**3GPP TSG-RAN WG1 Meeting #119R1-2410853**

**Orlando, US, November 18th – 22nd, 2024**

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| *CR-Form-v12.3* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **38.214** | **CR** | **0649** | **rev** | **-** | **Current version:** | **18.4.0** |  |
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| *For* ***[HE](http://www.3gpp.org/3G_Specs/CRs.htm" \l "_blank)******[LP](http://www.3gpp.org/3G_Specs/CRs.htm" \l "_blank)*** *on using this form: comprehensive instructions can be found at  <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:*** | Correction on TPMI determination for UL transmissions in 38.214 | | | | | | | | | |
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| ***Source to WG:*** | CATT(Moderator), New H3C, Ericsson, ZTE, OPPO | | | | | | | | | |
| ***Source to TSG:*** |  | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_MIMO\_evo\_DL\_UL-Core | | | | |  | ***Date:*** | | | 2024-11-21 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | F |  | | | | | ***Release:*** | | | Rel-18 |
|  | *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-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)  Rel-20 (Release 20)* | |
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| ***Reason for change:*** | | - For codebook based PUSCH transmission scheduled by DCI format 0\_2, the maximum transmission rank is configured by the higher layer parameter *maxRankDCI-0-2.* However, such descriptions are missed for multi-panel SDM and SFN schemes.  - When *multipanelSchemeSDM* or *multipanelSchemeSFN* is configured 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', and codepoint "00" or "01" of *SRS Resource Set* *indicator* is indicated, *maxRank* is defining the maximum number of layers applied over the first SRS resource set or the second SRS resource set.  - A “is” is missing in sentence “where v ≤ *maxRankSFN* or *maxRankSFN-DCI-0-2* and *maxRankSFN* or *maxRankSFN-DCI-0-2* defining the maximum number of layers applied over the first SRS resource set and over the second SRS resource set separately.” | | | | | | | | |
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| ***Summary of change:*** | | - Clarify that when *multipanelSchemeSDM* or *multipanelSchemeSFN* is configured and two SRS resource sets are configured in *srs-ResourceSetToAddModListDCI-0-2*, for PUSCH transmissions with codepoint "00" or "01" of *SRS Resource Set* *indicator* indicated, the first TPMI is used to indicate the precoder to be applied over layers {0…v-1}, where v ≤ *maxRankDCI-0-2.*  - Add “set” in sentence “*maxRank* is defining the maximum number of layers applied over the first SRS resource set or the second SRS resource” for SFN scheme and add the corresponding part for SDM scheme.  - Add “is” behind “*maxRankSFN-DCI-0-2*” in sentence “where v ≤ *maxRankSFN* or *maxRankSFN-DCI-0-2* and *maxRankSFN* or *maxRankSFN-DCI-0-2* defining the maximum number of layers applied over the first SRS resource set and over the second SRS resource set separately.”  - Change “are” behind “maxRankSDM-DCI-0-2” in sentence “where v ≤ maxRankSDM or maxRankSDM-DCI-0-2 and maxRankSDM or maxRankSDM-DCI-0-2 defining the maximum number of layers applied over the first SRS resource set and over the second SRS resource set separately” to “is” to align with current spec. | | | | | | | | |
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| ***Consequences if not approved:*** | | -The determination of TPMI is not correct for PUSCH transmissions scheduled by DCI format 0\_2 and with codepoint "00" or "01" of *SRS Resource Set* *indicator* indicated when *multipanelSchemeSDM* or *multipanelSchemeSFN* is configured and two SRS resource sets are configured in *srs-ResourceSetToAddModListDCI-0-2*. And the description of the configuration of the maximum number of layer for both the first SRS resource set and the second SRS resource set for SDM and SFN schemes is not clear and is not aligned between SDM and SFN schemes.  - UE’s behaviour is not correct when *multipanelScheme* set to 'SFNscheme' 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', and codepoint "00" or "01" of *SRS Resource Set* *indicator* is indicated. | | | | | | | | |
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| ***Clauses affected:*** | | 6.1.1.1 | | | | | | | | |
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|  | | **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:*** | |  | | | | | | | | |
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| ***This CR's revision history:*** | |  | | | | | | | | |

#### 6.1.1.1 Codebook based UL transmission

<Unrelated parts are omitted>

When the higher layer parameter *multipanelScheme* is set to 'SDMScheme' 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', two SRI(s), and two TPMI(s) are given by the DCI fields of two SRS resource indicator and two Precoding information and number of layers in clause 7.3.1.1.2 and 7.3.1.1.3 of [5, TS 38.212] for DCI format 0\_1 and 0\_2 or given by *srs-ResourceIndicator, srs-ResourceIndicator2,* *precodingAndNumberOfLayers, and precodingAndNumberOfLayers2* in *configuredGrantConfig*:

- When codepoint "10" of *SRS Resource Set* *indicator* is indicated or when *srs-ResourceIndicator2 and* precodingAndNumberOfLayers2 are provided*,* the first TPMI is used to indicate the precoder to be applied over layers {0…v1-1}, where v1 is the number of layers indicated by the first TPMI, that corresponds to the SRS resource selected by the corresponding SRI when multiple SRS resources are configured for the applicable SRS resource set or if single SRS resource is configured for the applicable SRS resource set, and the second TPMI is used to indicate the precoder to be applied over layers {v1…. v2+v1-1}, where v2 is the number of layers indicated by the second TPMI, that corresponds to the SRS resource selected by the corresponding SRI when multiple SRS resources are configured for the applicable SRS resource set or if single SRS resource is configured for the applicable SRS resource set, v1 ≤ *maxRankSDM* or *maxRankSDM-DCI-0-2* andv2 ≤ *maxRankSDM* or *maxRankSDM-DCI-0-2* and *maxRankSDM* or *maxRankSDM-DCI-0-2* is defining the maximum number of layers applied over the first and the second SRS resource sets, separately.

- When codepoint "00" or "01" of *SRS Resource Set* *indicator* is indicated*,* the second SRI and second TPMI are reserved, the first TPMI is used to indicate the precoder to be applied over layers {0…v-1}, where v ≤ *maxRank* or *maxRankDCI-0-2,* where *maxRank* or *maxRankDCI-0-2* is defining the maximum number of layers applied over the first SRS resource set or the second SRS resource set.

- Codepoint "11" of *SRS Resource Set indicator* is reserved.

- For one or two TPMI(s), the transmission precoder is selected from the uplink codebook that has a number of antenna ports equal to the higher layer parameter *nrofSRS-Ports* in *SRS-Config* for the indicated SRI(s), as defined in Clause 6.3.1.5 of [4, TS 38.211]. When two TPMIs are indicated, the UE shall expect that the precoder indicated by the first TPMI and the precoder indicated by the second TPMI are mapped to different PUSCH antenna ports.

- When two SRIs are indicated, the UE shall expect that the number of SRS antenna ports associated with two indicated SRIs would be the same. When the UE is configured with the higher layer parameter *txConfig* set to 'codebook', the UE is configured with at least one SRS resource. Each of the indicated one or two SRI(s) in slot *n* is associated with the most recent transmission of SRS resource of associated SRS resource set identified by the SRI, where the SRS resource is prior to the PDCCH carrying the SRI. 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', the UE is not expected to be configured with different number of SRS resources in the two SRS resource sets.

When higher layer parameter *multipanelScheme* set to 'SFNscheme' 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', two SRI(s), and two TPMI(s) are given by the DCI fields of two SRS resource indicator and two Precoding information and number of layers in clause 7.3.1.1.2 and 7.3.1.1.3 of [5, TS 38.212] for DCI format 0\_1 and 0\_2 or given by *srs-ResourceIndicator, srs-ResourceIndicator2,* *precodingAndNumberOfLayers, and precodingAndNumberOfLayers2* in *configuredGrantConfig*:

- When codepoint "10" of *SRS Resource Set* *indicator* is indicated or when *srs-ResourceIndicator2 and* precodingAndNumberOfLayers2 are provided*,* the first TPMI is used to indicate precoder to be applied over layers {0…v-1} and the second TPMI is used to indicate the precoder to be applied over layers {0…v-1}, where v ≤ *maxRankSFN* or *maxRankSFN-DCI-0-2* and *maxRankSFN* or *maxRankSFN-DCI-0-2* is defining the maximum number of layers applied over the first SRS resource set and over the second SRS resource set separately.

- When codepoint "00" or "01" of *SRS Resource Set* *indicator* is indicated*,* the second SRI and second TPMI are reserved, the first TPMI is used to indicate precoder to be applied over layers {0…v-1}, where v ≤ *maxRank* or *maxRankDCI-0-2*, where *maxRank* or *maxRankDCI-0-2* is defining the maximum number of layers applied over the first SRS resource set or the second SRS resource set.

<Unrelated parts are omitted>