Transmission Configuration Indication',* if the PDSCH is scheduled by DCI format 1\_1/1\_2.If a UE configured with *dl-OrJointTCI-StateList* and having two indicated TCI-States is configured with *sfnSchemePdcch* set to 'sfnSchemeA' for a DL BWP and signaled by the higher layer parameter ~~[applyIndicatedTCIState]~~ *applyIndicatedTCI-State* to apply both indicated TCI-States to a PDCCH on a CORESET, and the UE does not report its capability of *sfn-SchemeA-PDCCH-only*, the UE is expected to be configured with *sfnSchemePdsch* set to *'sfnSchemeA'* and both indicated TCI-States are applicable to PDSCH, if the PDSCH is scheduled by DCI format 1\_1/1\_2 on the PDCCH.If a UE not configured with *dl-OrJointTCI-StateList* is configured with *sfnSchemePDCCH* set to 'sfnSchemeB' and activated with two TCI states by MAC CE, the UE is expected to be configured with *sfnSchemePDSCH* set to *'sfnSchemeB'* and indicated with two TCI states in a codepoint of the DCI field *'Transmission Configuration Indication',* if the PDSCH is scheduled by DCI format 1\_1/1\_2.If a UE configured with *dl-OrJointTCI-StateList* and having two indicated TCI-States is configured with *sfnSchemePdcch* set to 'sfnSchemeB' for a DL BWP, and signaled by the higher layer parameter ~~[~~~~applyIndicatedTCIState]~~ *applyIndicatedTCI-State* to apply both indicated TCI-States to a PDCCH on a CORESET, the UE is expected to be configured with *sfnSchemePdsch* set to *'sfnSchemeB'* and both indicated TCI-States are applicable to PDSCH*,* if the PDSCH is scheduled by DCI format 1\_1/1\_2 on the PDCCH.-------------------------------------------Unchanged parts are omitted-------------------------------------------5.1.5 Antenna ports quasi co-location-------------------------------------------Unchanged parts are omitted-------------------------------------------When a UE is configured by higher layer parameter *cjtSchemePDSCH* and *dl-OrJointTCI-StateList* and is indicated with two TCI-States applied for PDSCH reception and reports ~~[~~~~support for two joint TCI states for PDSCH-CJT]~~ *twoTCI-StatePDSCH-CJT-TxScheme*:- if the UE is configured with *cjtSchemeA*, the UE assumes that PDSCH DM-RS port(s) are QCLed with the DL RSs of both indicated TCI-States with respect to QCL-TypeA. - if the UE is configured with *cjtSchemeB*, the UE assumes that PDSCH DM-RS port(s) are QCLed with the DL RSs of both indicated TCI-States with respect to QCL-TypeA except for QCL parameters {Doppler shift, Doppler spread} of the second indicated joint TCI state.-------------------------------------------Unchanged parts are omitted-------------------------------------------When a UE is configured with *dl-OrJointTCI-StateList* and is having two indicated TCI-States:- Regardless of the offset between the reception of the scheduling DCI format 1\_0/1\_1/1\_2 and the scheduled/activated PDSCH reception, if the UE is in frequency range 1, or the UE reports its capability of *~~[two default beams for S-DCI based MTRP]~~* *defaultQCL-TwoTCI-r16* in frequency range 2, or- If the UE does not report its capability of *~~[two default beams for S-DCI based MTRP]~~ defaultQCL-TwoTCI-r16* in frequency range 2 and if the scheduling offset between the reception of the scheduling DCI format 1\_0/1\_1/1\_2 and the scheduled/activated PDSCH reception is equal to or larger than ~~[~~*timeDurationForQCL~~]~~*- The UE can be configured by higher layer parameter *~~applyIndicatedTCIState~~* *applyIndicatedTCI-StateDCI-1-0* to indicate whether the first, the second, or both of the indicated TCI-State(s) is/are applied to PDSCH reception scheduled or activated by DCI format 1\_0. The UE can be configured with *~~applyIndicatedTCIState~~* *applyIndicatedTCI-StateDCI-1-0* with value *both* only when the UE is configured with *~~cjtSchemePDSCH~~* *cjt-Scheme-PDSCH* and the UE reports ~~[~~*~~support for two joint TCI states for PDSCH-CJT~~*~~]~~ *twoTCI-StatePDSCH-CJT-TxScheme* or the UE is configured with *sfnSchemePdsch*. In that case, the UE shall apply both indicated TCI-States to PDSCH reception scheduled or activated by DCI format 1\_0 on a search space other than Type0/0A/2 CSS on CORESET#0. - If the UE is not configured with *~~applyIndicatedTCIState~~* *applyIndicatedTCI-StateDCI-1-0*, the first indicated TCI-States is applied to PDSCH reception scheduled or activated by DCI format 1\_0.- When the UE is configured with *tciSelection-PresentInDCI* jointly for both DCI formats 1\_1 and 1\_2 in the same DL BWP,and when the UE receives a DCI format 1\_1/1\_2 that schedules or activates PDSCH reception, the UE shall determine the indicated joint/DL TCI state(s) for the PDSCH reception according to the following:- If the DCI format 1\_1/1\_2 indicates codepoint "00" for the ~~[~~TCI selection field~~]~~, the UE shall apply the first one of two indicated joint/DL TCI states to all PDSCH DM-RS port(s) of corresponding PDSCH transmission occasion(s) scheduled or activated by the DCI format 1\_1/1\_2.- If the DCI format 1\_1/1\_2 indicates codepoint "01" for the ~~[~~TCI selection field~~]~~, the UE shall apply the second one of two indicated joint/DL TCI states to all PDSCH DM-RS port(s) of corresponding PDSCH transmission occasion(s) scheduled or activated by the DCI format 1\_1/1\_2.- If the DCI format 1\_1/1\_2 indicates codepoint "10" for the ~~[~~TCI selection field~~]~~, the UE shall apply both indicated joint/DL TCI states to the PDSCH reception scheduled or activated by the DCI format 1\_1/1\_2.- If the UE is not configured with *tciSelection-PresentInDCI* and when the UE receives a DCI format 1\_1/1\_2 that schedules/activates PDSCH reception, the UE shall apply both indicated TCI-Statesto the scheduled or activated PDSCH reception-------------------------------------------Unchanged parts are omitted-------------------------------------------6.1 UE procedure for transmitting the physical uplink shared channel-------------------------------------------Unchanged parts are omitted-------------------------------------------When a UE is configured with *dl-OrJointTCI-StateList* or *TCI-UL-State* and is having two indicated TCI-States or TCI-UL-States, - a UE having a PUSCH transmission scheduled or activated by DCI format 0\_0 should apply the first indicated TCI state to the PUSCH transmission, - a UE configured with a PUSCH transmission corresponding to a Type 1 configured grant is expected to be configured with the higher layer parameter *~~applyIndicatedTCIState~~* *applyIndicatedTCI-State* indicating the *first*, the *second* or *both* of the indicated TCI states to be applied for the PUSCH transmission. If 'both' TCI states are indicated, the UE should apply the first indicated TCI state to the PUSCH transmission occasion(s) or the PUSCH antenna port(s) associated with the first SRS resource set for CB/NCB transmission, and the second indicated TCI state to the PUSCH transmission occasion(s) or the PUSCH antenna port(s) associated with the second SRS resource set for CB/NCB transmission; otherwise the UE should apply either the 'first' or 'second' indicated TCI state to all PUSCH transmission occasions.- If the UE is configured by higher layer parameter *PDCCH-Config* that contains two different values of *coresetPoolIndex* in different *ControlResourceSets*, the first and the second indicated TCI states correspond to the indicated TCI-States or TCI-UL-States specific to coresetPoolIndex value 0 and value 1, respectively, and *~~applyIndicatedTCIState~~* *applyIndicatedTCI-State* does not indicate *both* of the indicated TCI states to be applied for the PUSCH transmission-------------------------------------------Unchanged parts are omitted-------------------------------------------When a UE is configured with *dl-OrJointTCI-StateList* or *TCI-UL-State* is having two indicated TCI states, and only one SRS resource set is configured in *srs-ResourceSetToAddModList* or *srs-ResourceSetToAddModListDCI-0-2* with higher layer parameter *usage* in *SRS-ResourceSet* set to 'codebook' or 'noncodebook', the PUSCH transmission occasion(s) scheduled or activated by DCI format 0\_1 or 0\_2 is associated with the first indicated *TCI-States* or *TCI-UL-States* if applies or is associated with the second indicated *TCI-States* or *TCI-UL-States* if applies, as indicated by the higher layer parameter*~~applyIndicatedTCIState-r18~~ applyIndicatedTCI-State* configured by *PUSCH-Config.*-------------------------------------------Unchanged parts are omitted-------------------------------------------6.2.1 UE sounding procedure-------------------------------------------Unchanged parts are omitted-------------------------------------------When the UE is configured *dl-OrJointTCI-StateList* or *TCI-UL-State* and is having two indicated TCI-States or TCI-UL-States, and if the UE is configured with ~~[[~~*followUnifiedTCI-StateSRS~~]]~~* to*,* a periodic, semi-persistent or aperiodic SRS resource set with higher layer parameter *usage* in *SRS-ResourceSet* set to '*codebook*', '*nonCodebook*' or '*antennaSwitching*' or to an aperiodic SRS resource set with higher layer parameter *usage* in *SRS-ResourceSet* set to '*beamManagement*' - The UE may be configured by higher layer parameter *~~applyIndicatedTCIState~~* *applyIndicatedTCI-State* to the SRS resource set to indicate whether the UE shall apply the first or the second indicated *TCI-State* or *TCI-UL-State* to the SRS resource set. - When a UE is configured by higher layer parameter *PDCCH-Config* that contains two different values of *coresetPoolIndex* in *ControlResourceSet*, the first and second indicated *TCI-States* or *TCI-UL-States* correspond to the indicated *TCI-States* or *TCI-UL-States* specific to *coresetPoolIndex* value 0 and value 1, respectively. - When a UE is configured by higher layer parameter *PDCCH-Config* that contains two different values of *coresetPoolIndex* in *ControlResourceSet*, and the aperiodic SRS resource set which is not configured with higher layer parameter *~~applyIndicatedTCIState~~ applyIndicatedTCI-State* and the aperiodic SRS resource set is triggered by PDCCH on a CORESET associated with a *coresetPoolIndex* value, the UE shall apply the indicated *TCI-State* or *TCI-UL-State* specific to the *coresetPoolIndex* value to the aperiodic SRS resource set. - When two SRS resource sets with higher layer parameter *usage* in *SRS-ResourceSet* set to 'codebook' or 'nonCodebook' are configured, the UE does not expect that the first indicated *TCI-State* or *TCI-UL-State* is applied to the second SRS resource set and that the second indicated *TCI-State* or *TCI-UL-State* is applied to the first SRS resource set.-------------------------------------------Unchanged parts are omitted------------------------------------------- |

**Text Proposal 2.1 for M-DCI based STxMP**

Adopt the following text proposal to TS 38.213 V18.2.0 Section 7.7.1:

* Reason for change:
* Summary of change:
* Consequences if not approved:

|  |
| --- |
| 7.7.1 Type 1 PH report-------------------------------------------Unchanged parts are omitted------------------------------------------For active UL BWP$b$ of carrier $f$ of serving cell $c, i$f a UE is not provided *twoPHRMode*, and is provided- two SRS resource sets in *srs-ResourceSetToAddModList* or *srs-ResourceSetToAddModListDCI-0-2* with usage set to 'codebook' or 'nonCodebook', - *dl-OrJointTCI-StateList* or *TCI-UL-State* and is indicated a first *TCI-State* or *TCI-UL-State* and a second *TCI-State* or *TCI-UL-State*, - is not provided *coresetPoolIndex* or is provided *coresetPoolIndex* with a value of 0 for first CORESETs on active DL BWPs of serving cells, - is provided *coresetPoolIndex* with a value of 1 for second CORESETs on active DL BWPs of the serving cells, and- *sTx-2Panel*the UE provides one Type 1 power headroom report for the actual PUSCH transmission associated with *coresetPoolIndex* value 0 when there are two actual PUSCH transmissions associated with different *coresetPoolIndex* valuesoverlap in time.-------------------------------------------Unchanged parts are omitted------------------------------------------ |

**Text Proposal 2.1 for S-DCI based STxMP**

Adopt the following text proposal to TS 38.213 V18.2.0 Section 7.7.1:

* Reason for change:
* Summary of change:
* Consequences if not approved:

|  |
| --- |
| 7.7.1 Type 1 PH report-------------------------------------------Unchanged parts are omitted------------------------------------------For active UL BWP$b$ of carrier $f$ of serving cell $c, i$f a UE is not provided *twoPHRMode*, and is provided- two SRS resource sets in *srs-ResourceSetToAddModList* or *srs-ResourceSetToAddModListDCI-0-2* with usage set to 'codebook' or 'nonCodebook',- *dl-OrJointTCI-StateList* or *TCI-UL-State* and is indicated a first TCI-State or TCI-UL-State and a second TCI-State or TCI-UL-State, and- *multipanelScheme*the UE provides one Type 1 power headroom report and one configured maximum output power associated with the first *TCI-State* or *TCI-UL-State* for an actual PUSCH transmission using a spatial domain filter corresponding to the first *TCI-State* or *TCI-UL-State* and using a spatial domain filter corresponding to the second *TCI-State* or *TCI-UL-State.*-------------------------------------------Unchanged parts are omitted------------------------------------------ |

**Text Proposal 1.1**

Adopt the following text proposal to TS 38.214 V18.2.0 Section 5.1.5:

* Reason for change:
* Summary of change:
* Consequences if not approved:

|  |
| --- |
| 5.1.5       Antenna ports quasi co-location-------------------------------------------Unchanged parts are omitted------------------------------------------When a UE configured with *dl-OrJointTCI-StateList* would transmit a PUCCH with positive HARQ-ACK or a PUSCH with positive HARQ-ACK corresponding to the DCI carrying the TCI State indication and without DL assignment, or corresponding to the PDSCH scheduled by the DCI carrying the TCI State indication, and if the indicated TCI State(s) is/are different from the previously indicated one(s), the indicatedTCI-State(s) and/or *TCI-UL-State*(s)should be applied starting from the first slot that is at least $beamAppTime$ symbols after the last symbol of the PUCCH or the PUSCH, and if the UE receives more than one indicated TCI state for a CC/BWP to be applied starting from the first slot that is at least $beamAppTime$ symbols after the last symbol of the PUCCH or the PUSCH, the indicated TCI state carried in the latest DCI for the corresponding *coresetPoolIndex* value when applicable in time corresponding to positive HARQ-ACK value is applied. The first slot and the $beamAppTime$ symbols are both determined on the active BWP with the smallest SCS among the BWP(s) from the CCs applying the indicated *TCI-State*(s) or *TCI-UL-State*(s) that are active at the end of the PUCCH or the PUSCH carrying the positive HARQ-ACK.-------------------------------------------Unchanged parts are omitted------------------------------------------ |

Table 0 Company inputs for text proposals

|  |  |
| --- | --- |
| **Company** | **Input** |
| ZTE | We are open to discuss with issues related to TP1.1, but the exact TP is not good. It may strongly imply that this sentence is only relevant to M-DCI. Then, we are okay for the others.BTW, for the other issues, some F2F/online discussion for clarifying the intention/issue behind that is definitely needed. Otherwise, some proposals may be postponed again and again.  |
| vivo | **TP 1.2**: Support**TP 1.5**: Support in principle. There are some highlighted places need to change also:5.2.1.5.1 Aperiodic CSI Reporting/Aperiodic CSI-RS when the triggering PDCCH and the CSI-RS have the same numerology-------------------------------------------Unchanged parts are omitted-------------------------------------------When a UE is configured with *dl-OrJointTCI-StateList* and is having two indicated ~~TCI states~~ *TCI states*, a higher layer configuration can be provided to an aperiodic CSI-RS resource set or a CSI-RS resource in an aperiodic CSI-RS resource set to inform that the UE shall apply the first or the second indicated ~~TCI state~~ *TCI state* to the aperiodic CSI-RS resource set or to the CSI-RS resource in the aperiodic CSI-RS resource set, if the aperiodic CSI-RS resource set for CSI or BM is configured with *followUnifiedTCI-State* and if the offset between the last symbol of the PDCCH carrying the triggering DCI and the first symbol of the aperiodic CSI-RS resources in the aperiodic CSI-RS resource set is equal to or larger than a threshold.- If the UE is configured by higher layer parameter PDCCH-Config that contains two different values of ~~CORESETPoolIndex~~ *coresetPoolIndex* in different ~~ControlResourceSets~~ *ControlResourceSets*, the first and the second indicated ~~TCI-States~~ *TCI-States* correspond to the indicated ~~TCI-States~~ *TCI-States* specific to coresetPoolIndex value 0 and value 1, respectively.-------------------------------------------Unchanged parts are omitted-------------------------------------------**TP2.1 for M-DCI based STxMP**: Current version doesn’t cover the case for reference PUSCH if twoPHRmode is not provided. Besides, we think the cases if twoPHRmode is provided for M-DCI STx2P can be supported. We provide our version as follows:If a UE, for active UL BWP$b$ of carrier $f$ of serving cell $c$,- is not provided *coresetPoolIndex* or is provided *coresetPoolIndex* with a value of 0 for first CORESETs, and is provided *coresetPoolIndex* with a value of 1 for second CORESETs, on active DL BWPs of serving cells, nd- is provided two SRS resource sets in *srs-ResourceSetToAddModList* or *srs-ResourceSetToAddModListDCI-0-2* with usage set to 'codebook' or 'nonCodebook',- is provided *dl-OrJointTCI-StateList* or *TCI-UL-State* and is indicated a first *TCI-State* or *TCI-UL-State* and a second *TCI-State* or *TCI-UL-State*, where the first and second indicated *TCI-States* or *TCI-UL-States* correspond to the indicated *TCI-States* or *TCI-UL-States* specific to *coresetPoolIndex* value 0 and value 1, respectively- is provided *enableSTx2PofmDCI*If UE is provided *twoPHRMode*, * if the UE provides a first Type 1 power headroom report and a first configured maximum output power for an actual PUSCH of a PUSCH transmission starting earliest in slot $n$ that is associated with one *TCI-State* or *TCI-UL-State,*

- if the UE transmits PUSCH associated with the other *TCI-State* or *TCI-UL-State* in slot $n$, the UE provides a second Type 1 power headroom report and a second configured maximum output power for an actual PUSCH associated with the other *TCI-State* or *TCI-UL-State* that overlaps with slot $n$- else, the UE provides a second Type 1 power headroom report and a second configured maximum output power for a reference PUSCH transmission associated with the other *TCI-State* or *TCI-UL-State*, where the second Type 1 power headroom report using the *p0AlphaSetforPUSCH* and *pathlossReferenceRS-Id-r17* values associated with the *TCI-State* or *TCI-UL-State.*- else, if the UE provides a Type 1 power headroom report and a first configured maximum output power for a reference PUSCH transmission associated with the first *TCI-State* or *TCI-UL-State*, the UE provides a Type 1 power headroom report and a configured maximum output power for a reference PUSCH transmission associated with the second *TCI-State* or *TCI-UL-State*, where- the UE provides the first or the second Type 1 power headroom reports using the *p0AlphaSetforPUSCH* and *pathlossReferenceRS-Id-r17* values associated with the first *TCI-State* or *TCI-UL-State* or with the second *TCI-State* or *TCI-UL-State*, respectively, if the reference PUSCH transmission is associated with the first *TCI-State* or *TCI-UL-State* or with the second *TCI-State* or *TCI-UL-State*, respectively else, UE provides one Type 1 power headroom report in a slot $n$. If the Type 1 power headroom report is for an actual PUSCH transmission and UE would transmit two PUSCHs overlapping in time domain in slot $n$, the Type 1 power headroom report for the actual PUSCH transmission is associated with the first *TCI-State* or *TCI-UL-State*. If the Type 1 power headroom report is for a reference PUSCH transmission, the Type 1 power headroom report for the reference PUSCH transmission using the *p0AlphaSetforPUSCH* and *pathlossReferenceRS-Id-r17* values associated with the first *TCI-State* or *TCI-UL-State*.**TP2.1 for S-DCI based STxMP**:Fine.**TP1.1**: Regarding ZTE’s concern, the TP can be updated as follows:5.1.5       Antenna ports quasi co-location-------------------------------------------Unchanged parts are omitted------------------------------------------When a UE configured with *dl-OrJointTCI-StateList* would transmit a PUCCH with positive HARQ-ACK or a PUSCH with positive HARQ-ACK corresponding to the DCI carrying the TCI State indication and without DL assignment, or corresponding to the PDSCH scheduled by the DCI carrying the TCI State indication, and if the indicated TCI State(s) is/are different from the previously indicated one(s), the indicatedTCI-State(s) and/or *TCI-UL-State*(s)should be applied starting from the first slot that is at least $beamAppTime$ symbols after the last symbol of the PUCCH or the PUSCH, and if the UE receives more than one indicated TCI state for a CC/BWP to be applied starting from the first slot that is at least $beamAppTime$ symbols after the last symbol of the PUCCH or the PUSCH, the indicated TCI state carried in the latest DCI, or the last DCI for the corresponding *coresetPoolIndex* value when applicable, in time corresponding to positive HARQ-ACK value is applied. The first slot and the $beamAppTime$ symbols are both determined on the active BWP with the smallest SCS among the BWP(s) from the CCs applying the indicated *TCI-State*(s) or *TCI-UL-State*(s) that are active at the end of the PUCCH or the PUSCH carrying the positive HARQ-ACK.-------------------------------------------Unchanged parts are omitted------------------------------------------ |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

# Discussion on maintenance issues

Issue 1 – Maintenance issue on unified TCI extension

Table 1 Summary for Issue 1

|  |  |  |  |
| --- | --- | --- | --- |
| # | Issue | Assessment | Companies’ view (please provide your view on the assessment of each issue) |
| 1.1 | (M-DCI) BAT issue in M-DCI based MTRP operation. One contribution points out a potential issue of BAT for joint HARQ-ACK feedback in M-DCI based MTRP operation [11]* Based on current Rel-18 specification, if multiple HARQ-ACK bits are transmitted on a PUCCH/PUSCH, the indicated TCI state associated with the latest DCI with positive HARQ-ACK value is applied.
* However, in case of joint HARQ-ACK codebook for M-DCI based MTRP operation, one PUCCH/PUSCH may contain multiple HARQ-ACK bits associated with both TRPs. Based on the TS38.214 V18.1.0, the UE applies the indicated TCI state associated with the latest DCI with positive HARQ-ACK value regardless of coresetPoolIndex value. This makes cross-TRP TCI state indication which is not aligned with the previous RAN1 agreement for Rel-18 eUTCI.

FL note: The issue has been brought up for the third meeting. Text Proposal 1.1 is provided for this issue in Section 2. | C/N? | Critical (C): Docomo [15], NEC, Samsung, ZTE (conclusion is also fine), Apple, CATTNon-essential (N): OPPO, Ericsson, LG, LenovoDocomo: In RAN1#116b, 7 companies think this issue is critical and 3 companies understand the current spec. specifies cross TRP TCI state indication (R1-2402181). For opponents, could you explain how can we read the following text as “non-cross TRP beam indication” in case of joint HARQ-ACK feedback in mDCI mTRP?--5.1.5 Antenna ports quasi co-location[…]and if the UE receives more than one indicated TCI state for a CC/BWP to be applied starting from the first slot that is at least $ beamAppTime$ symbols after the last symbol of the PUCCH or the PUSCH, the indicated TCI state carried in the latest DCI in time corresponding to positive HARQ-ACK value is applied.OPPO: From our understanding, we can hardly to interpret the excerpts above as “cross TRP beam indication”. Firstly, we are all clear that this BAT is specified for the case of M-DCI MTRP. Secondly and literally, the highlighted text involves only “the indicated TCI state”, rather than both TCI states (for 2 TRPs). In our reading, we would interpret that the indicated TCI state carried in the latest DCI by default applies on a per TRP basis, therefore no cross TRP beam indication.  ZTE: Per my understanding, the current spec should be interpreted per CORESET (otherwise, it does not make sense). Alternatively, we may have a RAN1 conclusion. Ericsson: Not needed. The specification statesWhen a UE is configured with *dl-OrJointTCI-StateList* or *TCI-UL-State* and is configured by higher layer parameter *PDCCH-Config* that contains two different values of coresetPoolIndex in *ControlResourceSet*, an indicated TCI state is specific to a coresetPoolIndex value, when it is indicated by the DCI field 'Transmission Configuration Indication' in DCI format 1\_1/1\_2 associated with the coresetPoolIndex value.So an indicated TCI state is specific to a coresetPoolIndex. The highlighted paragraph should be understood in that context. In other words, for mDCI any indicated TCI state is specific to a coresetPoolIndex .Huawei/HiSilicon: We think it is a good idea to explicitly clarify that the above yellow part by DCM is per *coresetpoolindex* rather than relying on an implicit deduction of such restriction from other parts of the spec. LG: To my understanding, TCI state indication is operated based on per coresetPoolIndex value for M-DCI based MTRP. Then, the procedure for TCI state update also should be applied per coresetPoolIndex value implicitly.Lenovo: Agree with Ericsson.Apple: If all companies share the view that the design RAN1 agreed is to apply TCI-state on per CORESETpoolIndex basis, we recommend explicitly capturing this concensus into specification. Doing so will help prevent ambigurity during implementation and mitigate any potential IoDT issue. regardiing Ericsson’s comment, the crux lies in how to interpret the text ‘…an indicated TCI state is specific to a coresetPoolIndex value, …’. Interpretation #1 restricts it to the sentence containing the text alone. While, interpretation #2 is to apply it to all cases for mDCI mTRP. Ericsson’s interpretation is #2 and therefore think CR is unncessary. However, if someone interpret it as #1, it would lead problem and the CR tries to avoid this. In any case, if a CR can help avoid IoDT issue, we believe it is worthwhile to make the correction. Docomo2: Thank you for the discussion. We believe it is better to avoid potential misunderstanding. After offline discussion with Ericsson, we can provide another version of TP. The following version also makes clear.

|  |
| --- |
| 5.1.5 Antenna ports quasi co-location[…]When a UE configured with *dl-OrJointTCI-StateList* would transmit a PUCCH with positive HARQ-ACK or a PUSCH with positive HARQ-ACK corresponding to the DCI carrying the TCI State indication and without DL assignment, or corresponding to the PDSCH scheduled by the DCI carrying the TCI State indication, and if the indicated TCI State(s) is/are different from the previously indicated one(s), the indicatedTCI-State(s) and/or *TCI-UL-State*(s)should be applied starting from the first slot that is at least $beamAppTime$ symbols after the last symbol of the PUCCH or the PUSCH, and if the UE receives more than one indicated TCI state for a CC/BWP to be applied starting from the first slot that is at least $beamAppTime$ symbols after the last symbol of the PUCCH or the PUSCH, the indicated TCI state carried in the latest DCI for the corresponding *coresetPoolIndex* when applicable in time corresponding to positive HARQ-ACK value is applied. The first slot and the $beamAppTime$ symbols are both determined on the active BWP with the smallest SCS among the BWP(s) from the CCs applying the indicated *TCI-State*(s) or *TCI-UL-State*(s) that are active at the end of the PUCCH or the PUSCH carrying the positive HARQ-ACK. |

CATT：Support. We have similar view as Huawei.Nokia: we can be fine with the latest version provided by DCM. |
| 1.2 | In current TS 38.214, it is specified that when two SRS resource sets with higher layer parameter usage in SRS-ResourceSet set to 'codebook' or 'nonCodebook' are configured, the UE does not expect that the first indicated TCI-State or TCI-UL-State is applied to the second SRS resource set and that the second indicated TCI-State or TCI-UL-State is applied to the first SRS resource set. However, it should be clarified that the number of SRS resource sets should be counted within *srs-ResourceSetToAddModList* or s*rs-ResourceSetToAddModListDCI-0-2*, instead of both lists.6.2.1 UE sounding procedure-----------------------------------Unchanged parts are omitted------------------------------------ When two SRS resource sets are configured in *srs-ResourceSetToAddModList* or *srs-ResourceSetToAddModListDCI-0-2* with higher layer parameter *usage* in *SRS-ResourceSet* set to 'codebook' or 'nonCodebook' ~~are configured~~, the UE does not expect that the first indicated *TCI-State* or *TCI-UL-State* is applied to the second SRS resource set and that the second indicated *TCI-State* or *TCI-UL-State* is applied to the first SRS resource set.-----------------------------------Unchanged parts are omitted-----------------------------------FL note: The issue has been brought up for the first meeting. Text Proposal 1.2 is provided for this issue in Section 2. | C | Critical (C): CATT [11], Docomo, OPPO, Panasonic, Samsung, ZTE, Ericsson, Xiaomi, LG, Lenovo, Fujitsu, Apple, NokiaNon-essential (N): Huawei/HiSilicon: Just to clarify, what is the intention of this CR? Is it to ensure that, for instance, when one SRS resource set is configured in *srs-ResourceSetToAddModList* and another SRS resource set is configured in *srs-ResourceSetToAddModListDCI-0-2*, the two configured SRS resource sets are not considered as the first and the second SRS resource sets? If this is the intention, we are OK with the CR. If the intention is something else, we appreciate some further clarification. [Mod] Yes, your understanding is correct. |
| 1.3 | (S-DCI/M-DCI) Clarify that a PDCCH reception should be prioritized if a PDSCH reception scheduled before a threshold overlaps (in at least one symbol) with the PDCCH reception having QCL assumptions different from that of the firs/second indicated TCI state, for both S-DCI and M-DCI cases [2]FL note: The issue has been brought up for the third meeting. | N | Critical (C): ZTE [7][8], Samsung (open to discuss)Non-essential (N): Docomo, OPPO, Ericsson, Huawei/HiSilicon, Lenovo, Apple, CATTZTE: Regardless of reviewing the spec for other case, e.g., R17 uTCI or R15~17 mTRP operation, we have clear rule of handling this overlapping between PDCCH/CORESET and PDSCH < a threshold. If not, but overlapping occur. What’s the UE behavior? We do believe that the clear UE behavior is needed herein. Ericsson: Current specification already covers this. Huawei/HiSilicon: Our understanding is that a similar solution is specified in Rel-17 uTCI framework only for ICBM. For other cases, no solution was specified and handling such potential collision was left to gNB implementation. We think a similar approach should be used in Rel-18. If the proponent would like to tailor the CR only for ICBM, we are happy to look into it. For other cases, we think it could be handled by gNB similar to Rel-17. ZTE2: @Ericsson, if our understanding is correct, the current specification you mentioned is the legacy UE behavior of Rel-16 mTRP, right? If so, clearly, they are also precluded due to the main bullet restriction of precluding them from uTCI framework in the current spec

|  |
| --- |
| Independent of the configuration of *tci-PresentInDCI* and *tci-PresentDCI-1-2* in RRC connected mode, if the UE is not provided *dl-OrJointTCI-StateList-r17*, and if the offset between the reception of the DL DCI and the corresponding PDSCH is less than the threshold *timeDurationForQCL* and at least one configured TCI state for the serving cell of scheduled PDSCH contains *qcl-Type* set to 'typeD', … |

@Huawei, we are open to tailor the CR referring to the ICBM related paragraph as following. That is also the motivation of our CR [7][8], and how to interpret ‘that of the PDCCH DM-RS’ is questionable. To tailor this CR, how about the following way-forward suggestion:* Like ICBM, let’s only focus on the case of ‘the UE does not report its capability of [two default beams for S-DCI based MTRP],
	+ For S-DCI, due to the fact that we may have SFN-PDSCH case: 'QCL-TypeD' of the PDSCH DMRS is different from any one of those of PDCCH DMRS(s)’
	+ For M-DCI, it should be simpler: the 'QCL-TypeD' of the PDSCH DMRS is different from that of PDCCH DMRS

|  |
| --- |
| Independent of the configuration of *tci-PresentInDCI* and *tci-PresentDCI-1-2* in RRC connected mode, if the UE is provided *dl-OrJointTCI-StateList-r17*, and if the offset between the reception of the DL DCI and the corresponding PDSCH is less than the threshold *timeDurationForQCL* and at least one configured TCI state for the serving cell of scheduled PDSCH contains *qcl-Type* set to 'typeD', regardless of configuration of *followUnifiedTCI-State*,- if the indicated TCI state is associated with the PCI of the serving cell, the indicated TCI state is applied to PDSCH reception.- if the indicated TCI state is associated with a PCI different from the serving cell, the UE may assume that the DM-RS ports of PDSCH(s) of a serving cell are quasi co-located with the RS(s) with respect to the QCL parameter(s) used for PDCCH quasi co-location indication of the CORESET associated with a monitored search space with the lowest *controlResourceSetId* in the latest slot in which one or more CORESETs within the active BWP of the serving cell are monitored by the UE. In the CA case, if the 'QCL-TypeD' of the PDSCH DM-RSs from respective CCs in a band are different in a slot, the QCL-TypeD assumption of the PDSCH DM-RS in the CC with lowest CC ID in the band is applied to all the PDSCH DM-RSs in the CCs in the band. In this case, if the *qcl-Type* is set to 'typeD' of the PDSCH DM-RS is different from that of the PDCCH DM-RS with which they overlap in at least one symbol, the UE is expected to prioritize the reception of PDCCH associated with that CORESET. This also applies to the intra-band CA case (when PDSCH and the CORESET are in different component carriers). |

Apple: For sDCI based mTRP, the TCI-state of CORESET is known at NW side. Consequently, the overlapping between PDSCH (larger than threshold) and PDCCH CORESET with different ‘typeD’ can be avoided by NW scheduler. As for mDCI mTRP, achieving this is feasible through implementation in our opinion.  |
| 1.4 | Based on current specification, when an AP CSI-RS triggered before the threshold in the same symbols of other DL signal with an indicated TCI state, if the UE is in frequency range 1, or the UE reports its capability of [default beam per coresetPoolIndex for M-DCI based MTRP] in frequency range 2, and there are two other DL signals applying the first and the second indicated TCI states, respectively, in the same symbols as the aperiodic CSI-RS, the UE shall apply the first or the second indicated TCI state to the aperiodic CSI-RS according to the higher layer configuration(s) provided to the aperiodic CSI-RS resource or aperiodic CSI-RS resource set. But actually, UE can buffer the AP CSI-RS with two TCI states if any one of the three conditions satisfied. The combination of any two conditions is unnecessary. It means the UE shall apply the first or the second indicated TCI state to the aperiodic CSI-RS according to the higher layer configuration(s) provided to the aperiodic CSI-RS resource or aperiodic CSI-RS resource set when any one of the three conditions satisfied, i.e., 1) if the UE is in frequency range 1, 2) or if the UE reports its capability of [default beam per coresetPoolIndex for M-DCI based MTRP] in frequency range 2, 3) or if there are two other DL signals applying the first and the second indicated TCI states, respectively, in the same symbols as the aperiodic CSI-RS.FL note: The issue has been brought up for the second meeting. | C/N? | Critical (C): Xiaomi [12], CATT (ok to discuss)Non-essential (N): Docomo, OPPO, Ericsson, Lenovo, Apple Xiaomi: There are 3 conditions. Could opponents explain which condition can’t work standalone? We think UE can buffer with two beams if any one of 3 conditions satisfied. It means that:* Condition 1: if the UE is in frequency range 1, the UE shall apply the first or the second indicated TCI state to the aperiodic CSI-RS according to the higher layer configuration(s) provided to the aperiodic CSI-RS resource or aperiodic CSI-RS resource set.
* Condition 2: if the UE reports its capability of [default beam per coresetPoolIndex for M-DCI based MTRP] in frequency range 2, the UE shall apply the first or the second indicated TCI state to the aperiodic CSI-RS according to the higher layer configuration(s) provided to the aperiodic CSI-RS resource or aperiodic CSI-RS resource set.
* Condition 3: if the UE is in frequency range 2, and there are two other DL signals applying the first and the second indicated TCI states, respectively, in the same symbols as the aperiodic CSI-RS, the UE shall apply the first or the second indicated TCI state to the aperiodic CSI-RS according to the higher layer configuration(s) provided to the aperiodic CSI-RS resource or aperiodic CSI-RS resource set.

There is no doubt on Condition 1. But for Condition 2 and Condition 3, more clarification is needed. In our opinion, either Condition 2 or Condition 3 satisfied, UE can buffer data with two beams. The UE capability of Condition 3 is ‘full/partially-overlapped PDSCHs in time for Multi-DCI based multi-TRP’ (i.e., 16-2a/2a-0/2a-1) and ‘Simultaneous reception with different Type-D’ (16-2c), it is different from the capability (i.e., 16-2a-6, default beam per coresetPoolIndex for M-DCI based MTRP) in Condition 2. Capability in Condition 2 means UE can buffer with two beams if the offset between DCI and DL signals is less than timedurationQCL. The FG 16-2a and 16-2c are the prerequisites of the FG 16-2a-6. But there is no redundant between Condition 2 and Condition 3. That means if there are two overlapped DL signals but UE doesn’t support two default beams, UE can also buffer with two beams. If “and” between Condition 2 and Condition 3 is used, for the case of Condition 2 is satisfied but there is only one other DL signal or no other DL signal, the UE can only buffer data with one beam according to the current text, that is not correct.Apple: Following the discussion in the RAN1 116bis meeting, current spec appears lucid and effective. In case of ‘a single PDSCH with single TCI-state’, the UE behavior is defined in the subsequent section i.e., ‘otherwise…’. Given the maintainance stage, we recommend to maintain the UE behavior as already defined in spec.  |
| 1.5 | 1. For cjtSchemeB, the second indicated TCI state is not needed to be restricted as only “joint TCI state”. Updating the second indicated TCI state for cjtSchemeB to remove the unnecessary restriction of joint TCI state.

FL note: To my understanding, PDSCH-CJT must be supported in joint DL/UL TCI mode, as agreed in RAN1#110bis. However, to align the terminology in TS 38.214 and TS 38.331, we can still use “TCI-state” to represent a joint TCI state.1. In current TS 38.214, there are some places with wording “joint/DL TCI state” or with italic “*TCI-state*” to represent joint or downlink TCI state, while there are some places only mentioning not italic “TCI-state”, leading to non-uniform expression. Update with unified form of italic “*TCI-state*” to represent joint or downlink TCI state.

FL note: Text Proposal 1.5 is provided for above two issues in Section 2.1. It was agreed that for multi-TRP scenario, one TCI codepoint can update a subset of joint/DL TCI states, and/or a subset of UL TCI states, while the condition “When a UE is configured with dl-OrJointTCI-StateList and is having two indicated TCI-states” only mentions case of two joint/DL TCI states, two indicated TCI-UL-States should also be included to make it complete. Adding “and/or two indicated TCI-UL-States” to make condition complete.

|  |
| --- |
| When a UE is configured with *dl-OrJointTCI-StateList* and is having two indicated *TCI-states* and/or two indicated *TCI-UL-States*, if the UE receives a TCI codepoint mapped with a sub-set of first and second *TCI-State(s)* and/or a sub-set offirst and second *TCI-UL-State(s)*, the UE shall update the first/second *TCI-State(s)* and/or first/second *TCI-UL-State(s)* mapped to the TCI codepoint, when applicable, and keep the previously indicated first/second *TCI-State(s)* and/or first/second *TCI-UL-State(s)* that is/are not updated by the TCI codepoint. |

 | E for 1 &2N for 3 | Editorial (E): NEC [13], Docomo, OPPO, Samsung, ZTE, Huawei/HiSilicon, LG, Lenovo, Fujitsu, Apple, CATTNEC: There is one more update place for subset of updating TCI states, where UL TCI states (*TCI-UL-States*) should also be included in the condition:

|  |
| --- |
| When a UE is configured with *dl-OrJointTCI-StateList* and is having two indicated *TCI-states* and/or two indicated *TCI-UL-States*, if the UE receives a TCI codepoint mapped with a sub-set of first and second *TCI-State(s)* and/or a sub-set offirst and second *TCI-UL-State(s)*, the UE shall update the first/second *TCI-State(s)* and/or first/second *TCI-UL-State(s)* mapped to the TCI codepoint, when applicable, and keep the previously indicated first/second *TCI-State(s)* and/or first/second *TCI-UL-State(s)* that is/are not updated by the TCI codepoint. |

And regarding “joint TCI state” for CJT, thanks FL for the assessment, we are fine to keep all the mentioned TCI state for CJT to be “joint TCI state” or remove the word “joint”, at least we think the description should be aligned in the same paragraph, rather than “TCI-states” in some places and “joint TCI state” for the second indicated one, so the purple highlight should be aligned with same form as the green highlight.

|  |
| --- |
| When a UE is configured by higher layer parameter *cjtSchemePDSCH* and *dl-OrJointTCI-StateList* and is indicated with two *TCI-States* applied for PDSCH reception and reports [support for two joint TCI states for PDSCH-CJT]:- if the UE is configured with *cjtSchemeA*, the UE assumes that PDSCH DM-RS port(s) are QCLed with the DL RSs of both indicated *TCI-States* with respect to QCL-TypeA. - if the UE is configured with *cjtSchemeB*, the UE assumes that PDSCH DM-RS port(s) are QCLed with the DL RSs of both indicated *TCI-States* with respect to QCL-TypeA except for QCL parameters {Doppler shift, Doppler spread} of the second indicated *TCI-state*. |

Non-essential (N): OPPO: If we are going to add UL TCI state in this case, should we also mention that the UL TCI states are configured too as the change below?

|  |
| --- |
| When a UE is configured with *dl-OrJointTCI-StateList* and is having two indicated *TCI-states* and/or is configured with *ul-TCI-StateList* and is having two indicated *TCI-UL-States*, if the UE receives a TCI codepoint mapped with a sub-set of first and second *TCI-State(s)* and/or a sub-set offirst and second *TCI-UL-State(s)*, the UE shall update the first/second *TCI-State(s)* and/or first/second *TCI-UL-State(s)* mapped to the TCI codepoint, when applicable, and keep the previously indicated first/second *TCI-State(s)* and/or first/second *TCI-UL-State(s)* that is/are not updated by the TCI codepoint. |

ZTE: In my views, it should be possible that there is a single DL TCI state but two UL TCI states for UL mTRP operation in Rel18 eUTCI. Ericsson: Sometimes, it is better to use the looser term TCI state (without italics) when there is no risk for misunderstanding, and I think this is the case here. The proposed change: When a UE is configured with *dl-OrJointTCI-StateList* and is having two indicated *TCI-states* and/or two indicated *TCI-UL-States*seems unnecessary, since the UE must have two indicated DL TCI states if it has two UL TCI states. The conditions are thus equivalent.Huawei/HiSilicon: OK with the changes corresponding to issue 1 and 2. For issue 3, no need to change as Ericsson pointed out. Apple: Support all of three issues. Regarding Ericsson ‘s comment, it is unclear for us why ‘the UE must have two indicated DL TCI states if it has two UL TCI states’. Our view is that the combination of ‘1 DL TCI + 2 UL TCI-state’ is a valid state for uTCI mTRP. Nokia: Regarding the change to italic, the logic in the spec is that we have italic font when referring exactly to the IE name from higher layer specification, but this is not the case all the time as there is also more descriptive text. I also think the names used in the CR are not existing in the RRC spec, so if this is the case the CR is not correct! |
| 1.6 | The following higher layer parameters in TS38.214 are not align with those in TS38.331/TS38.306/TS38.212:* applyIndicatedTCIState
* tciSelection-PresentInDCI
* two default beams for S-DCI based MTRP
* support for two joint TCI states for PDSCH-CJT
* [[followUnifiedTCI-StateSRS]]
* cjtSchemePDSCH

Update above parameters in TS 38.214 to:* applyIndicatedTCI-State
* applyIndicatedTCI-StateDCI-1-0
* tci-SelectionPresentInDCI
* defaultQCL-TwoTCI-r16
* twoTCI-StatePDSCH-CJT-TxScheme
* ~~[[~~followUnifiedTCI-StateSRS~~]]~~
* cjt-Scheme-PDSCH

FL note: Text Proposal 1.6 is provided for this issue in Section 2. | E | Editorial (E): CATT [11], NEC, Docomo, OPPO, Panasonic, Samsung, ZTE, Ericsson, Huawei/HiSilicon, LG, Lenovo, Fujitsu, Apple, Nokia Non-essential (N):Ericsson: note that in RAN1 specs, we omit the extension “-r18” when there is no risk for misunderstanding. Huawei/HiSilicon: Agree with Ericsson. For this CR, it looks like all extensions should be removed.  |

Issue 2 – Maintenance issue on UL power control and beam failure recovery

Table 2 Summary for Issue 2

|  |  |  |  |
| --- | --- | --- | --- |
| # | Issue | Assessment | Companies’ view (please provide your view on the assessment of each issue) |
| 2.1 | Enhancements to single PHR mode (i.e., if a UE is not provided *twoPHRMode*). UE behaviors of single PHR mode in current specification for may not be clear for STx2P in some cases, and corresponding enhancements proposed by companies including:1. For single-DCI based STx2P, if an actual PUSCH transmission associated with both first and second indicated TCI states, the UE provides a PHR for the actual PUSCH transmission based on the first indicated TCI state
2. For multi-DCI based STx2P, if two PUSCH transmissions associated with two different *coresetPoolIndex* values overlapped to each other in time domain, the UE provides a PHR for the actual PUSCH transmission associated with *coresetPoolIndex* value 0

FL note: It would be good if the UE behaviors of single PHR mode for STx2P can be clarified. Text Proposal 2.1 is provided for this issue in Section 2. | C | Critical (C): Samsung [4], vivo [5], Nokia [14], Docomo [16], ZTE, Ericsson, Lenovo, Apple Non-essential (N):OPPO: Open to have a discussion on solutions Xiaomi: generally ok with the proposal, fine to discuss further.Huawei/HiSilicon: OK to discuss the actual CR. LG: Fine to discuss furtherApple: Open to discuss. CATT: Open to discuss. |
| 2.2 | For cell-specific BFR, specify how the UE would implicitly determine the BFD-RS set according to the RS index(es) in the two indicated TCI statesFL note: The issue has been brought up for the third meeting. To my understanding, the UE would implicitly determine the BFD-RS set from the TCI state used for CORESETs based on current spec, regardless of the TCI state provided by Rel-15 MAC-CE or Rel-17 unified TCI state.  | N | Critical (C): Samsung [2]Non-essential (N): Docomo, OPPO, Ericsson, Huawei/HiSilicon, LG, Lenovo, Docomo: We think the issue can be solved by gNB implementation (e.g. gNB configures 2 CORESETs and indicates 1st and 2nd indicated TCI to each CORSET).Samsung: for one indicated TCI state case, we would be fine with the FL’s assessment if the group has the same understanding, even though the text(s) highlighted here was originally provided for the TCI state indicated by Rel-15 MAC CE. But for Rel-18, we have two indicated TCI states, and we need to clarify that the UE should implicitly determine the BFD-RS set according to the two indicated TCI states for the cell-specific BFR. Regarding Docomo’s comment, we do not think that it can be solved by gNB implementation: when two TCI states are indicated, for cell-specific BFR, the UE needs to determine the BFD-RS set from both indicated TCI states – otherwise, it is unclear whether the UE can determine the BFD-RS set from one of the two indicated TCI states.Ericsson: Agree with FL. Even if the UE is indicated with two TCI states, it is only the TCI state(s) that are associated with PDCCH receptions that matter. Samsung2: If there are *two* indicated TCI states associated with respective CORESETs for PDCCH receptions (MDCI), the UE would implicitly determine the BFD RS set from the two indicated TCI states for the cell-specific BFR (both of them matter in this case because both of them are associated with PDCCH receptions). Based on FL’s/Ericsson’s comments, it seems that companies are on the same page, but only different in whether/how to capture the above. Our understanding to the current texts in 213 is that they do not capture the case with *two* indicated TCI states. Hence, we provide another version of the TP – same practice was used when clarifying the cell-specific beam resetting behaviors:

|  |
| --- |
| If the UE is not provided $\overbar{q}\_{0}$ by *failureDetectionResourcesToAddModList* for a BWP of the serving cell, the UE determines the set $\overbar{q}\_{0}$ to include periodic CSI-RS resource configuration indexes with same values as the RS indexes in the RS sets indicated by one or two *TCI-State*(s) for respective CORESETs that the UE uses for monitoring PDCCH.  |

  |
| 2.3 | For cell-specific BFR, capture that the two indicated TCI states are specific to the first and second *coresetPoolIndex* values, respectivelyFL note: The issue has been brought up for the third meeting. To my understanding, current spec already includes both S-DCI and M-DCI cases for cell-specific BFR. | N | Critical (C): Samsung [3], Huawei/HiSilicon, Apple Non-essential (N): Docomo, OPPO, ZTE, Ericsson, LG, LenovoDocomo: We think the issue can be solved by gNB implementation (e.g. gNB configures 2 CORESETs and indicates 1st and 2nd indicated TCI to each CORSET).Samsung: Our intention is only to clarify that the cell-specific BFR is applicable for MDCI as well (when two values of *coresetPoolIndex* are provided in *PDCCH-Config*). Same practices of clarifying that the two indicated TCI states (or the first and second indicated TCI states) are respectively associated to values 0 and 1 of *coresetPoolIndex* have been carried out throughout 213 (e.g., for indicating ‘first’/‘second’/‘both’ TCI state(s) for PUCCH transmission) and 214 (e.g., for indicating ‘first’/‘second’ TCI state for AP CSI-RS reception, ‘first’/‘second’ TCI state for PUSCH transmission and ‘first’/‘second’ for SRS transmission). The corresponding excerpts from 213 and 214 are provided below:In 38.213:

|  |
| --- |
| “If the UE- is not provided coresetPoolIndex or is provided coresetPoolIndex with a value of 0 for first CORESETs on an active DL BWP of a serving cell, and- is provided coresetPoolIndex with a value of 1 for second CORESETs on the active DL BWP of the serving cells,the first and second TCI-State or TCI-UL-State are specific to the first and second CORESETs, respectively.”  |

In 38.214:

|  |
| --- |
| “If the UE is configured by higher layer parameter PDCCH-Config that contains two different values of CORESETPoolIndex in different ControlResourceSets, the first and the second indicated TCI-States correspond to the indicated TCI-States specific to coresetPoolIndex value 0 and value 1, respectively.”  |

We believe that same clarifications are needed here.Ericsson: Agree with FL. The behaviour is the same for sDCI and mDCI: the RSs of all TCI states associated with any CORESET must fail, so there is no need to describe mDCI separately.Huawei/HiSilicon: We tend to agree with Samsung that such a clarification would be useful given that a similar clarification was made elsewhere in 213. Otherwise, the text may be interpreted to only be applicable for sDCI case.  |
| 2.4 | For TRP-specific BFR, support implicit BFD-RS determination in S-DCI based MTRP operation FL note: This issue has been discussed over several meetings without reaching a consensus, and it will not be treated if the situation is not changed in this meeting. | N | Critical (C): ZTE [9], Huawei/HiSilicon, LGNon-essential (N): Docomo, OPPO, Ericsson, LenovoDocomo: We think the issue can be solved by gNB implementation (e.g. gNB configures 2 CORESETs and indicates 1st and 2nd indicated TCI to each CORSET).Ericsson: This is a good idea, but we are in the maintenance phase.Apple: We are open to discuss this. However, our view is that this can not be solved by NW implementation because the current spec 213 restricts the implicit resource mapping for mDCI mTRP only and  |
| 2.5 | Question: Whether the Rel-17 enhancements on introducing a second TPC command field in DCI for both multi-TRP PUCCH and PUSCH operations could be used in Rel-18 unified TCI framework for MTRP operation? | C/N? | Yes: Docomo, NokiaNo:CATT: Open to discuss. |

# References

|  |  |  |  |
| --- | --- | --- | --- |
| # | Source | Title | Tdoc |
| 1 | Samsung | Discussions on cell-specific BFR under the Rel-18 unified TCI framework (eUTCI) | R1-2404092 |
| 2 | Samsung | Draft CR on BFD RS set determination for cell-specific BFR under the Rel-18 unified TCI framework | R1-2404093 |
| 3 | Samsung | Draft CR on BFD RS set determination for cell-specific BFR under the Rel-18 unified TCI framework | R1-2404094 |
| 4 | Samsung | Discussion on twoPHRmode for single-DCI based STx2P | R1-2404097 |
| 5 | vivo | Discussion on M-DCI based PUSCH+PUSCH STxMP | R1-2404158 |
| 6 | vivo | Draft CR on M-DCI based PUSCH+PUSCH STxMP | R1-2404159 |
| 7 | ZTE | Draft CR on beam collision between PDSCH with offset less than a threshold and PDCCH in S-DCI based MTRP | R1-2404252 |
| 8 | ZTE | Draft CR on beam collision between PDSCH with offset less than a threshold and PDCCH in M-DCI based MTRP | R1-2404253 |
| 9 | ZTE | Draft CR on implicit BFD-RS determination for S-DCI based MTRP | R1-2404254 |
| 10 | CATT | Correction on RRC parameters for NR Rel-18 MIMO in TS38.214 | R1-2404368 |
| 11 | CATT | Draft CR on configuration of TCI states for SRS | R1-2404370 |
| 12 | Xiaomi | Draft CR on default beam for AP CSI-RS in M-DCI based MTRP scenario with Rel-18 unified TCI state framework | R1-2404600 |
| 13 | NEC | Draft CR on indicated TCI state in TS38.214 | R1-2404673 |
| 14 | Nokia | Maintenance on NR MIMO Evolution for Downlink and Uplink | R1-2404917 |
| 15 | Docomo | Draft CR on beam application timing for mDCI mTRP for Rel-18 TCI framework | R1-2405021 |
| 16 | Docomo | Remaining issues on power control for M-TRP operation in NR MIMO Evolution for Downlink and Uplink | R1-2405022 |