**3GPP TSG-RAN WG1 Meeting #117R1-2405466**

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

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| *CR-Form-v12.2* | | | | | | | | |
| **DRAFT CHANGE REQUEST** | | | | | | | | |
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|  | **38.214** | **CR** | **DRAFT** | **rev** | **-** | **Current version:** | **17.9.0** |  |
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| *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)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network | **X** | Core Network |  |

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| ***Title:*** | Draft CR for 38.214 on unified TCI state | | | | | | | | | |
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| ***Source to WG:*** | Ericsson, Samsung, MediaTek Inc., Nokia | | | | | | | | | |
| ***Source to TSG:*** |  | | | | | | | | | |
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| ***Work item code:*** | NR\_FeMIMO | | | | |  | ***Date:*** | | | 2024-05-20 |
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| ***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-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)* | |
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| ***Reason for change:*** | | As part of the Rel-17 unified TCI framework, RAN1 specified functionality to operate without any MAC CE: in case there is only one TCI state that can be activated using MAC CE, that TCI state should be activate automatically. However, the corresponding text in 38.214 is somewhat ambiguous:  If a UE receives a higher layer configuration of *dl-OrJointTCI-StateList* with a single TCI-State, that can be used as an indicated TCI state, the UE obtains the QCL assumptions from the configured TCI state for DM-RS of PDSCH and DM-RS of PDCCH, and the CSI -RS applying the indicated TCI state.  There may be two ways to interpret this paragraph:  1. *dl-OrJointTCI-StateList* contains a single TCI-State that can be used as an indicated TCI state (*dl-OrJointTCI-StateList* may contain additional TCI states that cannot be used as an indicated TCI state)  2. *dl-OrJointTCI-StateList* contains a single TCI-State, and that TCI state can be indicated (*dl-OrJointTCI-StateList* contains only this single TCI state)  Both interpretations are possible. However, only 1. leads to a valid TCI state configuration, since the UE must always be provided with at least two TCI states:  1. one TCI state that contains a TRS, which is used as QCL source for DMRS  2. one TCI state that contains an SSB, which is used as QCL source for the TRS in TCI state 1.  This draft CR proposes to clarify this behaviour. It also clarifies that the default behaviour which applies when the UE is configured with more than one TCI state that can be indicated. | | | | | | | | |
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| ***Summary of change:*** | | Clarify that if the UE receives a higher layer configuration of *dl-OrJointTCI-StateList* where only one of the TCI states can be indicated, the UE automatically considers that TCI state indicated.  Clarify that “more than one TCI state” implies that the UE is provided with more than one TCI state that can be indicated. | | | | | | | | |
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| ***Consequences if not approved:*** | | Unclear behaviour. | | | | | | | | |
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| ***Clauses affected:*** | | 5.1.5 | | | | | | | | |
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|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **N** | Other core specifications | | | |  | | |
| ***affected:*** | |  | **N** | Test specifications | | | |  | | |
| ***(show related CRs)*** | |  | **N** | O&M Specifications | | | |  | | |
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| ***Other comments:*** | | Isolated impact analysis:  The only impact is when the NW configures the UE with a TCI state list, which includes one TCI state with a TRS and one TCI state with an SSB.  In this case:   * The NW cannot implement according to interpretation 2 – it is not a workable TCI state configuraiton * UE implemented according to interpretation 2, the UE would use a suboptimum QCL assumption. | | | | | | | | |
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| ***This CR's revision history:*** | | This is the first version | | | | | | | | |

5.1.5 Antenna ports quasi co-location

## <Unchanged text omitted>

After a UE receives an initial higher layer configuration of *dl-OrJointTCI-StateList* where more than one *TCI-State* can be used as an indicated TCI stateand before application of an indicated TCI state from the configured TCI states:

- The UE assumes that DM-RS of PDSCH and DM-RS of PDCCH and the CSI-RS applying the indicated TCI state are quasi co-located with the SS/PBCH block the UE identified during the initial access procedure

After a UE receives an initial higher layer configuration of *dl-OrJointTCI-StateList* where more than one *TCI-State* can be used as an indicated TCI stateor an initial higher layer configuration of *ul-TCI-StateList* where more than one *TCI-UL-State* can be used as an indicated TCI state and before application of an indicated TCI state from the configured TCI states:

- The UE assumes that the UL TX spatial filter, if applicable, for dynamic-grant and configured-grant based PUSCH and PUCCH, and for SRS applying the indicated TCI state, is the same as that for a PUSCH transmission scheduled by a RAR UL grant or a MsgA PUSCH transmission during the initial access procedure

After a UE receives a higher layer configuration of *dl-OrJointTCI-StateList* where more than one *TCI-State* can be used as an indicated TCI stateas part of a Reconfiguration with sync procedure as described in [12, TS 38.331]and before applying an indicated TCI state from the configured TCI states:

- The UE assumes that DM-RS of PDSCH and DM-RS of PDCCH, and the CSI-RS applying the indicated TCI state are quasi co-located with the SS/PBCH block or the CSI-RS resource the UE identified during the random access procedure initiated by the Reconfiguration with sync procedure as described in [12, TS 38.331].

After a UE receives a higher layer configuration of *dl-OrJointTCI-StateList* where more than one *TCI-State* can be used as an indicated TCI stateor a higher layer configuration of *ul-TCI-StateList* where more than one *TCI-UL-State* can be used as an indicated TCI state as part of a Reconfiguration with sync procedure as described in [12, TS 38.331] and before applying an indicated TCI state from the configured TCI states:

- The UE assumes that the UL TX spatial filter, if applicable, for dynamic-grant and configured-grant based PUSCH and PUCCH, and for SRS applying the indicated TCI state, is the same as that for a PUSCH transmission scheduled by a RAR UL grant or a MsgA PUSCH transmission during random access procedure initiated by the Reconfiguration with sync procedure as described in [12, TS 38.331].

If a UE receives a higher layer configuration of *dl-OrJointTCI-StateList* where only one *TCI-State* can be used as an indicated TCI state*,* the UE obtains the QCL assumptions from that TCI state for DM-RS of PDSCH and DM-RS of PDCCH, and the CSI -RS applying the indicated TCI state.

If a UE receives a higher layer configuration of *dl-OrJointTCI-StateList* where only one *TCI-State* can be used as an indicated TCI state or a higher layer configuration of *ul-TCI-StateList* where only one *TCI-UL-State* can be used as an indicated TCI state,the UE determines an UL TX spatial filter, if applicable, from that TCI state for dynamic-grant and configured-grant based PUSCH and PUCCH, and SRS applying the indicated TCI state.

## <Unchanged text omitted>