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| 3GPP TSG RAN WG1 #110 R1-2208099  **Toulouse, France, August 22nd – 26th, 2022**   |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | *CR-Form-v12.0* | | | | | | | | | | **CHANGE REQUEST** | | | | | | | | | |  | | | | | | | | | |  | **38.214** | **CR** | **0315** | **rev** | **-** | **Current version:** | **17.2.0** |  | |  | | | | | | | | | | *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network | **X** | Core Network |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | | | | | | | | | | | | ***Title:*** | CR on unified TCI in TS38.214 | | | | | | | | | | |  |  | | | | | | | | | | | ***Source to WG:*** | Moderator(ZTE), ZTE | | | | | | | | | | | ***Source to TSG:*** | R1 | | | | | | | | | | |  |  | | | | | | | | | | | ***Work item code:*** | NR\_feMIMO-Core | | | | |  | | ***Date:*** | | 2022-8-22 | |  |  | | | |  | | |  | |  | | ***Category:*** | **F** |  | | | | | | ***Release:*** | | Rel-17 | |  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) Rel-12 (Release 12) Rel-13 (Release 13) Rel-14 (Release 14) Rel-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17)* | | |  |  | | | | | | | | | | | ***Reason for change:*** | | There are some editorial issues for unified TCI in TS 38.214h20   * Issue 1:   A codedpoint value of DCI field *'Transmission Configuration Indication'* corresponding to Unified TCI States Activation/Deactivation MAC CE, can not only indicate one TCI state for DL channels/signals and one TCI state for UL channels/signals for a pair of TCI state, but also indicate one TCI state for DL channels/signals **OR** one TCI state for UL channels/signals for a pair of TCI state. The latter case has not been reflected in current spec.   * Issue 2:   A UE should transmit a whole transmission of PUCCH with HARQ-ACK, instead of only “the last symbol of a PUCCH with HAQR-ACK” as in current spec.  PDSCH is scheduled by a DCI, instead of “scheduling by” which is a typo.   * Issue 3:   Unified TCI state can be applied to PUSCH/SRS/PUCCH, by using a same spatial domain filter as for transmission/reception of a DL/UL RS based on the unified TCI state.   * The logic of current description of application unified TCI state for PUSCH and SRS is not correct. The RS for a reference to determine UL TX spatial filter is based on the RS configured with qcl-Type set to 'typeD' in QCL-Info of the indicated DLorJoint-TCIState or UL-TCIState, but the RS for a reference to determine UL TX spatial filter should not be parallel with (by using “or”) the RS configured with qcl-Type set to 'typeD' in QCL-Info of the indicated DLorJoint-TCIState or UL-TCIState as in current spec. | | | | | | | | | | ***-*** | |  | | | | | | | | | | ***Summary of change:*** | | * For issue 1:  1. Using “and/or” to replace “and” between DL TCI state and UL TCI state. 2. Updating subsection number for Unified TCI States Activation/Deactivation MAC CE in TS38.321, accordingly.  * For issue 2:  1. Removing the restriction of “the last symbol of” for a PUCCH transmitted by the UE. 2. Replacing “scheduling” by “scheduled”.  * For issue 3:  1. Clarifying the RS for determining UL Tx spatial filter is determined by the indicated *DLorJoint-TCIState* or *UL-TCIState* for both PUSCH and SRS. | | | | | | | | | |  | |  | | | | | | | | | | ***Consequences if not approved:*** | | * For issue 1: There is misalignment between descriptions of activation command in TS38.214 and Unified TCI States Activation/Deactivation MAC CE in TS38.321. * For issue 2: UE’s behavior for PUCCH transmission carrying HARQ is not correct. * For issue 3: UE’s behavior for spatial domain filter determination may be ambiguous for PUSCH and SRS. | | | | | | | | | |  | |  | | | | | | | | | | ***Clauses affected:*** | | 5.1.5, 6.1, 6.2.1 | | | | | | | | | |  | |  | | | | | | | | | |  | | **Y** | **N** |  | | |  | | | | | ***Other specs*** | |  | **X** | Other core specifications | | | TS/TR ... CR ... | | | | | ***affected:*** | |  | **X** | Test specifications | | | TS/TR ... CR ... | | | | | ***(show related CRs)*** | |  | **X** | O&M Specifications | | | TS/TR ... CR ... | | | | |  | |  | | | | | | | | | | ***Other comments:*** | | Isolated impact analysis:  The CR aims to clarify the UE behavior on how to apply unified TCI state. It is expected UE and network have same understanding for implementation on this function. | | | | | | | | | |  | |  | | | | | | | | | | ***This CR's revision history:*** | | This is the first version for this CR. | | | | | | | | | |

### 5.1.5 Antenna ports quasi co-location

<Unchanged part omitted>

The UE receives an activation command, as described in clause 6.1.3.14 of [10, TS 38.321] or 6.1.3.47 of [10, TS 38.321], used to map up to 8 TCI states and/or pairs of TCI states, with one TCI state for DL channels/signals and/or one TCI state for UL channels/signals to the codepoints of the DCI field *'Transmission Configuration Indication'* for one or for a set of CCs/DL BWPs, and if applicable, for one or for a set of CCs/UL BWPs. When a set of TCI state IDs are activated for a set of CCs/DL BWPs and if applicable, for a set of CCs/UL BWPs, where the applicable list of CCs is determined by the indicated CC in the activation command, the same set of TCI state IDs are applied for all DL and/or UL BWPs in the indicated CCs. If the activation command maps *DLorJointTCIState* and/or *UL-TCIState* to only one TCI codepoint, the UE shall apply the indicated *DLorJointTCIState* and/or *UL-TCIState* to one or to a set of CCs /DL BWPs, and if applicable, to one or to a set of CCs /UL BWPs once the indicated mapping for the one single TCI codepoint is applied as described in [11, TS 38.133].

<Unchanged part omitted>

When the UE would transmit a PUCCH with HARQ-ACK information 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 is different from the previously indicated one, the indicated *DLorJointTCIState* or *UL-TCIstate* should be applied starting from the first slot that is at least symbols after the last symbol of the PUCCH.

<Unchanged part omitted>

## 6.1 UE procedure for transmitting the physical uplink shared channel

<Unchanged part omitted>

For the PUSCH transmission corresponding to a Type 1 configured grant or a Type 2 configured grant activated by DCI format 0\_0 or 0\_1, the parameters applied for the transmission are provided by *configuredGrantConfig* except for *dataScramblingIdentityPUSCH*, *txConfig*, *codebookSubset*, *maxRank*, *scaling* of *UCI-OnPUSCH,* which are provided by *pusch-Config*. For the PUSCH transmission corresponding to a Type 2 configured grant activated by DCI format 0\_2, the parameters applied for the transmission are provided by *configuredGrantConfig* except for *dataScramblingIdentityPUSCH*, *txConfig*, *codebookSubsetDCI-0-2*, *maxRankDCI-0-2*, *scaling* of *UCI-OnPUSCH*, *resourceAllocationType1GranularityDCI-0-2* provided by *pusch-Config*.If the UE is provided with *transformPrecoder* in *configuredGrantConfig*, the UE applies the higher layer parameter *tp-pi2BPSK*, if provided in *pusch-Config*, according to the procedure described in clause 6.1.4 for the PUSCH transmission corresponding to a configured grant. When the UE is configured *DLorJointTCIState* or *UL-TCIState*, the UE shall perform PUSCH transmission corresponding to a Type 1 configured grant or a Type 2 configured grant or a dynamic grant according to the spatial relation, if applicable, with a reference to the RS for determining UL Tx spatial filter. The RS is determined based on an RS configured with *qcl-Type* set to 'typeD' of the indicated *DLorJointTCIState* oran RS in the indicated *UL-TCIState*. The reference RS in the indicated *DLorJointTCIState* can be a CSI-RS resource in a *NZP-CSI-RS-ResourceSet* configured with higher layer parameter *repetition*, or a CSI-RS resource in an *NZP-CSI-RS-ResourceSet* configured with higher layer parameter *trs-Info.* The reference RS in the indicated *UL-TCIState* can be a CSI-RS resource in a *NZP-CSI-RS-ResourceSet* configured with higher layer parameter *repetition*, a CSI-RS resource in an *NZP-CSI-RS-ResourceSet* configured with higher layer parameter *trs-Info*, an SRS resource in an SRS resource set with the higher layer parameter *usage* set to 'beamManagement', or SS/PBCH block associated with the same or different PCI from the PCI of the serving cell.

<Unchanged part omitted>

### 6.2.1 UE sounding procedure

<Unchanged part omitted>

When the UE is configured *DLorJoint-TCIState* or *UL*-*TCIState,* the UE can assume that SRS resource(s) in any SRS resource set, except SRS resource set for positioning and an SRS resource set configured with *followUnifiedTCIstate-r17*, can be configured with *DLorJoint-TCIState* or *UL*-*TCIState* or updated as described in clause [6.1.3.X] of [10, TS 38.321]. The reference RS in the *DLorJoint-TCIState* can be a CSI-RS resource in a *NZP-CSI-RS-ResourceSet* configured with higher layer parameter *repetition*, or a CSI-RS resource in an *NZP-CSI-RS-ResourceSet* configured with higher layer parameter *trs-Info*. The reference RS in the *UL*-*TCIState*(s) can be a CSI-RS resource in a *NZP-CSI-RS-ResourceSet* configured with higher layer parameter *repetition*, a CSI-RS resource in an *NZP-CSI-RS-ResourceSet* configured with higher layer parameter *trs-Info*, an SRS resource with the higher layer parameter *usage* set to 'beamManagement', or SS/PBCH block associated with the same or different PCI from the PCI of the serving cell.

If an SRS resource set, except an SRS resource set for positioning, is configured with [*followUnifiedTCIstate-r17]*, the UE shall transmit the target SRS resource(s) within the SRS resource set according to the spatial relation, if applicable, with a reference to the RS used for determining UL TX spatial filter. The RS is determined based on an RS configured with *qcl-Type* set to 'typeD' in *QCL-Info* of the indicated *DLorJoint-TCIState* or an RS in the indicated *UL-TCIState*. The reference RS in the indicated *DLorJoint-TCIState* can be a CSI-RS resource in a *NZP-CSI-RS-ResourceSet* configured with higher layer parameter *repetition*, or a CSI-RS resource in an *NZP-CSI-RS-ResourceSet* configured with higher layer parameter *trs-Info.* The reference RS in the indicated *UL-TCIState* can be a CSI-RS resource in a *NZP-CSI-RS-ResourceSet* configured with higher layer parameter *repetition*, a CSI-RS resource in an *NZP-CSI-RS-ResourceSet* configured with higher layer parameter *trs-Info,* an SRS resource with the higher layer parameter *usage* set to 'beamManagement', or SS/PBCH block associated with the same or different PCI from the PCI of the serving cell.

<Unchanged part omitted>