**3GPP TSG-RAN WG1 Meeting #118** ***R1-24xxxxx***

**Maastricht, Netherlands, 19-23 August, 2024**

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| *CR-Form-v12.3* | | | | | | | | |
| **Draft CHANGE REQUEST** | | | | | | | | |
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|  | **38.212** | **CR** |  | **rev** |  | **Current version:** | **18.3.0** |  |
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| *For* [***HELP***](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:*** | Rel-18 editorial corrections for TS 38.212 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Huawei | | | | | | | | | |
| ***Source to TSG:*** |  | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_newRAT-Core, TEI18,  NR\_MIMO\_evo\_DL\_UL-Core,  NR\_MC\_enh-Core,  NR\_pos\_enh2-Core,  NR\_MBS\_enh-Core | | | | |  | ***Date:*** | | | 2024-08-26 |
|  |  | | | |  | |  | | |  |
| ***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)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | 1. Capture the TP in R1-2406794 per the agreement for Pre-Rel-18 NR maintenance from RAN1#118 meeting. 2. Correction on one typo in clause 6.2.7 for Rel-18 MIMO. 3. Capture the TP in R1-2405860 per the agreement for Rel-18 MIMO from RAN1#118 meeting. 4. Capture the agreement relevant to R1-2406155 for Rel-18 MIMO from RAN1#118 meeting. 5. Capture the TP in [R1-2407164](file:///D:\RAN1\RAN1%23118\tdocs\R1-2407164.zip) per the agreement for Pre-Rel-18 NR maintenance from RAN1#118 meeting. 6. Capture the agreement on DCI format 3\_2 for Rel-18 positioning from RAN1#118 meeting. 7. Capture the agreement on DCI format 4\_0 for Rel-18 MBS from RAN1#118 meeting. | | | | | | | | |
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| ***Summary of change:*** | | 1. Capture the editorial corrections for clause 6.2.7 according to R1-2406794. 2. Change "referes" to "refers" in clause 6.2.7. 3. Update DCI format 0\_1 and DCI format 0\_2 to reflect the changes in R1-2405860. Update RRC parameters to align the latest version in TS 38.331. 4. Update Table 7.3.1.1.2-36 in DCI format 0\_1 to reflect the agreements relevant to R1-2406155. 5. Update tables in DCI format 0\_1 and DCI format 1\_1 to reflect the changes in [R1-2407164](file:///D:\RAN1\RAN1%23118\tdocs\R1-2407164.zip). 6. Update DCI format 3\_2 to reflect the agreement for Rel-18 positioning from RAN1#118 meeting. 7. Update DCI format 4\_0 to reflect the agreement for Rel-18 MBS from RAN1#118 meeting. | | | | | | | | |
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| ***Consequences if not approved:*** | | Specification is incomplete or incorrect. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 6.2.7, 7.3.1.1.2, 7.3.1.1.3, 7.3.1.2.2, 7.3.1.4.3, 7.3.1.5.1 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | |  | | |
| ***affected:*** | |  | **X** | Test specifications | | | |  | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | |  | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

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6.2.7 Data and control multiplexing

In case where there are more than one UL-SCH transport blocks for the PUSCH transmission, the UCI information is multiplexed only on the UL-SCH transport block with highest *IMCS* value for the initial PUSCH, where *IMCS* is as defined in Clause 6.1.4.1 in [6, TS 38.214]. In case the two transport blocks have the same *IMCS* value for the initial PUSCH, the UCI information is multiplexed with data only on the first transport block. The PUSCH for UCI multiplexing in this Clause refers to the UL-SCH transport block for UCI multiplexing.

If the higher layer parameter *nrofBitsInUTO-UCI* is configured, the procedure in this clause 6.2.7 applies by replacing CG‑UCI with UTO-UCI in all the notations and texts, and replacing "when higher layer parameter *cg-UCI-Multiplexing* is configured" with "when UTO-UCI and HARQ-ACK are transmitted on a PUSCH".

Denote the coded bits for UL-SCH as .

Denote the coded bits for HARQ-ACK or jointly coded bits for HARQ-ACK and CG-UCI when the high layer parameter *cg-UCI-Multiplexing* is configured, if any, as .

Denote the coded bits for CSI part 1, if any, as .

Denote the coded bits for CSI part 2, if any, as .

Denote the coded bits for CG-UCI without HARQ-ACK, if any, as .

Denote the multiplexed data and control coded bit sequence as .

Denote  as the OFDM symbol index of the PUSCH transmission, starting from 0 to , where  is the total number of OFDM symbols of the PUSCH, including all OFDM symbols used for DMRS.

Denote  as the subcarrier index of the PUSCH transmission, starting from 0 to , where  is expressed as a number of subcarriers.

Denote  as the set of resource elements, in ascending order of indices , available for transmission of data in OFDM symbol , for .

Denote  as the number of elements in set . Denote  as the -th element in .

Denote  as the set of resource elements, in ascending order of indices , available for transmission of UCI in OFDM symbol , for . Denote  as the number of elements in set . Denote  as the -th element in . For any OFDM symbol that carries DMRS of the PUSCH, . For any OFDM symbol that does not carry DMRS of the PUSCH, .

If frequency hopping is configured for the PUSCH,

- denote  as the OFDM symbol index of the first OFDM symbol after the first set of consecutive OFDM symbol(s) carrying DMRS in the first hop;

- denote  as the OFDM symbol index of the first OFDM symbol after the first set of consecutive OFDM symbol(s) carrying DMRS in the second hop;

- denote  as the OFDM symbol index of the first OFDM symbol that does not carry DMRS in the first hop;

- denote  as the OFDM symbol index of the first OFDM symbol that does not carry DMRS in the second hop;

- if HARQ-ACK is present for transmission on the PUSCH with UL-SCH or if both HARQ-ACK and CG-UCI are present on the same PUSCH with UL-SCH, let:

< Unchanged parts are omitted >

##### 7.3.1.1.2 Format 0\_1

DCI format 0\_1 is used for the scheduling of one or multiple PUSCH in one cell, or indicating CG downlink feedback information (CG-DFI) to a UE.

< Unchanged parts are omitted >

- Precoding information and number of layers - number of bits determined by the following:

- 0 bits if the higher layer parameter *txConfig = nonCodeBook*;

- 0 bits for 1 antenna port and if the higher layer parameter *txConfig = codebook*;

- 4, 5, or 6 bits according to Table 7.3.1.1.2-2 for 4 antenna ports, if *txConfig = codebook,* *ul-FullPowerTransmission* is not configured or configured to *fullpowerMode2* or configured to *fullpower,* transform precoder is disabled, and according to the values of higher layer parameters *maxRank* if neither *multipanelSchemeSDM* nor *multipanelSchemeSFN* is configured or max{*maxRank*, *maxRankSfn*} if *multipanelSchemeSFN* is configuredor max{*maxRank*, *maxRankSdm*} if *multipanelSchemeSDM* is configured, and *codebookSubset*;

- 4 or 5 bits according to Table 7.3.1.1.2-2A for 4 antenna ports, if *txConfig = codebook,* *ul-FullPowerTransmission = fullpowerMode1, maxRank=2* if neither *multipanelSchemeSDM* nor *multipanelSchemeSFN* is configured or max{*maxRank*, *maxRankSfn*} = 2 if *multipanelSchemeSFN* is configuredor max{*maxRank*, *maxRankSdm*} = 2 if *multipanelSchemeSDM* is configured*,* transform precoder is disabled, and according to the values of higher layer parameter *codebookSubset*;

- 4 or 6 bits according to Table 7.3.1.1.2-2B for 4 antenna ports, if *txConfig = codebook, ul-FullPowerTransmission = fullpowerMode1,* *maxRank=3 or 4,* transform precoder is disabled, and according to the values of higher layer parameter *codebookSubset*;

- 2, 4, or 5 bits according to Table 7.3.1.1.2-3 for 4 antenna ports, if *txConfig = codebook,* *ul-FullPowerTransmission* is not configured or configured to *fullpowerMode2* or configured to *fullpower,* and according to whether transform precoder is enabled or disabled, and *maxRank=1* if neither *multipanelSchemeSDM* nor *multipanelSchemeSFN* is configured or max{*maxRank*, *maxRankSfn*} = 1 if *multipanelSchemeSFN* is configuredor max{*maxRank*, *maxRankSdm*} = 1 if *multipanelSchemeSDM* is configured, and *codebookSubset*;

- 3 or 4 bits according to Table 7.3.1.1.2-3A for 4 antenna ports, if *txConfig = codebook,* *ul-FullPowerTransmission = fullpowerMode1*, and according to whether transform precoder is enabled, or disabled and *maxRank*=1 if neither *multipanelSchemeSDM* nor *multipanelSchemeSFN* is configured or max{*maxRank*, *maxRankSfn*} = 1 if *multipanelSchemeSFN* is configuredor max{*maxRank*, *maxRankSdm*} = 1 if *multipanelSchemeSDM* is configured, and the values of higher layer parameter *codebookSubset*;

- 2 or 4 bits according to Table7.3.1.1.2-4 for 2 antenna ports, if *txConfig = codebook,* *ul-FullPowerTransmission* is not configured or configured to *fullpowerMode2* or configured to *fullpower,* transform precoder is disabled, and according to the values of higher layer parameters *maxRank* if neither *multipanelSchemeSDM* nor *multipanelSchemeSFN* is configured or max{*maxRank*, *maxRankSfn*} if *multipanelSchemeSFN* is configuredor max{*maxRank*, *maxRankSdm*} if *multipanelSchemeSDM* is configured, and *codebookSubset*;

- 2 bits according to Table 7.3.1.1.2-4A for 2 antenna ports, if *txConfig = codebook,* *ul-FullPowerTransmission = fullpowerMode1*, transform precoder is disabled, *maxRank=2* if neither *multipanelSchemeSDM* nor *multipanelSchemeSFN* is configured or max{*maxRank*, *maxRankSfn*} = 2 if *multipanelSchemeSFN* is configuredor max{*maxRank*, *maxRankSdm*} = 2 if *multipanelSchemeSDM* is configured, and *codebookSubset=nonCoherent*;

- 1 or 3 bits according to Table7.3.1.1.2-5 for 2 antenna ports, if *txConfig = codebook,* *ul-FullPowerTransmission* is not configured or configured to *fullpowerMode2* or configured to *fullpower,* and according to whether transform precoder is enabled or disabled, and *maxRank=1* if neither *multipanelSchemeSDM* nor *multipanelSchemeSFN* is configured or max{*maxRank*, *maxRankSfn*}*=1* if *multipanelSchemeSFN* is configuredor max{*maxRank*, *maxRankSdm*}*=1* if *multipanelSchemeSDM* is configured, and *codebookSubset*;

- 2 bits according to Table 7.3.1.1.2-5A for 2 antenna ports, if *txConfig = codebook, ul-FullPowerTransmission = fullpowerMode1*, and according to whether transform precoder is enabled, or disabled and *maxRank*=1 ifneither *multipanelSchemeSDM* nor *multipanelSchemeSFN* is configured or max{*maxRank*, *maxRankSfn*} = 1 if *multipanelSchemeSFN* is configured or max{*maxRank*, *maxRankSdm*} = 1 if *multipanelSchemeSDM* is configured, and the values of higher layer parameter *codebookSubset*;

- 7 bits according to Table 7.3.1.1.2-5B for 8 antenna ports, if *CodebookTypeUL= codebook1*, transform precoder is disabled, *maxRank* = 8, and according to *codebook1*;

- 7 bits according to Table 7.3.1.1.2-5C for 8 antenna ports, if *CodebookTypeUL= codebook1*, transform precoder is disabled, *maxRank* = 7, and according to *codebook1*;

- 7 bits according to Table 7.3.1.1.2-5D for 8 antenna ports, if *CodebookTypeUL= codebook1*, transform precoder is disabled, *maxRank* = 4, 5 or 6, and according to *maxRank*;

- 4, 6 or 7 bits according to Table 7.3.1.1.2-5E for 8 antenna ports, if *CodebookTypeUL= codebook1*, transform precoder is enabled or *maxRank* = 1, 2 or 3 if transform precoder is disabled, and according to transform precoder and *maxRank*;

- 8 bits according to Table 7.3.1.1.2-5F for 8 antenna ports, if *CodebookTypeUL= codebook4*, transform precoder is disabled, *maxRank* = 5, 6, 7 or 8, *ul-FullPowerTransmission* is not configured or configured to *fullpowerMode2* or configured to *fullpower*, and according to *maxRank*;

- 6 or 7 or 8 bits according to Table 7.3.1.1.2-5G for 8 antenna ports, if *CodebookTypeUL= codebook4*, transform precoder is disabled, *maxRank* = 2, 3 or 4, *ul-FullPowerTransmission* is not configured or configured to *fullpowerMode2* or configured to *fullpower*, and according to *maxRank*;

- 3 bits according to Table 7.3.1.1.2-5H for 8 antenna ports, if *CodebookTypeUL= codebook4*, transform precoder is enabled or *maxRank* = 1 if transform precoder is disabled, *ul-FullPowerTransmission* is not configured or configured to *fullpowerMode2* or configured to *fullpower*.

- 10 bits according to Table 7.3.1.1.2-5I for 8 antenna ports, if *CodebookTypeUL=codebook2*, transform precoder is disabled, *maxRank* = 5, 6, 7 or 8, *ul-FullPowerTransmission* is not configured or configured to *fullpowerMode2* or configured to *fullpower,* and according to *maxRank*;

- 5, 9 or 10 bits according to Table 7.3.1.1.2-5J for 8 antenna ports, if *CodebookTypeUL=codebook2*, transform precoder is enabled or *maxRank* = 1, 2, 3 or 4 if transform precoder is disabled, *ul-FullPowerTransmission* is not configured or configured to *fullpowerMode2* or configured to *fullpower*, and according to transform precoder and *maxRank*;

- 10 bits according to Table 7.3.1.1.2-5K for 8 antenna ports, if *CodebookTypeUL=codebook3*, transform precoder is disabled, *maxRank* = 5, 6, 7 or 8, *ul-FullPowerTransmission* is not configured or configured to *fullpowerMode2* or configured to *fullpower,* and according to *maxRank*;

- 4, 7, 9 or 10 bits according to Table 7.3.1.1.2-5L for 8 antenna ports, if *CodebookTypeUL=codebook3*, transform precoder is enabled or *maxRank* = 1, 2, 3 or 4 if transform precoder is disabled, *ul-FullPowerTransmission* is not configured or configured to *fullpowerMode2* or configured to *fullpower*, and according to transform precoder and *maxRank*;

- 6 or 7 or 8 bits according to Table 7.3.1.1.2-5M for 8 antenna ports, if *CodebookTypeUL=codebook4*, transform precoder is disabled, *maxRank* = 2, 3 or 4, *ul-FullPowerTransmission* is configured to *fullpowerMode1*, and according to *maxRank*;

- 4 bits according to Table 7.3.1.1.2-5N for 8 antenna ports, if *CodebookTypeUL=codebook4*, transform precoder is enabled or *maxRank* = 1 if transform precoder is disabled, *ul-FullPowerTransmission* is configured to *fullpowerMode1*.

- 6, 9 or 10 bits according to Table 7.3.1.1.2-5O for 8 antenna ports, if *CodebookTypeUL=codebook2*, transform precoder is enabled or *maxRank* = 1, 2, 3 or 4 if transform precoder is disabled, *ul-FullPowerTransmission* is configured to *fullpowerMode1*, and according to transform precoder and *maxRank*;

- 5, 7, 9 or 10 bits according to Table 7.3.1.1.2-5P for 8 antenna ports, if *CodebookTypeUL=codebook3*, transform precoder is enabled or *maxRank* = 1, 2, 3, or 4 if transform precoder is disabled, *ul-FullPowerTransmission* is configured to *fullpowerMode1*, and according to transform precoder and *maxRank*;

- 8 or 9 bits according to Table 7.3.1.1.2-5Q for 8 antenna ports, if *CodebookTypeUL*=*codebook4*, transform precoder is disabled, *maxRank* = 5, 6, 7 or 8, *ul-FullPowerTransmission* is configured to *fullpowerMode1*, and according to *maxRank*;

- 10 bits according to Table 7.3.1.1.2-5R for 8 antenna ports, if *CodebookTypeUL*=*codebook2*, transform precoder is disabled, *maxRank* = 5, 6, 7 or 8, *ul-FullPowerTransmission* is configured to *fullpowerMode1*, and according to *maxRank*;

- 10 bits according to Table 7.3.1.1.2-5S for 8 antenna ports, if *CodebookTypeUL*=*codebook3*, transform precoder is disabled, *maxRank* = 5, 6, 7, or 8, *ul-FullPowerTransmission* is configured to *fullpowerMode1*, and according to *maxRank*;

For the higher layer parameter *txConfig=codebook*, if *ul-FullPowerTransmission* is configured to *fullpowerMode2*, maxRank is configured to be larger than 2, and at least one SRS resource with 4 antenna ports or 8 antenna ports is configured in the SRS resource set indicated by SRS resource set indicator field if present, otherwise in an SRS resource set with usage set to 'codebook', and an SRS resource with 2 antenna ports is indicated via SRI in the same SRS resource set, then Table 7.3.1.1.2-4 is used.

For the higher layer parameter *txConfig=codebook*, if *ul-FullPowerTransmission* is configured to *fullpowerMode2*, *maxRank* is configured to be larger than 4, and at least one SRS resource with 8 antenna ports is configured in the SRS resource set with usage set to 'codebook', and an SRS resource with 4 antenna ports is indicated via SRI in the same SRS resource set, then Table 7.3.1.1.2-2 is used.

For the higher layer parameter *txConfig = codebook*, if different SRS resources with different number of antenna ports are configured, the bitwidth is determined according to the maximum number of ports in an SRS resource among the configured SRS resources in all SRS resource set(s) with usage set to 'codebook'. If the number of ports for a configured SRS resource in the set is less than the maximum number of ports in an SRS resource among the configured SRS resources, a number of most significant bits with value set to '0' are inserted to the field.

When the UE is not provided *coresetPoolIndex* or is provided *coresetPoolIndex* with value 0 for the first CORESETs, and is provided *coresetPoolIndex* with value 1 for the second CORESETs, and is provided *enableSTx2PofmDCI*, and there are two SRS resource sets configured by *srs-ResourceSetToAddModList* and associated with *usage* of value '*codebook*' or '*nonCodeBook*', the Precoding information and number of layers field is associated with the SRS resource set that is associated with the *coresetPoolIndex* value for the CORESET used for the PDCCH carrying the DCI format 0\_1.

For the higher layer parameter *txConfig = codebook*, when the Transform precoder indicator field is present, if the bit width of the Precoding information and number of layers field for the case with transform precoder enabled is not equal to that for the case with transform precoder disabled, a number of most significant bits with value set to '0' are inserted to the Precoding information and number of layers field for the case with smaller bit width until the bit width of the Precoding information and number of layers field for the two cases are the same.

- Second Precoding information - number of bits determined by the following:

- 0 bits if SRS resource set indicator field is not present;

- 0 bits if the higher layer parameter *txConfig = nonCodeBook*;

- 0 bits for 1 antenna port and if the higher layer parameter *txConfig = codebook*;

- 3, 4, or 5 bits according to Table 7.3.1.1.2-2C with the same number of layers indicated by Precoding information and number of layers field for 4 antenna ports, if SRS resource set indicator field is present, *txConfig = codebook,* *ul-FullPowerTransmission* is not configured or configured to *fullpowerMode2* or configured to *fullpower,* transform precoder is disabled, and according to the values of higher layer parameters *maxRank* if neither *multipanelSchemeSDM* nor *multipanelSchemeSFN* is configured or *maxRankSfn* if *multipanelSchemeSFN* is configured, and *codebookSubset*;

- 3 or 4 bits according to Table 7.3.1.1.2-2D with the same number of layers indicated by Precoding information and number of layers field for 4 antenna ports, if SRS resource set indicator field is present, *txConfig = codebook,* *ul-FullPowerTransmission = fullpowerMode1, maxRank=2* if neither *multipanelSchemeSDM* nor *multipanelSchemeSFN* is configured or *maxRankSfn=2* if *multipanelSchemeSFN* is configured*,* transform precoder is disabled, and according to the values of higher layer parameter *codebookSubset*;

- 3 or 4 bits according to Table 7.3.1.1.2-2E with the same number of layers indicated by Precoding information and number of layers field for 4 antenna ports, if SRS resource set indicator field is present, *txConfig = codebook, ul-FullPowerTransmission = fullpowerMode1,* *maxRank=3 or 4,* transform precoder is disabled, and according to the values of higher layer parameter *codebookSubset*;

- 2, 4, or 5 bits according to Table 7.3.1.1.2-3 with the same number of layers indicated by Precoding information and number of layers field for 4 antenna ports, if SRS resource set indicator field is present, *txConfig = codebook,* *ul-FullPowerTransmission* is not configured or configured to *fullpowerMode2* or configured to *fullpower,* and according to whether transform precoder is enabled or disabled, and the values of higher layer parameters *maxRank* if neither *multipanelSchemeSDM* nor *multipanelSchemeSFN* is configured or *maxRankSfn* if *multipanelSchemeSFN* is configured, and *codebookSubset*;

- 3 or 4 bits according to Table 7.3.1.1.2-3A with the same number of layers indicated by Precoding information and number of layers field for 4 antenna ports, if SRS resource set indicator field is present, *txConfig = codebook,* *ul-FullPowerTransmission = fullpowerMode1*, *maxRank=1* if neither *multipanelSchemeSDM* nor *multipanelSchemeSFN* is configured or *maxRankSfn=1* if *multipanelSchemeSFN* is configured, and according to whether transform precoder is enabled or disabled, and the values of higher layer parameter *codebookSubset*;

- 1 or 3 bits according to Table7.3.1.1.2-4B with the same number of layers indicated by Precoding information and number of layers field for 2 antenna ports, if SRS resource set indicator field is present, *txConfig = codebook,* *ul-FullPowerTransmission* is not configured or configured to *fullpowerMode2* or configured to *fullpower,* transform precoder is disabled, and according to the values of higher layer parameters *maxRank* if neither *multipanelSchemeSDM* nor *multipanelSchemeSFN* is configured or *maxRankSfn* if *multipanelSchemeSFN* is configured, and *codebookSubset*;

- 2 bits according to Table 7.3.1.1.2-4C with the same number of layers indicated by Precoding information and number of layers field for 2 antenna ports, if SRS resource set indicator field is present, *txConfig = codebook,* *ul-FullPowerTransmission = fullpowerMode1*, transform precoder is disabled, *maxRank=2* if neither *multipanelSchemeSDM* nor *multipanelSchemeSFN* is configured or *maxRankSfn=2* if *multipanelSchemeSFN* is configured, and *codebookSubset=nonCoherent*;

- 1 or 3 bits according to Table7.3.1.1.2-5 with the same number of layers indicated by Precoding information and number of layers field for 2 antenna ports, if SRS resource set indicator field is present, *txConfig = codebook,* *ul-FullPowerTransmission* is not configured or configured to *fullpowerMode2* or configured to *fullpower,* and according to whether transform precoder is enabled or disabled, and the values of higher layer parameters *maxRank* if neither *multipanelSchemeSDM* nor *multipanelSchemeSFN* is configured or *maxRankSfn* if *multipanelSchemeSFN* is configured, and *codebookSubset*;

- 2 bits according to Table 7.3.1.1.2-5A with the same number of layers indicated by Precoding information and number of layers field for 2 antenna ports, if SRS resource set indicator field is present, *txConfig = codebook,* *ul-FullPowerTransmission = fullpowerMode1*, *maxRank=1* if neither *multipanelSchemeSDM* nor *multipanelSchemeSFN* is configured or *maxRankSfn=1* if *multipanelSchemeSFN* is configured, and according to whether transform precoder is enabled or disabled, and the values of higher layer parameter *codebookSubset*;

- 4, 5, or 6 bits according to Table 7.3.1.1.2-2 for 4 antenna ports, if *txConfig = codebook,* *ul-FullPowerTransmission* is not configured or configured to *fullpowerMode2* or configured to *fullpower,* transform precoder is disabled, and according to the values of higher layer parameters *maxRankSdm* if *multipanelSchemeSDM* is configured, and *codebookSubset*;

- 4 or 5 bits according to Table 7.3.1.1.2-2A for 4 antenna ports, if *txConfig = codebook,* *ul-FullPowerTransmission = fullpowerMode1, maxRankSdm = 2* if *multipanelSchemeSDM* is configured*,* transform precoder is disabled, and according to the values of higher layer parameter *codebookSubset*;

- 2, 4, or 5 bits according to Table 7.3.1.1.2-3 for 4 antenna ports, if *txConfig = codebook,* *ul-FullPowerTransmission* is not configured or configured to *fullpowerMode2* or configured to *fullpower,* and according to whether transform precoder is enabled or disabled, and the values of higher layer parameters *maxRankSdm* if *multipanelSchemeSDM* is configured, and *codebookSubset*;

- 3 or 4 bits according to Table 7.3.1.1.2-3A for 4 antenna ports, if *txConfig = codebook,* *ul-FullPowerTransmission = fullpowerMode1*, *maxRankSdm = 1* if *multipanelSchemeSDM* is configured, and according to whether transform precoder is enabled or disabled, and the values of higher layer parameter *codebookSubset*;

- 2 or 4 bits according to Table7.3.1.1.2-4 for 2 antenna ports, if *txConfig = codebook,* *ul-FullPowerTransmission* is not configured or configured to *fullpowerMode2* or configured to *fullpower,* transform precoder is disabled, and according to the values of higher layer parameters *maxRankSdm* if *multipanelSchemeSDM* is configured, and *codebookSubset*;

- 2 bits according to Table 7.3.1.1.2-4A for 2 antenna ports, if *txConfig = codebook,* *ul-FullPowerTransmission = fullpowerMode1*, transform precoder is disabled, *maxRankSdm = 2* if *multipanelSchemeSDM* is configured, and *codebookSubset=nonCoherent*;

- 1 or 3 bits according to Table7.3.1.1.2-5 for 2 antenna ports, if *txConfig = codebook,* *ul-FullPowerTransmission* is not configured or configured to *fullpowerMode2* or configured to *fullpower,* and according to whether transform precoder is enabled or disabled, and *maxRankSdm= 1* if *multipanelSchemeSDM* is configured, and *codebookSubset*;

- 2 bits according to Table 7.3.1.1.2-5A for 2 antenna ports, if *txConfig = codebook,* *ul-FullPowerTransmission = fullpowerMode1*, *maxRankSdm = 1* if *multipanelSchemeSDM* is configured and according to whether transform precoder is enabled or disabled, and the values of higher layer parameter *codebookSubset*;

For the higher layer parameter *txConfig=codebook*, if *ul-FullPowerTransmission* is configured to *fullpowerMode2*, maxRank is configured to be larger than 2, and at least one SRS resource with 4 antenna ports is configured in the SRS resource set indicated by SRS resource set indicator field, and an SRS resource with 2 antenna ports is indicated via Second SRS resource indicator field in the same SRS resource set, then Table 7.3.1.1.2-4B is used.

For the higher layer parameter *txConfig = codebook*, if different SRS resources with different number of antenna ports are configured, the bitwidth is determined according to the maximum number of ports in an SRS resource among the configured SRS resources in the second SRS resource set with usage set to 'codebook' as defined in Table 7.3.1.1.2-36. If the number of ports for a configured SRS resource in the set is less than the maximum number of ports in an SRS resource among the configured SRS resources, a number of most significant bits with value set to '0' are inserted to the field.

For the higher layer parameter *txConfig = codebook*, when the Transform precoder indicator field is present, if the bit width of the Second Precoding information field for the case with transform precoder enabled is not equal to that for the case with transform precoder disabled, a number of most significant bits with value set to '0' are inserted to the Second Precoding information field for the case with smaller bit width until the bit width of the Second Precoding information field for the two cases are the same.

- Antenna ports - number of bits determined by the following

- 2 bits as defined by Tables 7.3.1.1.2-6, if transform precoder is enabled, *dmrs-Type*=1, and *maxLength*=1, except that *dmrs-UplinkTransformPrecoding* and *tp-pi2BPSK* are both configured and π/2 BPSK modulation is used;

- 2 bits as defined by Tables 7.3.1.1.2-6A, if transform precoder is enabled and *dmrs-UplinkTransformPrecoding* and *tp-pi2BPSK* are both configured, π/2 BPSK modulation is used, *dmrs-Type*=1, and *maxLength*=1, where nSCID is the scrambling identity for antenna ports defined in Clause 6.4.1.1.1.2, TS 38.211 [4];

- 4 bits as defined by Tables 7.3.1.1.2-7, if transform precoder is enabled, *dmrs-Type*=1, and *maxLength*=2, except that *dmrs-UplinkTransformPrecoding* and *tp-pi2BPSK* are both configured and π/2 BPSK modulation is used;

- 4 bits as defined by Tables 7.3.1.1.2-7A, if transform precoder is enabled and *dmrs-UplinkTransformPrecoding* and *tp-pi2BPSK* are both configured, π/2 BPSK modulation is used, *dmrs-Type*=1, and *maxLength*=2, where nSCID is the scrambling identity for antenna ports defined in Clause 6.4.1.1.1.2, TS 38.211 [4];

- 3 bits as defined by Tables 7.3.1.1.2-8/9/10/10A/11 according to the value of rank, if transform precoder is disabled, *dmrs-Type*=1, *dmrs-TypeEnh* is not configured, and *maxLength*=1;

- 4 bits as defined by Tables 7.3.1.1.2-12/13/14/14A/15/15A/15B/15C/15D according to the value of rank, if transform precoder is disabled, *dmrs-Type*=1, *dmrs-TypeEnh* is not configured, and *maxLength*=2;

- 4 bits as defined by Tables 7.3.1.1.2-16/17/18/18A/19/19A/19B according to the value of rank, if transform precoder is disabled, *dmrs-Type*=2, *dmrs-TypeEnh* is not configured, and *maxLength*=1;

- 5 bits as defined by Tables 7.3.1.1.2-20/21/22/22A/23/23A/23B/23C/23D according to the value of rank, if transform precoder is disabled, *dmrs-Type*=2, *dmrs-TypeEnh* is not configured, and *maxLength*=2.

- 4 bits as defined by Tables 7.3.1.1.2-38/39/40/40A/41/42/43/44/45, if transform precoder is disabled, *dmrs-Type*=1, *dmrs-TypeEnh* is configured, and *maxLength*=1;

- 5 bits as defined by Tables 7.3.1.1.2-46/47/48/48A/49/50/51/52/53, if transform precoder is disabled, *dmrs-Type*=1, *dmrs-TypeEnh* is configured, and *maxLength*=2;

- 5 bits as defined by Tables 7.3.1.1.2-54/55/56/56A/57/58/59/60/61, if transform precoder is disabled, *dmrs-Type*=2, *dmrs-TypeEnh* is configured, and *maxLength*=1;

- 6 bits as defined by Tables 7.3.1.1.2-62/63/64/64A/65/66/67/68/69, if transform precoder is disabled, *dmrs-Type*=2, *dmrs-TypeEnh* is configured, and *maxLength*=2.

where the number of CDM groups without data of values 1, 2, and 3 in Tables 7.3.1.1.2-6 to 7.3.1.1.2-23 refers to CDM groups {0}, {0,1}, and {0, 1,2} respectively, and the value of rank is:

- the sum of the value determined according to the SRS resource indicator field and the value determined according to the second SRS resource indicator field, if *txConfig = nonCodebook*, *multipanelSchemeSDM* is configuredand SRS resource set indicator field equals "10"

- the sum of the value determined according to the Precoding information and number of layers field and the value determined according to the Second Precoding information, if *txConfig = codebook*, *multipanelSchemeSDM* is configuredand SRS resource set indicator field equals "10"

- determined according to the SRS resource indicator field if the higher layer parameter *txConfig = nonCodebook* and *multipanelSchemeSDM* is not configured, or if the higher layer parameter *txConfig = nonCodebook*, *multipanelSchemeSDM* is configuredand SRS resource set indicator field equals "00" or “01”,

- determined according to the Precoding information and number of layers field if the higher layer parameter *txConfig = codebook* and *multipanelSchemeSDM* is not configured, or if the higher layer parameter *txConfig = codebook*, *multipanelSchemeSDM* is configuredand SRS resource set indicator field equals "00" or "01".

If a UE is configured with both *dmrs-UplinkForPUSCH-MappingTypeA* and *dmrs-UplinkForPUSCH-MappingTypeB*, the bitwidth of this field equals , where  is the "Antenna ports" bitwidth derived according to *dmrs-UplinkForPUSCH-MappingTypeA* and  is the "Antenna ports" bitwidthderived according to *dmrs-UplinkForPUSCH-MappingTypeB*. A number of  zeros are padded in the MSB of this field, if the mapping type of the PUSCH corresponds to the smaller value of  and .

When the Transform precoder indicator field is present, if the bit width of the Antenna ports field for the case with transform precoder enabled is not equal to that for the case with transform precoder disabled, a number of most significant bits with value set to '0' are inserted to the Antenna ports field for the case with smaller bit width until the bit width of the Antenna ports field for the two cases are the same.

- SRS request - 2 bits as defined by Table 7.3.1.1.2-24 for UEs not configured with *supplementaryUplink* in *ServingCellConfig* in the cell; 3 bits for UEs configured with *supplementaryUplink* in *ServingCellConfig* in the cell where the first bit is the non-SUL/SUL indicator as defined in Table 7.3.1.1.1-1 and the second and third bits are defined by Table 7.3.1.1.2-24. This bit field may also indicate the associated CSI-RS according to Clause 6.1.1.2 of [6, TS 38.214].

- SRS offset indicator - 0, 1 or 2 bits.

- 0 bit if higher layer parameter *AvailableSlotOffset* is not configured for any aperiodic SRS resource set in the scheduled cell, or if higher layer parameter *AvailableSlotOffset* is configured for at least one aperiodic SRS resource set in the scheduled cell and the maximum number of entries of *availableSlotOffsetList* configured for all aperiodic SRS resource set(s) is 1;

- otherwise, bits are used to indicate available slot offset according to Table 7.3.1.1.2-37 and Clause 6.2.1 of [6, TS 38.214], where K is the maximum number of entries of *availableSlotOffsetList* configured for all aperiodic SRS resource set(s) in the scheduled cell;

- CSI request - 0, 1, 2, 3, 4, 5, or 6 bits determined by higher layer parameter *reportTriggerSize*.

- CBG transmission information (CBGTI) - 0 bit if higher layer parameter *codeBlockGroupTransmission* for PUSCH is not configured or if the number of scheduled PUSCH indicated by the Time domain resource assignment field is larger than 1; otherwise, 2, 4, 6, or 8 bits as defined in Clause 6.1.5 of [6, TS38.214], determined by higher layer parameter *maxCodeBlockGroupsPerTransportBlock* and *maxRank* or *maxMIMO-Layers* for PUSCH.

- PTRS-DMRS association - number of bits determined as follows

- 0 bit if *PTRS-UplinkConfi*g is not configured in either *dmrs-UplinkForPUSCH-MappingTypeA* or *dmrs-UplinkForPUSCH-MappingTypeB* and transform precoder is disabled, or if transform precoder is enabled, or if *maxRank=1* and neither *multipanelSchemeSDM* nor *multipanelSchemeSFN* is configured, or if *maxRank=1* and *maxRankSfn=1*, or if *maxRank=1* and *maxRankSdm=1* when two PTRS ports are configured by *maxNrofPortsforSdm*;

- 2 or 4 bits otherwise, where Table 7.3.1.1.2-25/7.3.1.1.2-25A/7.3.1.1.2-25B/7.3.1.1.2-26/7.3.1.1.2-26A are used to indicate the association between PTRS port(s) and DMRS port(s), and the DMRS ports are indicated by the Antenna ports field.

- 2 bits when one PTRS port or two PTRS ports are configured by *maxNrofPorts* in *PTRS-UplinkConfig*, SRS resource set indicator field is absent or SRS resource set indicator field is present and equals "00" or “01” and *maxRank*<=4, this field indicates the association between PTRS port(s) and DMRS port(s) corresponding to SRS resource indicator field and/or Precoding information and number of layers field according to Tables 7.3.1.1.2-25 and 7.3.1.1.2-26.

- 2 bits when one PTRS port or two PTRS ports are configured by *maxNrofPorts* in *PTRS-UplinkConfig*, the SRS resource set indicator field is present and equals "10" or “11”, *maxRank=3 or 4* and neither *multipanelSchemeSDM* nor *multipanelSchemeSFN* is configured, this field indicates the association between PTRS port(s) and DMRS port(s) corresponding to SRS resource indicator field and/or Precoding information and number of layers field according to Tables 7.3.1.1.2-25 and 7.3.1.1.2-26.

- 2 bits when one PTRS port or two PTRS ports are configured by *maxNrofPorts* in *PTRS-UplinkConfig*, the SRS resource set indicator field is present and equals "10" or "11", *maxRank=2* and neither *multipanelSchemeSDM* nor *multipanelSchemeSFN* is configured, the MSB of this field indicates the association between PTRS port(s) and DMRS port(s) corresponding to SRS resource indicator and/or Precoding information and number of layers field, and the LSB of this field indicates the association between PTRS port(s) and DMRS port(s) corresponding to Second SRS resource indicator field and/or Second Precoding information field, according to Table 7.3.1.1.2-25A.

- 2 bits when two PTRS ports are configured by *maxNrofPortsforSDM* in *PTRS-UplinkConfig*, the SRS resource set indicator field is present and equals "10" and *multipanelSchemeSDM* is configured, the MSB of this field indicates the association between PTRS port 0 and DMRS port(s) corresponding to SRS resource indicator field and/or Precoding information and number of layers field, and the LSB of this field indicates the association between PTRS port 1 and DMRS port(s) corresponding to Second SRS resource indicator field and/or Second Precoding information field, according to Table 7.3.1.1.2-25A.

- 2 bits when one PTRS port is configured by *maxNrofPortsforSDM* in *PTRS-UplinkConfig*, SRS resource set indicator field is present and equals "10" and *multipanelSchemeSDM* is configured, this field indicates the association between PTRS port and DMRS ports corresponding to SRS resource indicator field and Second SRS resource indicator field and/or Precoding information and number of layers field and Second Precoding information field according to Table 7.3.1.1.2-25.

- 2 bits when one PTRS port or two PTRS ports are configured by *maxNrofPorts* in *PTRS-UplinkConfig,* SRS resource set indicator field is present and equals "10", *multipanelSchemeSFN* is configured, this field indicates the association between PTRS port(s) and DMRS port(s) corresponding to SRS resource indicator field and/or Precoding information and number of layers field according to Tables 7.3.1.1.2-25 and 7.3.1.1.2-26.

- 2 bits when one PTRS port is configured by *maxNrofPorts* in *PTRS-UplinkConfig*, the SRS resource set indicator field is absent, *maxRank>4* and neither *multipanelSchemeSDM* nor *multipanelSchemeSFN* is configured, this field indicates the association between PTRS port and DMRS port(s) corresponding to the selected codeword according to Table 7.3.1.1.2-25B, where the selected codeword is the codeword with higher MCS for the initial PUSCH if the MCS indices of the two codewords are different for the initial PUSCH, or codeword 0 otherwise.

- 4 bits when two PTRS ports are configured by *maxNrofPorts* in *PTRS-UplinkConfig*, the SRS resource set indicator field is absent, *maxRank>4* and neither *multipanelSchemeSDM* nor *multipanelSchemeSFN* is configured, this field indicates the association between PTRS port(s) and DMRS port(s) corresponding to SRS resource indicator field and/or Precoding information and number of layers field according to Table 7.3.1.1.2-26A.

If "Bandwidth part indicator" field indicates a bandwidth part other than the active bandwidth part and the "PTRS-DMRS association" field is present for the indicated bandwidth part but not present for the active bandwidth part, the UE assumes the "PTRS-DMRS association" field is not present for the indicated bandwidth part.

When the Transform precoder indicator field is present, if the bit width of PTRS-DMRS association field for the case with transform precoder enabled is not equal to that for the case with transform precoder disabled, a number of most significant bits with value set to '0' are inserted to the PTRS-DMRS association field for the case with smaller bit width until the bit width of the PTRS-DMRS association field for the two cases are the same.

- Second PTRS-DMRS association - 2 bits if PTRS-DMRS association field and SRS resource set indicator field are present and *maxRank>2* and neither *multipanelSchemeSDM* nor *multipanelSchemeSFN* is configured; 0 bit otherwise. Tables 7.3.1.1.2-25 and 7.3.1.1.2-26 are used to indicate the association between PTRS port(s) and DMRS port(s) corresponding to Second SRS resource indicator field and/or Second precoding information field when one PT-RS port and two PT-RS ports are configured by *maxNrofPorts* in *PTRS-UplinkConfig* respectively, and the DMRS ports are indicated by the Antenna ports field.

- beta\_offset indicator - 0 if the higher layer parameter *betaOffsets = semiStatic*; otherwise 2 bits as defined by Table 9.3-3 in [5, TS 38.213].

When two HARQ-ACK codebooks are configured by *pdsch-HARQ-ACK-CodebookList* or by *pdsch-HARQ-ACK-CodebookListMulticast* for the same serving cell and if higher layer parameter *priorityIndicatorDCI-0-1* is configured, if the bit width of the beta\_offset indicator in DCI format 0\_1 for one HARQ-ACK codebook is not equal to that of the beta\_offset indicator in DCI format 0\_1 for the other HARQ-ACK codebook, a number of most significant bits with value set to '0' are inserted to smaller beta\_offset indicator until the bit width of the beta\_offset indicator in DCI format 0\_1 for the two HARQ-ACK codebooks are the same.

- DMRS sequence initialization – 0 bit if transform precoder is enabled by higher layers and the Transform precoder indicator field is not present; 1 bit if transform precoder is disabled by higher layers or if the Transform precoder indicator field is present. If the Transform precoder indicator field is present and set to '0', the bit is reserved.

- UL-SCH indicator - 0 or 1 bit as follows

- 0 bit if the number of scheduled PUSCH indicated by the Time domain resource assignment field is larger than 1;

- 1 bit otherwise. A value of "1" indicates UL-SCH shall be transmitted on the PUSCH and a value of "0" indicates UL-SCH shall not be transmitted on the PUSCH. If a UE does not support triggering SRS only in DCI, except for DCI format 0\_1 with CRC scrambled by SP-CSI-RNTI, the UE is not expected to receive a DCI format 0\_1 with UL-SCH indicator of "0" and CSI request of all zero(s). If a UE supports triggering SRS only in DCI, except for DCI format 0\_1 with CRC scrambled by SP-CSI-RNTI, the UE is not expected to receive a DCI format 0\_1 with UL-SCH indicator of "0", CSI request of all zero(s) and SRS request of all zero(s). The UE is not expected to receive a DCI format 0\_1 with UL-SCH indicator of "0", when the indicated number of layers is larger than 4.

- ChannelAccess-CPext-CAPC - 0, 1, 2, 3, 4, 5 or 6 bits. The bitwidth for this field is determined as bits, where *I* is the number of entries in the higher layer parameter *ul-AccessConfigListDCI-0-1* or in Table 7.3.1.1.1-4A if *channelAccessMode-r16* = "*semiStatic*" is provided, for operation in a cell with shared spectrum channel access in frequency range 1, or for operation in frequency range 2-2 if *ChannelAccessMode2-r17* is provided; otherwise 0 bit. One or more entries from Table 7.3.1.1.2-35 or Table 7.3.1.1.2-35A are configured by the higher layer parameter *ul-AccessConfigListDCI-0-1.*

- Open-loop power control parameter set indication - 0 or 1 or 2 bits.

- 0 bit if the higher layer parameter *p0-PUSCH-SetList* is not configured;

- 1 or 2 bits otherwise,

- 1 bit if SRS resource indicator is present in the DCI format 0\_1;

- 1 or 2 bits as determined by higher layer parameter *olpc-ParameterSetDCI-0-1* if SRS resource indicator is not present in the DCI format 0\_1.

- Priority indicator - 0 bit if higher layer parameter *priorityIndicatorDCI-0-1* is not configured; otherwise 1 bit as defined in Clause 9 in [5, TS 38.213].

- Invalid symbol pattern indicator - 0 bit if higher layer parameter *invalidSymbolPatternIndicatorDCI-0-1* is not configured; otherwise 1 bit as defined in Clause 6.1.2.1 in [6, TS 38.214].

- Minimum applicable scheduling offset indicator - 0 or 1 bit

- 0 bit if higher layer parameter *minimumSchedulingOffsetK2* is not configured;

- 1 bit if higher layer parameter *minimumSchedulingOffsetK2* is configured. The 1 bit indication is used to determine the minimum applicable K2 for the active UL BWP and the minimum applicable K0 value for the active DL BWP, if configured respectively, according to Table 7.3.1.1.2-33. If the minimum applicable K0 is indicated, the minimum applicable value of the aperiodic CSI-RS triggering offset for an active DL BWP shall be the same as the minimum applicable K0 value.

- SCell dormancy indication - 0 bit if higher layer parameter *dormancyGroupWithinActiveTime* is not configured; otherwise 1, 2, 3, 4 or 5 bits bitmap determined according to the number of different *DormancyGroupID(s)* provided by higher layer parameter *dormancyGroupWithinActiveTime,* where each bit corresponds to one of the SCell group(s) configured by higher layers parameter *dormancyGroupWithinActiveTime,* with MSB to LSB of the bitmap corresponding to the first to last configured SCell group in ascending order of *DormancyGroupID*. The field is only present when this format is carried by PDCCH on the primary cell within DRX Active Time and the UE is configured with at least two DL BWPs for an SCell.

- Sidelink assignment index - 0, 1 or 2 bits:

- 1 bit if the UE is configured with *pdsch-HARQ-ACK-Codebook* = *semi-static* and, in addition, the UE is configured with a SL configured grant type 1 or to monitor DCI format 3\_0 with CRC scrambled by SL-RNTI or SL-CS-RNTI;

- 2 bits if the UE is configured with *pdsch-HARQ-ACK-Codebook* = *dynamic* and, in addition, the UE is configured with a SL configured grant type 1 or to monitor DCI format 3\_0 with CRC scrambled by SL-RNTI or SL-CS-RNTI;

- 0 bit otherwise.

- PDCCH monitoring adaptation indication - 0, 1 or 2 bits

- 1 or 2 bits, if *searchSpaceGroupIdList-r17* is not configured and if *pdcch-SkippingDurationList* is configured

- 1 bit if the UE is configured with only one duration by *pdcch-SkippingDurationList;*

- 2 bits if the UE is configured with more than one duration by *pdcch-SkippingDurationList*.

- 1 or 2 bits, if *pdcch-SkippingDurationList* is not configured and if *searchSpaceGroupIdList-r17* is configured

- 1 bit if the UE is configured by *searchSpaceGroupIdList-r17* with search space set(s) with group index 0 and search space set(s) with group index 1, and if the UE is not configured by *searchSpaceGroupIdList-r17* with any search space set with group index 2;

- 2 bits if the UE is configured by *searchSpaceGroupIdList-r17* with search space set(s) with group index 0, search space set(s) with group index 1 and search space set(s) with group index 2;

- 2 bits, if *pdcch-SkippingDurationList* is configured and if *searchSpaceGroupIdList-r17* is configured

- 0 bit, otherwise

A UE does not expect that the bit width of a field in DCI format 0\_1 with CRC scrambled by CS-RNTI is larger than corresponding bit width of same field in DCI format 0\_1 with CRC scrambled by C-RNTI for the same serving cell. If the bit width of a field in the DCI format 0\_1 with CRC scrambled by CS-RNTI is not equal to that of the corresponding field in the DCI format 0\_1 with CRC scrambled by C-RNTI for the same serving cell, a number of most significant bits with value set to '0' are inserted to the field in DCI format 0\_1 with CRC scrambled by CS-RNTI until the bit width equals that of the corresponding field in the DCI format 0\_1 with CRC scrambled by C-RNTI for the same serving cell.

If the number of information bits in DCI format 0\_1 scheduling a single PUSCH prior to padding is not equal to the number of information bits in DCI format 0\_1 scheduling multiple PUSCHs for the same serving cell, zeros shall be appended to the DCI format 0\_1 with smaller size until the payload size is the same for scheduling a single PUSCH and multiple PUSCHs.

For a UE configured with scheduling on the primary cell from an SCell, if prior to padding the number of information bits in DCI format 0\_1 carried by PDCCH on the primary cell is not equal to the number of information bits in DCI format 0\_1 carried by PDCCH on the SCell for scheduling on the primary cell, zeros shall be appended to the DCI format 0\_1 with smaller size until the payload size is the same.

- If application of step 4C in clause 7.3.1.0 results in additional zero padding for DCI format 0\_1 for scheduling on the primary cell, corresponding zeros shall be appended to both DCI format 0\_1 monitored on the primary cell and DCI format 0\_1 monitored on the SCell for scheduling on the primary cell.

- If the SCell is deactivated and *firstActiveDownlinkBWP-Id* is not set to dormant BWP, the UE determines the number of information bits in DCI format 0\_1 carried by PDCCH on the primary cell based on a DL BWP provided by *firstActiveDownlinkBWP-Id* for the SCell. If the active DL BWP of the SCell is a dormant DL BWP, or if the SCell is deactivated and *firstActiveDownlinkBWP-Id* is set to dormant BWP, the UE determines the number of information bits in DCI format 0\_1 carried by PDCCH on the primary cell based on a DL BWP provided by *firstWithinActiveTimeBWP-Id* for the SCell if provided; otherwise, based on a DL BWP provided by *firstOutsideActiveTimeBWP-Id* for the SCell.

Table 7.3.1.1.2-1: Bandwidth part indicator

|  |  |
| --- | --- |
| Value of BWP indicator field | Bandwidth part |
| 2 bits |
| 00 | Configured BWP with BWP-Id = 1 |
| 01 | Configured BWP with BWP-Id = 2 |
| 10 | Configured BWP with BWP-Id = 3 |
| 11 | Configured BWP with BWP-Id = 4 |

< Unchanged parts are omitted >

**Table 7.3.1.1.2-10: Antenna port(s), transform precoder is disabled, *multipanelSchemeSDM* is not  
configured, *dmrs-Type*=1, *dmrs-TypeEnh* is not configured,  
*maxLength*=1, rank = 3**

|  |  |  |
| --- | --- | --- |
| **Value** | **Number of DMRS CDM group(s) without data** | **DMRS port(s)** |
| 0 | 2 | 0-2 |
| 1-7 | Reserved | Reserved |

**Table 7.3.1.1.2-10A: Antenna port(s), transform precoder is disabled, *multipanelSchemeSDM*** **is configured, *dmrs-Type*=1, *dmrs-TypeEnh* is not configured, *maxLength*=1, rank = 3**

|  |  |  |
| --- | --- | --- |
| **Value** | **Number of DMRS CDM group(s) without data** | **DMRS port(s)** |
| 0 | 2 | 0-2 |
| 1 | 2 | 0,2,3 |
| 2-7 | Reserved | Reserved |

**Table 7.3.1.1.2-11: Antenna port(s), transform precoder is disabled, *dmrs-Type*=1,  
*dmrs-TypeEnh* is not configured, *maxLength*=1, rank = 4**

|  |  |  |
| --- | --- | --- |
| **Value** | **Number of DMRS CDM group(s) without data** | **DMRS port(s)** |
| 0 | 2 | 0-3 |
| 1-7 | Reserved | Reserved |

**Table 7.3.1.1.2-12: Antenna port(s), transform precoder is disabled, *dmrs-Type*=1,  
*dmrs-TypeEnh* is not configured, *maxLength*=2, rank = 1**

|  |  |  |  |
| --- | --- | --- | --- |
| **Value** | **Number of DMRS CDM group(s) without data** | **DMRS port(s)** | **Number of front-load symbols** |
| 0 | 1 | 0 | 1 |
| 1 | 1 | 1 | 1 |
| 2 | 2 | 0 | 1 |
| 3 | 2 | 1 | 1 |
| 4 | 2 | 2 | 1 |
| 5 | 2 | 3 | 1 |
| 6 | 2 | 0 | 2 |
| 7 | 2 | 1 | 2 |
| 8 | 2 | 2 | 2 |
| 9 | 2 | 3 | 2 |
| 10 | 2 | 4 | 2 |
| 11 | 2 | 5 | 2 |
| 12 | 2 | 6 | 2 |
| 13 | 2 | 7 | 2 |
| 14-15 | Reserved | Reserved | Reserved |

**Table 7.3.1.1.2-13: Antenna port(s), transform precoder is disabled, *dmrs-Type*=1,  
*dmrs-TypeEnh* is not configured, *maxLength*=2, rank = 2**

|  |  |  |  |
| --- | --- | --- | --- |
| **Value** | **Number of DMRS CDM group(s) without data** | **DMRS port(s)** | **Number of front-load symbols** |
| 0 | 1 | 0,1 | 1 |
| 1 | 2 | 0,1 | 1 |
| 2 | 2 | 2,3 | 1 |
| 3 | 2 | 0,2 | 1 |
| 4 | 2 | 0,1 | 2 |
| 5 | 2 | 2,3 | 2 |
| 6 | 2 | 4,5 | 2 |
| 7 | 2 | 6,7 | 2 |
| 8 | 2 | 0,4 | 2 |
| 9 | 2 | 2,6 | 2 |
| 10-15 | Reserved | Reserved | Reserved |

**Table 7.3.1.1.2-14: Antenna port(s), transform precoder is disabled, *multipanelSchemeSDM* is not configured, *dmrs-Type*=1, *dmrs-TypeEnh* is not configured, *maxLength*=2, rank = 3**

|  |  |  |  |
| --- | --- | --- | --- |
| **Value** | **Number of DMRS CDM group(s) without data** | **DMRS port(s)** | **Number of front-load symbols** |
| 0 | 2 | 0-2 | 1 |
| 1 | 2 | 0,1,4 | 2 |
| 2 | 2 | 2,3,6 | 2 |
| 3-15 | Reserved | Reserved | Reserved |

**Table 7.3.1.1.2-14A: Antenna port(s), transform precoder is disabled, *multipanelSchemeSDM* is configured, *dmrs-Type*=1, *dmrs-TypeEnh* is not configured, *maxLength*=2, rank = 3**

|  |  |  |  |
| --- | --- | --- | --- |
| **Value** | **Number of DMRS CDM group(s) without data** | **DMRS port(s)** | **Number of front-load symbols** |
| 0 | 2 | 0-2 | 1 |
| 1 | 2 | 0,1,4 | 2 |
| 2 | 2 | 2,3,6 | 2 |
| 3 | 2 | 0,2,3 | 1 |
| 4-15 | Reserved | Reserved | Reserved |

**Table 7.3.1.1.2-15: Antenna port(s), transform precoder is disabled, *dmrs-Type*=1,  
*dmrs-TypeEnh* is not configured, *maxLength*=2, rank = 4**

|  |  |  |  |
| --- | --- | --- | --- |
| **Value** | **Number of DMRS CDM group(s) without data** | **DMRS port(s)** | **Number of front-load symbols** |
| 0 | 2 | 0-3 | 1 |
| 1 | 2 | 0,1,4,5 | 2 |
| 2 | 2 | 2,3,6,7 | 2 |
| 3 | 2 | 0,2,4,6 | 2 |
| 4-15 | Reserved | Reserved | Reserved |

**Table 7.3.1.1.2-15A: Antenna port(s), transform precoder is disabled, *dmrs-Type*=1,  
*dmrs-TypeEnh* is not configured, *maxLength*=2, rank = 5**

|  |  |  |  |
| --- | --- | --- | --- |
| **Value** | **Number of DMRS CDM group(s) without data** | **DMRS port(s)** | **Number of front-load symbols** |
| 0 | 2 | 0-4 | 2 |
| 1-15 | Reserved | Reserved | Reserved |

**Table 7.3.1.1.2-15B Antenna port(s), transform precoder is disabled, *dmrs-Type*=1,  
*dmrs-TypeEnh* is not configured, *maxLength*=2, rank = 6**

|  |  |  |  |
| --- | --- | --- | --- |
| **Value** | **Number of DMRS CDM group(s) without data** | **DMRS port(s)** | **Number of front-load symbols** |
| 0 | 2 | 0,1,2,3,4,6 | 2 |
| 1-15 | Reserved | Reserved | Reserved |

**Table 7.3.1.1.2-15C: Antenna port(s), transform precoder is disabled, *dmrs-Type*=1,  
*dmrs-TypeEnh* is not configured, *maxLength*=2, rank = 7**

|  |  |  |  |
| --- | --- | --- | --- |
| **Value** | **Number of DMRS CDM group(s) without data** | **DMRS port(s)** | **Number of front-load symbols** |
| 0 | 2 | 0,1,2,3,4,5,6 | 2 |
| 1-15 | Reserved | Reserved | Reserved |

**Table 7.3.1.1.2-15D: Antenna port(s), transform precoder is disabled, *dmrs-Type*=1,  
*dmrs-TypeEnh* is not configured, *maxLength*=2, rank = 8**

|  |  |  |  |
| --- | --- | --- | --- |
| **Value** | **Number of DMRS CDM group(s) without data** | **DMRS port(s)** | **Number of front-load symbols** |
| 0 | 2 | 0,1,2,3,4,5,6,7 | 2 |
| 1-15 | Reserved | Reserved | Reserved |

**Table 7.3.1.1.2-16: Antenna port(s), transform precoder is disabled, *dmrs-Type*=2,  
*dmrs-TypeEnh* is not configured, *maxLength*=1, rank=1**

|  |  |  |
| --- | --- | --- |
| **Value** | **Number of DMRS CDM group(s) without data** | **DMRS port(s)** |
| 0 | 1 | 0 |
| 1 | 1 | 1 |
| 2 | 2 | 0 |
| 3 | 2 | 1 |
| 4 | 2 | 2 |
| 5 | 2 | 3 |
| 6 | 3 | 0 |
| 7 | 3 | 1 |
| 8 | 3 | 2 |
| 9 | 3 | 3 |
| 10 | 3 | 4 |
| 11 | 3 | 5 |
| 12-15 | Reserved | Reserved |

**Table 7.3.1.1.2-17: Antenna port(s), transform precoder is disabled, *dmrs-Type*=2,  
*dmrs-TypeEnh* is not configured, *maxLength*=1, rank=2**

|  |  |  |
| --- | --- | --- |
| **Value** | **Number of DMRS CDM group(s) without data** | **DMRS port(s)** |
| 0 | 1 | 0,1 |
| 1 | 2 | 0,1 |
| 2 | 2 | 2,3 |
| 3 | 3 | 0,1 |
| 4 | 3 | 2,3 |
| 5 | 3 | 4,5 |
| 6 | 2 | 0,2 |
| 7-15 | Reserved | Reserved |

**Table 7.3.1.1.2-18: Antenna port(s), transform precoder is disabled, *multipanelSchemeSDM* is not  
configured, *dmrs-Type*=2, *dmrs-TypeEnh* is not configured,  
*maxLength*=1, rank =3**

|  |  |  |
| --- | --- | --- |
| **Value** | **Number of DMRS CDM group(s) without data** | **DMRS port(s)** |
| 0 | 2 | 0-2 |
| 1 | 3 | 0-2 |
| 2 | 3 | 3-5 |
| 3-15 | Reserved | Reserved |

**Table 7.3.1.1.2-18A: Antenna port(s), transform precoder is disabled, *multipanelSchemeSDM* is configured, *dmrs-Type*=2, *dmrs-TypeEnh* is not configured, *maxLength*=1, rank =3**

|  |  |  |
| --- | --- | --- |
| **Value** | **Number of DMRS CDM group(s) without data** | **DMRS port(s)** |
| 0 | 2 | 0-2 |
| 1 | 3 | 0-2 |
| 2 | 3 | 3-5 |
| 3 | 2 | 0,2,3 |
| 4 | 3 | 0,2,3 |
| 3-15 | Reserved | Reserved |

**Table 7.3.1.1.2-19: Antenna port(s), transform precoder is disabled, *dmrs-Type*=2,  
*dmrs-TypeEnh* is not configured, *maxLength*=1, rank =4**

|  |  |  |
| --- | --- | --- |
| **Value** | **Number of DMRS CDM group(s) without data** | **DMRS port(s)** |
| 0 | 2 | 0-3 |
| 1 | 3 | 0-3 |
| 2-15 | Reserved | Reserved |

**Table 7.3.1.1.2-19A: Antenna port(s), transform precoder is disabled, *dmrs-Type*=2,  
*dmrs-TypeEnh* is not configured, *maxLength*=1, rank = 5**

|  |  |  |
| --- | --- | --- |
| **Value** | **Number of DMRS CDM group(s) without data** | **DMRS port(s)** |
| 0 | 3 | 0-4 |
| 1-15 | Reserved | Reserved |

**Table 7.3.1.1.2-19B: Antenna port(s), transform precoder is disabled, *dmrs-Type*=2,  
*enhanced-dmrs-Typedmrs-TypeEnh* is not configured, *maxLength*=1, rank = 6**

|  |  |  |
| --- | --- | --- |
| **Value** | **Number of DMRS CDM group(s) without data** | **DMRS port(s)** |
| 0 | 3 | 0-5 |
| 1-15 | Reserved | Reserved |

**Table 7.3.1.1.2-20: Antenna port(s), transform precoder is disabled, *dmrs-Type*=2,  
*dmrs-TypeEnh* is not configured, *maxLength*=2, rank=1**

|  |  |  |  |
| --- | --- | --- | --- |
| **Value** | **Number of DMRS CDM group(s) without data** | **DMRS port(s)** | **Number of front-load symbols** |
| 0 | 1 | 0 | 1 |
| 1 | 1 | 1 | 1 |
| 2 | 2 | 0 | 1 |
| 3 | 2 | 1 | 1 |
| 4 | 2 | 2 | 1 |
| 5 | 2 | 3 | 1 |
| 6 | 3 | 0 | 1 |
| 7 | 3 | 1 | 1 |
| 8 | 3 | 2 | 1 |
| 9 | 3 | 3 | 1 |
| 10 | 3 | 4 | 1 |
| 11 | 3 | 5 | 1 |
| 12 | 3 | 0 | 2 |
| 13 | 3 | 1 | 2 |
| 14 | 3 | 2 | 2 |
| 15 | 3 | 3 | 2 |
| 16 | 3 | 4 | 2 |
| 17 | 3 | 5 | 2 |
| 18 | 3 | 6 | 2 |
| 19 | 3 | 7 | 2 |
| 20 | 3 | 8 | 2 |
| 21 | 3 | 9 | 2 |
| 22 | 3 | 10 | 2 |
| 23 | 3 | 11 | 2 |
| 24 | 1 | 0 | 2 |
| 25 | 1 | 1 | 2 |
| 26 | 1 | 6 | 2 |
| 27 | 1 | 7 | 2 |
| 28-31 | Reserved | Reserved | Reserved |

**Table 7.3.1.1.2-21: Antenna port(s), transform precoder is disabled, *dmrs-Type*=2,  
*dmrs-TypeEnh* is not configured, *maxLength*=2, rank=2**

|  |  |  |  |
| --- | --- | --- | --- |
| **Value** | **Number of DMRS CDM group(s) without data** | **DMRS port(s)** | **Number of front-load symbols** |
| 0 | 1 | 0,1 | 1 |
| 1 | 2 | 0,1 | 1 |
| 2 | 2 | 2,3 | 1 |
| 3 | 3 | 0,1 | 1 |
| 4 | 3 | 2,3 | 1 |
| 5 | 3 | 4,5 | 1 |
| 6 | 2 | 0,2 | 1 |
| 7 | 3 | 0,1 | 2 |
| 8 | 3 | 2,3 | 2 |
| 9 | 3 | 4,5 | 2 |
| 10 | 3 | 6,7 | 2 |
| 11 | 3 | 8,9 | 2 |
| 12 | 3 | 10,11 | 2 |
| 13 | 1 | 0,1 | 2 |
| 14 | 1 | 6,7 | 2 |
| 15 | 2 | 0,1 | 2 |
| 16 | 2 | 2,3 | 2 |
| 17 | 2 | 6,7 | 2 |
| 18 | 2 | 8,9 | 2 |
| 19-31 | Reserved | Reserved | Reserved |

**Table 7.3.1.1.2-22: Antenna port(s), transform precoder is disabled, *multipanelSchemeSDM* is not  
configured*, dmrs-Type*=2, *dmrs-TypeEnh* is not configured,  
*maxLength*=2, rank=3**

|  |  |  |  |
| --- | --- | --- | --- |
| **Value** | **Number of DMRS CDM group(s) without data** | **DMRS port(s)** | **Number of front-load symbols** |
| 0 | 2 | 0-2 | 1 |
| 1 | 3 | 0-2 | 1 |
| 2 | 3 | 3-5 | 1 |
| 3 | 3 | 0,1,6 | 2 |
| 4 | 3 | 2,3,8 | 2 |
| 5 | 3 | 4,5,10 | 2 |
| 6-31 | Reserved | Reserved | Reserved |

**Table 7.3.1.1.2-22A: Antenna port(s), transform precoder is disabled, *multipanelSchemeSDM* is configured, *dmrs-Type*=2, *dmrs-TypeEnh* is not configured, *maxLength*=2, rank=3**

|  |  |  |  |
| --- | --- | --- | --- |
| **Value** | **Number of DMRS CDM group(s) without data** | **DMRS port(s)** | **Number of front-load symbols** |
| 0 | 2 | 0-2 | 1 |
| 1 | 3 | 0-2 | 1 |
| 2 | 3 | 3-5 | 1 |
| 3 | 3 | 0,1,6 | 2 |
| 4 | 3 | 2,3,8 | 2 |
| 5 | 3 | 4,5,10 | 2 |
| 6 | 2 | 0,2,3 | 1 |
| 7 | 3 | 0,2,3 | 1 |
| 8-31 | Reserved | Reserved | Reserved |

**Table 7.3.1.1.2-23: Antenna port(s), transform precoder is disabled, *dmrs-Type*=2,  
*dmrs-TypeEnh* is not configured, *maxLength*=2, rank=4**

|  |  |  |  |
| --- | --- | --- | --- |
| **Value** | **Number of DMRS CDM group(s) without data** | **DMRS port(s)** | **Number of front-load symbols** |
| 0 | 2 | 0-3 | 1 |
| 1 | 3 | 0-3 | 1 |
| 2 | 3 | 0,1,6,7 | 2 |
| 3 | 3 | 2,3,8,9 | 2 |
| 4 | 3 | 4,5,10,11 | 2 |
| 5-31 | Reserved | Reserved | Reserved |

**Table 7.3.1.1.2-23A: Antenna port(s), transform precoder is disabled, *dmrs-Type*=2,  
*dmrs-TypeEnh* is not configured, *maxLength*=2, rank = 5**

|  |  |  |  |
| --- | --- | --- | --- |
| **Value** | **Number of DMRS CDM group(s) without data** | **DMRS port(s)** | **Number of front-load symbols** |
| 0 | 3 | 0-4 | 1 |
| 1 | 2 | 0,1,2,3,6 | 2 |
| 12-31 | Reserved | Reserved | Reserved |

**Table 7.3.1.1.2-23B Antenna port(s), transform precoder is disabled, *dmrs-Type*=2,  
*dmrs-TypeEnh* is not configured, *maxLength*=2, rank = 6**

|  |  |  |  |
| --- | --- | --- | --- |
| **Value** | **Number of DMRS CDM group(s) without data** | **DMRS port(s)** | **Number of front-load symbols** |
| 0 | 3 | 0-5 | 1 |
| 1 | 2 | 0,1,2,3,6,8 | 2 |
| 2-31 | Reserved | Reserved | Reserved |

**Table 7.3.1.1.2-23C: Antenna port(s), transform precoder is disabled, *dmrs-Type*=2,  
*dmrs-TypeEnh* is not configured, *maxLength*=2, rank = 7**

|  |  |  |  |
| --- | --- | --- | --- |
| **Value** | **Number of DMRS CDM group(s) without data** | **DMRS port(s)** | **Number of front-load symbols** |
| 0 | 2 | 0,1,2,3,6,7,8 | 2 |
| 1-31 | Reserved | Reserved | Reserved |

**Table 7.3.1.1.2-23D: Antenna port(s), transform precoder is disabled, *dmrs-Type*=2,  
*dmrs-TypeEnh* is not configured, *maxLength*=2, rank = 8**

|  |  |  |  |
| --- | --- | --- | --- |
| **Value** | **Number of DMRS CDM group(s) without data** | **DMRS port(s)** | **Number of front-load symbols** |
| 0 | 2 | 0,1,2,3,6,7,8,9 | 2 |
| 1-31 | Reserved | Reserved | Reserved |

**Table 7.3.1.1.2-24: SRS request**

|  |  |  |
| --- | --- | --- |
| **Value of SRS request field, or value of ‘SRS request’ index for each cell in the scheduled cell set indicated by SRS request field in DCI 0\_3 or 1\_3** | **Triggered aperiodic SRS resource set(s) for DCI format 0\_1, 0\_2, 0\_3, 1\_1, 1\_2, 1\_3, and 2\_3 configured with higher layer parameter *srs-TPC-PDCCH-Group* set to 'typeB'** | **Triggered aperiodic SRS resource set(s) for DCI format 2\_3 configured with higher layer parameter *srs-TPC-PDCCH-Group* set to 'typeA'** |
| 00 | No aperiodic SRS resource set triggered | No aperiodic SRS resource set triggered |
| 01 | SRS resource set(s) configured by *SRS-ResourceSet* with higher layer parameter *aperiodicSRS-ResourceTrigger* set to 1 or an entry in *aperiodicSRS-ResourceTriggerList* set to 1  SRS resource set(s) configured by *SRS-PosResourceSet* with an entry in *aperiodicSRS-ResourceTriggerList* set to 1 when triggered by DCI formats 0\_1, 0\_2, 0\_3, 1\_1, 1\_2 and 1\_3 | SRS resource set(s) configured with higher layer parameter *usage* in *SRS-ResourceSet* set to '*antennaSwitching*' and *resourceType* in *SRS-ResourceSet* set to 'aperiodic' for a 1st set of serving cells configured by higher layers |
| 10 | SRS resource set(s) configured by *SRS-ResourceSet* with higher layer parameter *aperiodicSRS-ResourceTrigger* set to 2 or an entry in *aperiodicSRS-ResourceTriggerList* set to 2  SRS resource set(s) configured by *SRS-PosResourceSet* with an entry in *aperiodicSRS-ResourceTriggerList* set to 2 when triggered by DCI formats 0\_1, 0\_2, 0\_3, 1\_1, 1\_2 and 1\_3 | SRS resource set(s) configured with higher layer parameter *usage* in *SRS-ResourceSet* set to '*antennaSwitching*' and *resourceType* in *SRS-ResourceSet* set to 'aperiodic' for a 2nd set of serving cells configured by higher layers |
| 11 | SRS resource set(s) configured by *SRS-ResourceSet* with higher layer parameter *aperiodicSRS-ResourceTrigger* set to 3 or an entry in *aperiodicSRS-ResourceTriggerList* set to 3  SRS resource set(s) configured by *SRS-PosResourceSet* with an entry in *aperiodicSRS-ResourceTriggerList* set to 3 when triggered by DCI formats 0\_1, 0\_2, 0\_3, 1\_1, 1\_2 and 1\_3 | SRS resource set(s) configured with higher layer parameter *usage* in *SRS-ResourceSet* set to '*antennaSwitching*' and *resourceType* in *SRS-ResourceSet* set to 'aperiodic' for a 3rd set of serving cells configured by higher layers |

**Table 7.3.1.1.2-25: PTRS-DMRS association or Second PTRS-DMRS association for UL PTRS port 0**

|  |  |
| --- | --- |
| **Value** | **DMRS port** |
| 0 | 1st scheduled DMRS port |
| 1 | 2nd scheduled DMRS port |
| 2 | 3rd scheduled DMRS port |
| 3 | 4th scheduled DMRS port |

**Table 7.3.1.1.2-25A: PTRS-DMRS association for UL PTRS port 0 or for the actual UL PT-RS port if neither *multipanelSchemeSDM* nor *multipanelSchemeSFN* is configured, or PTRS-DMRS association for UL PTRS port 0 and 1 if *multipanelSchemeSDM* is configured and *maxNrofPortsforSDM* is set to 2**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Value of MSB** | **DMRS port** |  | **Value of LSB** | **DMRS port** |
| 0 | 1st scheduled DMRS port corresponding to SRS resource indicator field and/or Precoding information and number of layers field |  | 0 | 1st scheduled DMRS port corresponding to Second SRS resource indicator field and/or Second Precoding information field |
| 1 | 2nd scheduled DMRS port corresponding to SRS resource indicator field and/or Precoding information and number of layers field |  | 1 | 2nd scheduled DMRS port corresponding to Second SRS resource indicator field and/or Second Precoding information field |

< Unchanged parts are omitted >

**Table 7.3.1.1.2-30A: Second SRI indication for non-codebook based PUSCH transmission, if neither *multipanelSchemeSDM* nor *multipanelSchemeSFN* is configured,**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Bit field mapped to index** | **SRI(s),** | **Bit field mapped to index** | **SRI(s),** | **Bit field mapped to index** | **SRI(s),** |
| 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1 | 1 | 1 | 1 | 1 |
| 0 | 0,1 | 2 | 2 | 2 | 2 |
| 1 | 2 layers: reserved | 3 | 1 layer: reserved | 3 | 3 |
|  |  | 0 | 0,1 | 4-7 | 1 layer: reserved |
|  |  | 1 | 0,2 | 0 | 0,1 |
|  |  | 2 | 1,2 | 1 | 0,2 |
|  |  | 3 | 2 layers: reserved | 2 | 0,3 |
|  |  | 0 | 0,1,2 | 3 | 1,2 |
|  |  | 1-3 | 3 layers: reserved | 4 | 1,3 |
|  |  |  |  | 5 | 2,3 |
|  |  |  |  | 6-7 | 2 layers: reserved |
|  |  |  |  | 0 | 0,1,2 |
|  |  |  |  | 1 | 0,1,3 |
|  |  |  |  | 2 | 0,2,3 |
|  |  |  |  | 3 | 1,2,3 |
|  |  |  |  | 4-7 | 3 layers: reserved |

< Unchanged parts are omitted >

Table 7.3.1.1.2-31A: Second SRI indication for non-codebook based PUSCH transmission,  
if neither *multipanelSchemeSDM* nor *multipanelSchemeSFN* is configured,

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Bit field mapped to index | SRI(s), | Bit field mapped to index | SRI(s), | Bit field mapped to index | SRI(s), |
| 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1 | 1 | 1 | 1 | 1 |
| 0 | 0,1 | 2 | 2 | 2 | 2 |
| 1 | 2 layers: reserved | 3 | 1 layer: reserved | 3 | 3 |
|  |  | 0 | 0,1 | 4-7 | 1 layer: reserved |
|  |  | 1 | 0,2 | 0 | 0,1 |
|  |  | 2 | 1,2 | 1 | 0,2 |
|  |  | 3 | 2 layers: reserved | 2 | 0,3 |
|  |  | 0 | 0,1,2 | 3 | 1,2 |
|  |  | 1-3 | 3 layers: reserved | 4 | 1,3 |
|  |  |  |  | 5 | 2,3 |
|  |  |  |  | 6-7 | 2 layers: reserved |
|  |  |  |  | 0 | 0,1,2 |
|  |  |  |  | 1 | 0,1,3 |
|  |  |  |  | 2 | 0,2,3 |
|  |  |  |  | 3 | 1,2,3 |
|  |  |  |  | 4-7 | 3 layer: reserved |
|  |  |  |  | 0 | 0,1,2,3 |
|  |  |  |  | 1-7 | 4 layers: reserved |

< Unchanged parts are omitted >

**Table 7.3.1.1.2-35: Allowed entries for DCI format 0\_1/0\_3 and DCI format 0\_2, configured by  
higher layer parameter *ul-AccessConfigListDCI-0-1* and *ul-AccessConfigListDCI-0-2*, respectively,  
in frequency range 1**

| **Entry index** | **Channel Access Type** | **The CP extension T\_"ext" index defined in Clause 5.3.1 of [4, 38.211]** | **CAPC** |
| --- | --- | --- | --- |
| 0 | Type2C-ULChannelAccess defined in clause 4.2.1.2.3 in TS 37.213 [14] | 0 | 1 |
| 1 | Type2C-ULChannelAccess defined in clause 4.2.1.2.3 in TS 37.213 [14] | 0 | 2 |
| 2 | Type2C-ULChannelAccess defined in clause 4.2.1.2.3 in TS 37.213 [14] | 0 | 3 |
| 3 | Type2C-ULChannelAccess defined in clause 4.2.1.2.3 in TS 37.213 [14] | 0 | 4 |
| 4 | Type2C-ULChannelAccess defined in clause 4.2.1.2.3 in TS 37.213 [14] | 2 | 1 |
| 5 | Type2C-ULChannelAccess defined in clause 4.2.1.2.3 in TS 37.213 [14] | 2 | 2 |
| 6 | Type2C-ULChannelAccess defined in clause 4.2.1.2.3 in TS 37.213 [14] | 2 | 3 |
| 7 | Type2C-ULChannelAccess defined in clause 4.2.1.2.3 in TS 37.213 [14] | 2 | 4 |
| 8 | Type2B-ULChannelAccess defined in clause 4.2.1.2.2 in TS 37.213 [14] | 0 | 1 |
| 9 | Type2B-ULChannelAccess defined in clause 4.2.1.2.2 in TS 37.213 [14] | 0 | 2 |
| 10 | Type2B-ULChannelAccess defined in clause 4.2.1.2.2 in TS 37.213 [14] | 0 | 3 |
| 11 | Type2B-ULChannelAccess defined in clause 4.2.1.2.2 in TS 37.213 [14] | 0 | 4 |
| 12 | Type2B-ULChannelAccess defined in clause 4.2.1.2.2 in TS 37.213 [14] | 2 | 1 |
| 13 | Type2B-ULChannelAccess defined in clause 4.2.1.2.2 in TS 37.213 [14] | 2 | 2 |
| 14 | Type2B-ULChannelAccess defined in clause 4.2.1.2.2 in TS 37.213 [14] | 2 | 3 |
| 15 | Type2B-ULChannelAccess defined in clause 4.2.1.2.2 in TS 37.213 [14] | 2 | 4 |
| 16 | Type2A-ULChannelAccess defined in clause 4.2.1.2.1 in TS 37.213 [14] | 0 | 1 |
| 17 | Type2A-ULChannelAccess defined in clause 4.2.1.2.1 in TS 37.213 [14] | 0 | 2 |
| 18 | Type2A-ULChannelAccess defined in clause 4.2.1.2.1 in TS 37.213 [14] | 0 | 3 |
| 19 | Type2A-ULChannelAccess defined in clause 4.2.1.2.1 in TS 37.213 [14] | 0 | 4 |
| 20 | Type2A-ULChannelAccess defined in clause 4.2.1.2.1 in TS 37.213 [14] | 1 | 1 |
| 21 | Type2A-ULChannelAccess defined in clause 4.2.1.2.1 in TS 37.213 [14] | 1 | 2 |
| 22 | Type2A-ULChannelAccess defined in clause 4.2.1.2.1 in TS 37.213 [14] | 1 | 3 |
| 23 | Type2A-ULChannelAccess defined in clause 4.2.1.2.1 in TS 37.213 [14] | 1 | 4 |
| 24 | Type2A-ULChannelAccess defined in clause 4.2.1.2.1 in TS 37.213 [14] | 3 | 1 |
| 25 | Type2A-ULChannelAccess defined in clause 4.2.1.2.1 in TS 37.213 [14] | 3 | 2 |
| 26 | Type2A-ULChannelAccess defined in clause 4.2.1.2.1 in TS 37.213 [14] | 3 | 3 |
| 27 | Type2A-ULChannelAccess defined in clause 4.2.1.2.1 in TS 37.213 [14] | 3 | 4 |
| 28 | Type1-ULChannelAccess defined in clause 4.2.1.1 in TS 37.213 [14] | 0 | 1 |
| 29 | Type1-ULChannelAccess defined in clause 4.2.1.1 in TS 37.213 [14] | 0 | 2 |
| 30 | Type1-ULChannelAccess defined in clause 4.2.1.1 in TS 37.213 [14] | 0 | 3 |
| 31 | Type1-ULChannelAccess defined in clause 4.2.1.1 in TS 37.213 [14] | 0 | 4 |
| 32 | Type1-ULChannelAccess defined in clause 4.2.1.1 in TS 37.213 [14] | 1 | 1 |
| 33 | Type1-ULChannelAccess defined in clause 4.2.1.1 in TS 37.213 [14] | 1 | 2 |
| 34 | Type1-ULChannelAccess defined in clause 4.2.1.1 in TS 37.213 [14] | 1 | 3 |
| 35 | Type1-ULChannelAccess defined in clause 4.2.1.1 in TS 37.213 [14] | 1 | 4 |
| 36 | Type1-ULChannelAccess defined in clause 4.2.1.1 in TS 37.213 [14] | 2 | 1 |
| 37 | Type1-ULChannelAccess defined in clause 4.2.1.1 in TS 37.213 [14] | 2 | 2 |
| 38 | Type1-ULChannelAccess defined in clause 4.2.1.1 in TS 37.213 [14] | 2 | 3 |
| 39 | Type1-ULChannelAccess defined in clause 4.2.1.1 in TS 37.213 [14] | 2 | 4 |
| 40 | Type1-ULChannelAccess defined in clause 4.2.1.1 in TS 37.213 [14] | 3 | 1 |
| 41 | Type1-ULChannelAccess defined in clause 4.2.1.1 in TS 37.213 [14] | 3 | 2 |
| 42 | Type1-ULChannelAccess defined in clause 4.2.1.1 in TS 37.213 [14] | 3 | 3 |
| 43 | Type1-ULChannelAccess defined in clause 4.2.1.1 in TS 37.213 [14] | 3 | 4 |

**Table 7.3.1.1.2-35A: Allowed entries for DCI format 0\_1, DCI format 0\_2 and DCI format 0\_3, configured by higher layer parameter *ul-AccessConfigListDCI-0-1* in frequency range 2-2**

|  |  |
| --- | --- |
| **Entry index** | **Channel Access Type** |
| 0 | Type 1 channel access defined in clause 4.4.1 of TS 37.213 [14] |
| 1 | Type 2 channel access defined in clause 4.4.2 of TS 37.213 [14] |
| 2 | Type 3 channel access defined in clause 4.4.3 of TS 37.213 [14] |

**Table 7.3.1.1.2-36: SRS resource set indication**

|  |  |
| --- | --- |
| Bit field mapped to index | SRS resource set indication |
| 0 | SRS resource indicator field and Precoding information and number of layers field are associated with the first SRS resource set;  Second SRS resource indicator field and Second Precoding information field are reserved;  If there are two indicated joint/UL TCI states, the first indicated joint/UL TCI state is applied to the corresponding PUSCH transmission occasions. |
| 1 | SRS resource indicator field and Precoding information and number of layers field are associated with the second SRS resource set;  Second SRS resource indicator field and Second Precoding information field are reserved;  If there are two indicated joint/UL TCI states, the second indicated joint/UL TCI state is applied to the corresponding PUSCH transmission occasions. |
| 2 | SRS resource indicator field and Precoding information and number of layers field are associated with the first SRS resource set;  Second SRS resource indicator field and Second Precoding information field are associated with the second SRS resource set;  If there are two indicated joint/UL TCI states, the first indicated joint/UL TCI state is applied to the PUSCH transmission occasions/antenna ports associated with the first SRS resource set, and the second indicated joint/UL TCI state is applied to the PUSCH transmission occasions/antenna ports associated with the second SRS resource set. |
| 3 | SRS resource indicator field and Precoding information and number of layers field are associated with the first SRS resource set;  Second SRS resource indicator field and Second Precoding information field are associated with the second SRS resource set;  If there are two indicated joint/UL TCI states, the first indicated joint/UL TCI state is applied to the PUSCH transmission occasions associated with the first SRS resource set, and the second indicated joint/UL TCI state is applied to the PUSCH transmission occasions associated with the second SRS resource set.  If *multipanelSchemeSDM or multipanelSchemeSFN* is configured, this row is reserved. |
| NOTE 1: The first and the second SRS resource sets are respectively the ones with lower and higher *srs-ResourceSetId* of the two SRS resources sets configured by higher layer parameter *srs-ResourceSetToAddModList* or *srs-ResourceSetToAddModListDCI-0-2*, and associated with the higher layer parameter *usage* of value '*nonCodeBook*' if *txConfig*=*nonCodebook* or '*codebook*' if *txConfig*=*codebook*. When only one SRS resource set is configured by higher layer parameter *srs-ResourceSetToAddModList* or *srs-ResourceSetToAddModListDCI-0-2*, and associated with the higher layer parameter usage of value '*codebook*' or '*nonCodeBook*' respectively, the first SRS resource set is the SRS resource set. The association of the first and second SRS resource sets to PUSCH repetitions for each bit field index value is as defined in Clause 6.1.2.1 of TS 38.214 [6].  NOTE 2: For DCI format 0\_2, the first and second SRS resource sets configured by higher layer parameter *srs-ResourceSetToAddModListDCI-0-2* are composed of the first SRS resources together with other configurations in the first and second SRS resource sets configured by higher layer parameter *srs-ResourceSetToAddModList*, if any, and associated with the higher layer parameter *usage* of value '*codebook*' or '*nonCodeBook*', respectively, except for the higher layer parameters *'srs-ResourceSetId' and 'srs-ResourceIdList'.* | |

< Unchanged parts are omitted >

Table 7.3.1.1.2-40: Antenna port(s), transform precoder is disabled, *dmrs-Type*=1, *multipanelSchemeSDM* is not configured, *dmrs-TypeEnh* is configured, *maxLength*=1, rank = 3

|  |  |  |
| --- | --- | --- |
| **Value** | **Number of DMRS CDM group(s) without data** | **DMRS port(s)** |
| 0 | 2 | 0-2 |
| 1 | 2 | 8-10 |
| 2 | 1 | 0,1,8 |
| 3 | 2 | 0,1,8 |
| 4 | 2 | 2,3,10 |
| 5-15 | Reserved | Reserved |

Table 7.3.1.1.2-40A: Antenna port(s), transform precoder is disabled, *dmrs-Type*=1, *multipanelSchemeSDM* is configured, *dmrs-TypeEnh* is configured, *maxLength*=1, rank = 3

|  |  |  |
| --- | --- | --- |
| **Value** | **Number of DMRS CDM group(s) without data** | **DMRS port(s)** |
| 0 | 2 | 0-2 |
| 1 | 2 | 8-10 |
| 2 | 1 | 0,1,8 |
| 3 | 2 | 0,1,8 |
| 4 | 2 | 2,3,10 |
| 5 | 2 | 0,2,3 |
| 6-15 | Reserved | Reserved |

< Unchanged parts are omitted >

Table 7.3.1.1.2-48: Antenna port(s), transform precoder is disabled, *dmrs-Type*=1, *multipanelSchemeSDM* is not configured, *dmrs-TypeEnh* is configured, *maxLength*=2, rank = 3

|  |  |  |  |
| --- | --- | --- | --- |
| **Value** | **Number of DMRS CDM group(s) without data** | **DMRS port(s)** | **Number of front-load symbols** |
| 0 | 2 | 0-2 | 1 |
| 1 | 2 | 0,1,4 | 2 |
| 2 | 2 | 2,3,6 | 2 |
| 3 | 2 | 9-11 | 1 |
| 4 | 2 | 8,9,12 | 2 |
| 5 | 2 | 10,11,14 | 2 |
| 6 | 1 | 0,1,8 | 1 |
| 7 | 2 | 0,1,8 | 1 |
| 8 | 2 | 2,3,10 | 1 |
| 9 | 2 | 0,1,8 | 2 |
| 10 | 2 | 4,5,12 | 2 |
| 11 | 2 | 2,3,10 | 2 |
| 12 | 2 | 6,7,14 | 2 |
| 13 | 2 | 5,8,9 | 2 |
| 14 | 2 | 7,10,11 | 2 |
| 15 | 2 | 7,12,13 | 2 |
| 16-31 | Reserved | Reserved | Reserved |

Table 7.3.1.1.2-48A: Antenna port(s), transform precoder is disabled, *dmrs-Type*=1, *multipanelSchemeSDM* is configured, *dmrs-TypeEnh* is configured, *maxLength*=2, rank = 3

|  |  |  |  |
| --- | --- | --- | --- |
| **Value** | **Number of DMRS CDM group(s) without data** | **DMRS port(s)** | **Number of front-load symbols** |
| 0 | 2 | 0-2 | 1 |
| 1 | 2 | 0,1,4 | 2 |
| 2 | 2 | 2,3,6 | 2 |
| 3 | 2 | 9-11 | 1 |
| 4 | 2 | 8,9,12 | 2 |
| 5 | 2 | 10,11,14 | 2 |
| 6 | 1 | 0,1,8 | 1 |
| 7 | 2 | 0,1,8 | 1 |
| 8 | 2 | 2,3,10 | 1 |
| 9 | 2 | 0,1,8 | 2 |
| 10 | 2 | 4,5,12 | 2 |
| 11 | 2 | 2,3,10 | 2 |
| 12 | 2 | 6,7,14 | 2 |
| 13 | 2 | 5,8,9 | 2 |
| 14 | 2 | 7,10,11 | 2 |
| 15 | 2 | 7,12,13 | 2 |
| 16 | 2 | 0,2,3 | 1 |
| 17-31 | Reserved | Reserved | Reserved |

< Unchanged parts are omitted >

Table 7.3.1.1.2-56: Antenna port(s), transform precoder is disabled, *dmrs-Type*=2, *multipanelSchemeSDM* is not configured, *dmrs-TypeEnh* is configured, *maxLength*=1, rank = 3

|  |  |  |
| --- | --- | --- |
| **Value** | **Number of DMRS CDM group(s) without data** | **DMRS port(s)** |
| 0 | 2 | 0-2 |
| 1 | 3 | 0-2 |
| 2 | 3 | 3-5 |
| 3 | 1 | 0,1,12 |
| 4 | 2 | 0,1,12 |
| 5 | 2 | 2,3,14 |
| 6 | 3 | 0,1,12 |
| 7 | 3 | 2,3,14 |
| 8 | 3 | 4,5,16 |
| 9 | 3 | 13,15,17 |
| 10-31 | Reserved | Reserved |

Table 7.3.1.1.2-56A: Antenna port(s), transform precoder is disabled, *dmrs-Type*=2, *multipanelSchemeSDM* is configured, *dmrs-TypeEnh* is configured, *maxLength*=1, rank = 3

| **Value** | **Number of DMRS CDM group(s) without data** | **DMRS port(s)** |
| --- | --- | --- |
| 0 | 2 | 0-2 |
| 1 | 3 | 0-2 |
| 2 | 3 | 3-5 |
| 3 | 1 | 0,1,12 |
| 4 | 2 | 0,1,12 |
| 5 | 2 | 2,3,14 |
| 6 | 3 | 0,1,12 |
| 7 | 3 | 2,3,14 |
| 8 | 3 | 4,5,16 |
| 9 | 3 | 13,15,17 |
| 10 | 2 | 0,2,3 |
| 11-31 | Reserved | Reserved |

< Unchanged parts are omitted >

Table 7.3.1.1.2-64: Antenna port(s), transform precoder is disabled, *dmrs-Type*=2, *multipanelSchemeSDM* is not configured, *dmrs-TypeEnh* is configured, *maxLength*=2, rank = 3

| **Value** | **Number of DMRS CDM group(s) without data** | **DMRS port(s)** | **Number of front-load symbols** |
| --- | --- | --- | --- |
| 0 | 2 | 0-2 | 1 |
| 1 | 3 | 0-2 | 1 |
| 2 | 3 | 3-5 | 1 |
| 3 | 3 | 0,1,6 | 2 |
| 4 | 3 | 2,3,8 | 2 |
| 5 | 3 | 4,5,10 | 2 |
| 6 | 1 | 0,1,12 | 1 |
| 7 | 2 | 0,1,12 | 1 |
| 8 | 2 | 2,3,14 | 1 |
| 9 | 3 | 0,1,12 | 1 |
| 10 | 3 | 2,3,14 | 1 |
| 11 | 3 | 4,5,16 | 1 |
| 12 | 3 | 7,12,13 | 2 |
| 13 | 3 | 9,14,15 | 2 |
| 14 | 3 | 11,16,17 | 2 |
| 15 | 3 | 9,18,19 | 2 |
| 16 | 3 | 18,19,20 | 2 |
| 17 | 3 | 21,22,23 | 2 |
| 18 | 3 | 13,15,17 | 1 |
| 19-63 | Reserved | Reserved | Reserved |

Table 7.3.1.1.2-64A: Antenna port(s), transform precoder is disabled, *dmrs-Type*=2, *multipanelSchemeSDM* is configured, *dmrs-TypeEnh* is configured, *maxLength*=2, rank = 3

|  |  |  |  |
| --- | --- | --- | --- |
| **Value** | **Number of DMRS CDM group(s) without data** | **DMRS port(s)** | **Number of front-load symbols** |
| 0 | 2 | 0-2 | 1 |
| 1 | 3 | 0-2 | 1 |
| 2 | 3 | 3-5 | 1 |
| 3 | 3 | 0,1,6 | 2 |
| 4 | 3 | 2,3,8 | 2 |
| 5 | 3 | 4,5,10 | 2 |
| 6 | 1 | 0,1,12 | 1 |
| 7 | 2 | 0,1,12 | 1 |
| 8 | 2 | 2,3,14 | 1 |
| 9 | 3 | 0,1,12 | 1 |
| 10 | 3 | 2,3,14 | 1 |
| 11 | 3 | 4,5,16 | 1 |
| 12 | 3 | 7,12,13 | 2 |
| 13 | 3 | 9,14,15 | 2 |
| 14 | 3 | 11,16,17 | 2 |
| 15 | 3 | 9,18,19 | 2 |
| 16 | 3 | 18,19,20 | 2 |
| 17 | 3 | 21,22,23 | 2 |
| 18 | 3 | 13,15,17 | 1 |
| 19 | 2 | 0,2,3 | 1 |
| 20-63 | Reserved | Reserved | Reserved |

< Unchanged parts are omitted >

##### 7.3.1.1.3 Format 0\_2

DCI format 0\_2 is used for the scheduling of PUSCH in one cell.

< Unchanged parts are omitted >

- Precoding information and number of layers - number of bits determined by the following:

- 0 bits if the higher layer parameter *txConfig = nonCodeBook*;

- 0 bits for 1 antenna port and if the higher layer parameter *txConfig = codebook*;

- 4, 5, or 6 bits according to Table 7.3.1.1.2-2 for 4 antenna ports by replacing *maxRank*, *maxRankSfn*, *maxRankSdm* and *codebookSubset* with *maxRankDCI-0-2*, *maxRankSfnDCI-0-2*, *maxRankSdmDCI-0-2* and *codebookSubsetDCI-0-2*, respectively, if *txConfig = codebook,* *ul-FullPowerTransmission* is not configured or configured to *fullpowerMode2* or configured to *fullpower,* transform precoder is disabled, and according to the values of higher layer parameters *maxRankDCI-0-2* if neither *multipanelSchemeSDM* nor *multipanelSchemeSFN* is configured or max{*maxRankDCI-0-2*, *maxRankSfnDCI-0-2*} if *multipanelSchemeSFN* is configuredor max{*maxRankDCI-0-2*, *maxRankSdmDCI-0-2*} if *multipanelSchemeSDM* is configured, and *codebookSubsetDCI-0-2*;

- 4 or 5 bits according to Table 7.3.1.1.2-2A for 4 antenna ports by replacing *maxRank*, *maxRankSfn*, *maxRankSdm* and *codebookSubset* with *maxRankDCI-0-2*, *maxRankSfnDCI-0-2*, *maxRankSdmDCI-0-2* and *codebookSubsetDCI-0-2*, respectively, if *txConfig = codebook,* *ul-FullPowerTransmission =fullpowerMode1,* the values of higher layer parameters *maxRankDCI-0-2=2* if neither *multipanelSchemeSDM* nor *multipanelSchemeSFN* is configured or max{*maxRankDCI-0-2*, *maxRankSfnDCI-0-2*} = 2 if *multipanelSchemeSFN* is configured or max{*maxRanDCI-0-2k*, *maxRankSdmDCI-0-2*} = 2 if *multipanelSchemeSDM* is configured*,* transform precoder is disabled, and according to the value of higher layer parameter *codebookSubsetDCI-0-2*;

- 4 or 6 bits according to Table 7.3.1.1.2-2B for 4 antenna ports by replacing *maxRank* and *codebookSubset* with *maxRankDCI-0-2* and *codebookSubsetDCI-0-2* respectively, if *txConfig = codebook, ul-FullPowerTransmission =fullpowerMode1,* the values of higher layer parameters *maxRankDCI-0-2=3 or 4,* transform precoder is disabled, and according to the value of higher layer parameter *codebookSubsetDCI-0-2*;

- 2, 4, or 5 bits according to Table 7.3.1.1.2-3 for 4 antenna ports by replacing *maxRank*, *maxRankSfn*, *maxRankSdm* and *codebookSubset* with *maxRankDCI-0-2*, *maxRankSfnDCI-0-2*, *maxRankSdmDCI-0-2* and *codebookSubsetDCI-0-2*, respectively, if *txConfig = codebook,* *ul-FullPowerTransmission* is not configured or configured to *fullpowerMode2* or configured to *fullpower,* and according to whether transform precoder is enabled or disabled, and *maxRankDCI-0-2=1* if neither *multipanelSchemeSDM* nor *multipanelSchemeSFN* is configured or max{*maxRankDCI-0-2*, *maxRankSfnDCI-0-2*} = 1 if *multipanelSchemeSFN* is configuredor max{*maxRankDCI-0-2*, *maxRankSdmDCI-0-2*} = 1 if *multipanelSchemeSDM* is configured, and *codebookSubsetDCI-0-2*;

- 3 or 4 bits according to Table 7.3.1.1.2-3A for 4 antenna ports by replacing *maxRank*, *maxRankSfn*, *maxRankSdm* and *codebookSubset* with *maxRankDCI-0-2*, *maxRankSfnDCI-0-2*, *maxRankSdmDCI-0-2* and *codebookSubsetDCI-0-2*, respectively, if *txConfig = codebook,* *ul-FullPowerTransmission =fullpowerMode1*, *maxRankDCI-0-2=1* if neither *multipanelSchemeSDM* nor *multipanelSchemeSFN* is configured or max{*maxRankDCI-0-2*, *maxRankSfnDCI-0-2*} = 1 if *multipanelSchemeSFN* is configured or max{*maxRankDCI-0-2*, *maxRankSdmDCI-0-2*} = 1 if *multipanelSchemeSDM* is configured, and according to whether transform precoder is enabled or disabled, and the value of higher layer parameter *codebookSubsetDCI-0-2*;

- 2 or 4 bits according to Table7.3.1.1.2-4 for 2 antenna ports by replacing *maxRank*, *maxRankSfn*, *maxRankSdm* and *codebookSubset* with *maxRankDCI-0-2*, *maxRankSfnDCI-0-2*, *maxRankSdmDCI-0-2* and *codebookSubsetDCI-0-2*, respectively, if *txConfig = codebook,* *ul-FullPowerTransmission* is not configured or configured to *fullpowerMode2* or configured to *fullpower,* transform precoder is disabled, and according to the values of higher layer parameters *maxRankDCI-0-2* if neither *multipanelSchemeSDM* nor *multipanelSchemeSFN* is configured or max{*maxRankDCI-0-2*, *maxRankSfnDCI-0-2*} if *multipanelSchemeSFN* is configuredor max{*maxRankDCI-0-2*, *maxRankSdmDCI-0-2*} if *multipanelSchemeSDM* is configured, and *codebookSubsetDCI-0-2*;

- 2 bits according to Table 7.3.1.1.2-4A for 2 antenna ports by replacing *maxRank*, *maxRankSfn*, *maxRankSdm* and *codebookSubset* with *maxRankDCI-0-2*, *maxRankSfnDCI-0-2*, *maxRankSdmDCI-0-2* and *codebookSubsetDCI-0-2*, respectively, if *txConfig = codebook,* *ul-FullPowerTransmission =fullpowerMode1*, transform precoder is disabled, the *maxRankDCI-0-2=2* if neither *multipanelSchemeSDM* nor *multipanelSchemeSFN* is configured or max{*maxRankDCI-0-2*, *maxRankSfnDCI-0-2*} = 2 if *multipanelSchemeSFN* is configured or max{*maxRankDCI-0-2*, *maxRankSdmDCI-0-2*} = 2 if *multipanelSchemeSDM* is configured, and *codebookSubsetDCI-0-2=nonCoherent*;

- 1 or 3 bits according to Table7.3.1.1.2-5 for 2 antenna ports by replacing *maxRank*, *maxRankSfn*, *maxRankSdm* and *codebookSubset* with *maxRankDCI-0-2*, *maxRankSfnDCI-0-2*, *maxRankSdmDCI-0-2* and *codebookSubsetDCI-0-2*, respectively, if *txConfig = codebook,* *ul-FullPowerTransmission* is not configured or configured to *fullpowerMode2* or configured to *fullpower,* and according to whether transform precoder is enabled or disabled, and *maxRankDCI-0-2=1* if neither *multipanelSchemeSDM* nor *multipanelSchemeSFN* is configured or max{*maxRankDCI-0-2*, *maxRankSfnDCI-0-2*}*=1* if *multipanelSchemeSFN* is configuredor max{*maxRankDCI-0-2*, *maxRankSdmDCI-0-2*}*=1* if *multipanelSchemeSDM* is configured, and *codebookSubsetDCI-0-2*;

- 2 bits according to Table 7.3.1.1.2-5A for 2 antenna ports by replacing *maxRank*, *maxRankSfn*, *maxRankSdm* and *codebookSubset* with *maxRankDCI-0-2*, *maxRankSfnDCI-0-2*, *maxRankSdmDCI-0-2* and *codebookSubsetDCI-0-2*, respectively, if *txConfig = codebook*, *ul-FullPowerTransmission =fullpowerMode1*, *maxRankDCI-0-2=1* if neither *multipanelSchemeSDM* nor *multipanelSchemeSFN* is configured or max{*maxRankDCI-0-2*, *maxRankSfnDCI-0-2*} = 1 if *multipanelSchemeSFN* is configured or max{*maxRankDCI-0-2*, *maxRankSdmDCI-0-2*} = 1 if *multipanelSchemeSDM* is configured, and according to whether transform precoder is enabled or disabled, and the value of higher layer parameter *codebookSubsetDCI-0-2*.

- 7 bits according to Table 7.3.1.1.2-5D for 8 antenna ports by replacing *maxRank-n8* with *maxRankDCI-0-2*, if *CodebookTypeUL=codebook1*, transform precoder is disabled, *maxRankDCI-0-2* =4, and according to *maxRankDCI-0-2*;

- 4, 6 or 7 bits according to Table 7.3.1.1.2-5E for 8 antenna ports by replacing *maxRank* with *maxRankDCI-0-2*, if *CodebookTypeUL=codebook1*, transform precoder is enabled or *maxRankDCI-0-2* =1, 2 or 3 if transform precoder is disabled, and according to transform precoder and *maxRankDCI-0-2*;

- 6 or 7 or 8 bits according to Table 7.3.1.1.2-5G for 8 antenna ports by replacing *maxRank* with *maxRankDCI-0-2*, if *CodebookTypeUL=codebook4*, transform precoder is disabled, *maxRankDCI-0-2*=2, 3 or 4, *ul-FullPowerTransmission* is not configured or configured to *fullpowerMode2* or configured to *fullpower*, and according to *maxRankDCI-0-2*;

- 3 bits according to Table 7.3.1.1.2-5H for 8 antenna ports by replacing *maxRank* with *maxRankDCI-0-2*, if *CodebookTypeUL=codebook4*, transform precoder is enabled or *maxRankDCI-0-2*=1 if transform precoder is disabled, *ul-FullPowerTransmission* is not configured or configured to *fullpowerMode2* or configured to *fullpower*.

- 5, 9 or 10 bits according to Table 7.3.1.1.2-5J for 8 antenna ports by replacing *maxRank* with *maxRankDCI-0-2*, if *CodebookTypeUL=codebook2*, transform precoder is enabled or *maxRankDCI-0-2* =1, 2, 3 or 4 if transform precoder is disabled, *ul-FullPowerTransmission* is not configured or configured to *fullpowerMode2* or configured to *fullpower*, and according to transform precoder and *maxRankDCI-0-2*;

- 4, 7, 9 or 10 bits according to Table 7.3.1.1.2-5L for 8 antenna ports by replacing *maxRank* with *maxRankDCI-0-2*, if *CodebookTypeUL=codebook3*, transform precoder is enabled or *maxRankDCI-0-2* =1, 2, 3 or 4 if transform precoder is disabled, *ul-FullPowerTransmission* is not configured or configured to *fullpowerMode2* or configured to *fullpower*, and according to transform precoder and *maxRankDCI-0-2*;

- 6 or 7 or 8 bits according to Table 7.3.1.1.2-5M for 8 antenna ports by replacing *maxRank* with *maxRankDCI-0-2*, if *CodebookTypeUL=codebook4*, transform precoder is disabled, *maxRankDCI-0-2*=2, 3 or 4, *ul-FullPowerTransmission* is configured to *fullpowerMode1*, and according to *maxRankDCI-0-2*;

- 4 bits according to Table 7.3.1.1.2-5N for 8 antenna ports, if *CodebookTypeUL=codebook4*, transform precoder is enabled or *maxRankDCI-0-2*=1 if transform precoder is disabled, *ul-FullPowerTransmission* is configured to *fullpowerMode1*.

- 6, 9 or 10 bits according to Table 7.3.1.1.2-5O for 8 antenna ports by replacing *maxRank* with *maxRankDCI-0-2*, if *CodebookTypeUL=codebook2*, transform precoder is enabled or *maxRankDCI-0-2* =1, 2, 3 or 4 if transform precoder is disabled, *ul-FullPowerTransmission* is configured to *fullpowerMode1*, and according to transform precoder and *maxRankDCI-0-2*;

- 5, 7, 9 or 10 bits according to Table 7.3.1.1.2-5P for 8 antenna ports by replacing *maxRank* with *maxRankDCI-0-2*, if *CodebookTypeUL=codebook3*, transform precoder is enabled or *maxRankDCI-0-2* =1, 2, 3 or 4 if transform precoder is disabled, *ul-FullPowerTransmission* is configured to *fullpowerMode1*, and according to transform precoder and *maxRankDCI-0-2*;

For the higher layer parameter *txConfig=codebook*, if *ul-FullPowerTransmission* is configured to *fullpowerMode2*, the values of higher layer parameters *maxRankDCI-0-2* is configured to be larger than 2, and at least one SRS resource with 4 antenna ports is configured in the SRS resource set indicated by SRS resource set indicator field if present, otherwise in an SRS resource set with usage set to 'codebook', and an SRS resource with 2 antenna ports is indicated via SRI in the same SRS resource set, then Table 7.3.1.1.2-4 is used by replacing *maxRank* and *codebookSubset* with *maxRankDCI-0-2* and *codebookSubsetDCI-0-2* respectively.

For the higher layer parameter *txConfig = codebook*, if different SRS resources with different number of antenna ports are configured, the bitwidth is determined according to the maximum number of ports in an SRS resource among the configured SRS resources in all SRS resource set(s) with usage set to 'codebook'. If the number of ports for a configured SRS resource in the set is less than the maximum number of ports in an SRS resource among the configured SRS resources, a number of most significant bits with value set to '0' are inserted to the field.

For the higher layer parameter *txConfig = codebook*, when the Transform precoder indicator field is present, if the bit width of the Precoding information and number of layers field for the case with transform precoder enabled is not equal to that for the case with transform precoder disabled, a number of most significant bits with value set to '0' are inserted to the Precoding information and number of layers field for the case with smaller bit width until the bit width of the Precoding information and number of layers field for the two cases are the same.

When the UE is not provided *coresetPoolIndex* or is provided *coresetPoolIndex* with value 0 for the first CORESETs, and is provided *coresetPoolIndex* with value 1 for the second CORESETs, and is provided *enableSTx2PofmDCI*, and there are two SRS resource sets configured by *srs-ResourceSetToAddModListDCI-0-2* and associated with *usage* of value '*codebook*' or '*nonCodeBook*', the Precoding information and number of layers field is associated with the SRS resource set that is associated with the *coresetPoolIndex* value for the CORESET used for the PDCCH carrying the DCI format 0\_2.

- Second Precoding information - number of bits determined by the following:

- 0 bits if SRS resource set indicator field is not present;

- 0 bits if the higher layer parameter *txConfig = nonCodeBook*;

- 0 bits for 1 antenna port and if the higher layer parameter *txConfig = codebook*;

- 3, 4, or 5 bits according to Table 7.3.1.1.2-2C with the same number of layers indicated by Precoding information and number of layers field for 4 antenna ports by replacing *maxRank*, *maxRankSfn* and *codebookSubset* with *maxRankDCI-0-2*, *maxRankSfnDCI-0-2* and *codebookSubsetDCI-0-2*, respectively, if SRS resource set indicator field is present, *txConfig = codebook,* *ul-FullPowerTransmission* is not configured or configured to *fullpowerMode2* or configured to *fullpower,* transform precoder is disabled, and according to the values of higher layer parameters *maxRankDCI-0-2* if neither *multipanelSchemeSDM* nor *multipanelSchemeSFN* is configured or *maxRankSfnDCI-0-2* if *multipanelSchemeSFN* is configured, and *codebookSubsetDCI-0-2*;

- 3 or 4 bits according to Table 7.3.1.1.2-2D with the same number of layers indicated by Precoding information and number of layers field for 4 antenna ports by replacing *maxRank*, *maxRankSfn* and *codebookSubset* with *maxRankDCI-0-2*, *maxRankSfnDCI-0-2* and *codebookSubsetDCI-0-2*, respectively, if SRS resource set indicator field is present, *txConfig = codebook,* *ul-FullPowerTransmission =fullpowerMode1,* the values of higher layer parameters *maxRankDCI-0-2=2* if neither *multipanelSchemeSDM* nor *multipanelSchemeSFN* is configured or *maxRankSfnDCI-0-2=2* if *multipanelSchemeSFN* is configured*,* transform precoder is disabled, and according to the value of higher layer parameter *codebookSubsetDCI-0-2*;

- 3 or 4 bits according to Table 7.3.1.1.2-2E with the same number of layers indicated by Precoding information and number of layers field for 4 antenna ports by replacing *maxRank* and *codebookSubset* with *maxRankDCI-0-2* and *codebookSubsetDCI-0-2* respectively, if SRS resource set indicator field is present, *txConfig = codebook, ul-FullPowerTransmission =fullpowerMode1,* *maxRankDCI-0-2=3 or 4,* transform precoder is disabled, and according to the value of higher layer parameter *codebookSubsetDCI-0-2*;

- 2, 4, or 5 bits according to Table 7.3.1.1.2-3 with the same number of layers indicated by Precoding information and number of layers field for 4 antenna ports by replacing *maxRank*, *maxRankSfn* and *codebookSubset* with *maxRankDCI-0-2*, *maxRankSfnDCI-0-2* and *codebookSubsetDCI-0-2*, respectively, if *txConfig = codebook,* *ul-FullPowerTransmission* is not configured or configured to *fullpowerMode2* or configured to *fullpower,* and according to whether transform precoder is enabled or disabled, and the values of higher layer parameters *maxRankDCI-0-2* if neither *multipanelSchemeSDM* nor *multipanelSchemeSFN* is configured or *maxRankSfnDCI-0-2* if *multipanelSchemeSFN* is configured and *codebookSubsetDCI-0-2*;

- 3 or 4 bits according to Table 7.3.1.1.2-3A with the same number of layers indicated by Precoding information and number of layers field for 4 antenna ports by replacing *maxRank*, *maxRankSfn* and *codebookSubset* with *maxRankDCI-0-2*, *maxRankSfnDCI-0-2* and *codebookSubsetDCI-0-2*, respectively, if *txConfig = codebook,* *ul-FullPowerTransmission =fullpowerMode1*, and according to whether transform precoder is enabled, or disabled and *maxRankDCI-0-2*=1 if neither *multipanelSchemeSDM* nor *multipanelSchemeSFN* is configured or *maxRankSfnDCI-0-2*=1 if *multipanelSchemeSFN* is configured, and the value of higher layer parameter *codebookSubsetDCI-0-2*;

- 1 or 3 bits according to Table7.3.1.1.2-4B with the same number of layers indicated by Precoding information and number of layers field for 2 antenna ports by replacing *maxRank*, *maxRankSfn* and *codebookSubset* with *maxRankDCI-0-2*, *maxRankSfnDCI-0-2* and *codebookSubsetDCI-0-2*, respectively, if SRS resource set indicator field is present, *txConfig = codebook,* *ul-FullPowerTransmission* is not configured or configured to *fullpowerMode2* or configured to *fullpower,* transform precoder is disabled, and according to the values of higher layer parameters *maxRankDCI-0-2* if neither *multipanelSchemeSDM* nor *multipanelSchemeSFN* is configured or *maxRankSfnDCI-0-2* if *multipanelSchemeSFN* is configured, and *codebookSubsetDCI-0-2*;

- 2 bits according to Table 7.3.1.1.2-4C with the same number of layers indicated by Precoding information and number of layers field for 2 antenna ports by replacing *maxRank*, *maxRankSfn* and *codebookSubset* with *maxRankDCI-0-2*, *maxRankSfnDCI-0-2* and *codebookSubsetDCI-0-2*, respectively, if SRS resource set indicator field is present, *txConfig = codebook,* *ul-FullPowerTransmission =fullpowerMode1*, transform precoder is disabled, the *maxRankDCI-0-2=2* if neither *multipanelSchemeSDM* nor *multipanelSchemeSFN* is configured or *maxRankSfnDCI-0-2=2* if *multipanelSchemeSFN* is configured, and *codebookSubsetDCI-0-2=nonCoherent*;

- 1 or 3 bits according to Table7.3.1.1.2-5 with the same number of layers indicated by Precoding information and number of layers field for 2 antenna ports by replacing *maxRank*, *maxRankSfn* and *codebookSubset* with *maxRankDCI-0-2*, *maxRankSfnDCI-0-2* and *codebookSubsetDCI-0-2*, respectively, if SRS resource set indicator field is present, *txConfig = codebook,* *ul-FullPowerTransmission* is not configured or configured to *fullpowerMode2* or configured to *fullpower,* and according to whether transform precoder is enabled or disabled, and the values of higher layer parameters *maxRankDCI-0-2* if neither *multipanelSchemeSDM* nor *multipanelSchemeSFN* is configured or *maxRankSfnDCI-0-2* if *multipanelSchemeSFN* is configured, and *codebookSubsetDCI-0-2*;

- 2 bits according to Table 7.3.1.1.2-5A with the same number of layers indicated by Precoding information and number of layers field for 2 antenna ports by replacing *maxRank*, *maxRankSfn* and *codebookSubset* with *maxRankDCI-0-2*, *maxRankSfnDCI-0-2* and *codebookSubsetDCI-0-2*, respectively, if SRS resource set indicator field is present, *txConfig = codebook,* *ul-FullPowerTransmission =fullpowerMode1*, and according to whether transform precoder is enabled, or disabled and *maxRankDCI-0-2*=1 if neither *multipanelSchemeSDM* nor *multipanelSchemeSFN* is configured or *maxRankSfnDCI-0-2*=1 if *multipanelSchemeSFN* is configured, and the value of higher layer parameter *codebookSubsetDCI-0-2*.

For the higher layer parameter *txConfig=codebook*, if *ul-FullPowerTransmission* is configured to *fullpowerMode2*, the values of higher layer parameters *maxRankDCI-0-2* is configured to be larger than 2, and at least one SRS resource with 4 antenna ports is configured in the SRS resource set indicated by SRS resource set indicator field, and an SRS resource with 2 antenna ports is indicated via Second SRS resource indicator field in the same SRS resource set, then Table 7.3.1.1.2-4B is used by replacing *maxRank* and *codebookSubset* with *maxRankDCI-0-2* and *codebookSubsetDCI-0-2* respectively.

For the higher layer parameter *txConfig = codebook*, if different SRS resources with different number of antenna ports are configured, the bitwidth is determined according to the maximum number of ports in an SRS resource among the configured SRS resources in the second SRS resource set with usage set to 'codebook' as defined in Table 7.3.1.1.2-36. If the number of ports for a configured SRS resource in the set is less than the maximum number of ports in an SRS resource among the configured SRS resources, a number of most significant bits with value set to '0' are inserted to the field.

For the higher layer parameter *txConfig = codebook*, when the Transform precoder indicator field is present, if the bit width of the Second Precoding information field for the case with transform precoder enabled is not equal to that for the case with transform precoder disabled, a number of most significant bits with value set to '0' are inserted to the Second Precoding information field for the case with smaller bit width until the bit width of the Second Precoding information field for the two cases are the same.

- Antenna ports - number of bits determined by the following:

- 0 bit if higher layer parameter *antennaPortsFieldPresenceDCI-0-2* is notconfigured;

- 2, 3, 4, 5 or 6 bits otherwise,

- 2 bits as defined by Tables 7.3.1.1.2-6, if transform precoder is enabled, *dmrs-Type*=1, and *maxLength*=1, except that *dmrs-UplinkTransformPrecoding* and *tp-pi2BPSK* are both configured and π/2 BPSK modulation is used;

- 2 bits as defined by 7.3.1.1.2-6A, if transform precoder is enabled, and *dmrs-UplinkTransformPrecoding* and *tp-pi2BPSK* are both configured, π/2 BPSK modulation is used, *dmrs-Type*=1, and *maxLength*=1, where nSCID is the scrambling identity for antenna ports defined in Clause 6.4.1.1.1.2, in [4, TS38.211];

- 4 bits as defined by Tables 7.3.1.1.2-7, if transform precoder is enabled, *dmrs-Type*=1, and *maxLength*=2, except that *dmrs-UplinkTransformPrecoding* and *tp-pi2BPSK* are both configured and π/2 BPSK modulation is used;

- 4 bits as defined by Tables 7.3.1.1.2-7A, if transform precoder is enabled, and *dmrs-UplinkTransformPrecoding* and *tp-pi2BPSK* are both configured, π/2 BPSK modulation is used, *dmrs-Type*=1, and *maxLength*=2, where *nSCID* is the scrambling identity for antenna ports defined in Clause 6.4.1.1.1.2, in [4, TS38.211];

- 3 bits as defined by Tables 7.3.1.1.2-8/9/10/10A/11 according to the value of rank, if transform precoder is disabled, *dmrs-Type*=1, *dmrs-TypeEnh* is not configured, and *maxLength*=1;

- 4 bits as defined by Tables 7.3.1.1.2-12/13/14/14A/15 according to the value of rank, if transform precoder is disabled, *dmrs-Type*=1, *dmrs-TypeEnh* is not configured, and *maxLength*=2;

- 4 bits as defined by Tables 7.3.1.1.2-16/17/18/18A/19 according to the value of rank, if transform precoder is disabled, *dmrs-Type*=2, *dmrs-TypeEnh* is not configured, and *maxLength*=1;

- 5 bits as defined by Tables 7.3.1.1.2-20/21/22/22A/23 according to the value of rank, if transform precoder is disabled, *dmrs-Type*=2, *dmrs-TypeEnh* is not configured, and *maxLength*=2.

- 4 bits as defined by Tables 7.3.1.1.2-38/39/40/40A/41, if transform precoder is disabled, *dmrs-Type*=1, *dmrs-TypeEnh* is configured, and *maxLength*=1;

- 5 bits as defined by Tables 7.3.1.1.2-46/47/48/48A/49, if transform precoder is disabled, *dmrs-Type*=1, *dmrs-TypeEnh* is configured, and *maxLength*=2;

- 5 bits as defined by Tables 7.3.1.1.2-54/55/56/56A/57, if transform precoder is disabled, *dmrs-Type*=2, *dmrs-TypeEnh* is configured, and *maxLength*=1;

- 6 bits as defined by Tables 7.3.1.1.2-62/63/64/64A/65, if transform precoder is disabled, *dmrs-Type*=2, *dmrs-TypeEnh* is configured, and *maxLength*=2.

where the number of CDM groups without data of values 1, 2, and 3 in Tables 7.3.1.1.2-6 to 7.3.1.1.2-23 refers to CDM groups {0}, {0,1}, and {0, 1,2} respectively, and the value of rank is

- the sum of the value determined according to the SRS resource indicator field and the value determined according to the second SRS resource indicator field, if *txConfig = nonCodebook* and *multipanelSchemeSDM* is configuredand SRS resource set indicator field equals "10"

- the sum of the value determined according to the Precoding information and number of layers field and the value determined according to the Second Precoding information, if *txConfig = codebook* and *multipanelSchemeSDM* is configuredand SRS resource set indicator field equals "10"

- determined according to the SRS resource indicator field if the higher layer parameter *txConfig = nonCodebook* and *multipanelSchemeSDM* is not configured, , or if the higher layer parameter *txConfig = nonCodebook*, *multipanelSchemeSDM* is configured and SRS resource set indicator field equals "00" or “01”

- determined according to the Precoding information and number of layers field if the higher layer parameter *txConfig = codebook* and *multipanelSchemeSDM* is not configured, or if the higher layer parameter *txConfig = codebook*, *multipanelSchemeSDM* is configuredand SRS resource set indicator field equals "00" or "01".

If a UE is configured with both *dmrs-UplinkForPUSCH-MappingTypeA-DCI-0-2* and *dmrs-UplinkForPUSCH-MappingTypeB-DCI-0-2* and is configured with *antennaPortsFieldPresenceDCI-0-2*, the bitwidth of this field equals , where is the "Antenna ports" bitwidth derived according to *dmrs-UplinkForPUSCH-MappingTypeA-DCI-0-2* and is the "Antenna ports" bitwidthderived according to *dmrs-UplinkForPUSCH-MappingTypeB-DCI-0-2*. A number of zeros are padded in the MSB of this field, if the mapping type of the PUSCH corresponds to the smaller value of and .

If a UE is not configured with higher layer parameter *antennaPortsFieldPresenceDCI-0-2,* antenna port(s) are defined assuming bit field index value 0 in Tables 7.3.1.1.2-6 to 7.3.1.1.2-23.

When the Transform precoder indicator field is present, if the bit width of the Antenna ports field for the case with transform precoder enabled is not equal to that for the case with transform precoder disabled, a number of most significant bits with value set to '0' are inserted to the Antenna ports field for the case with smaller bit width until the bit width of the Antenna ports field for the two cases are the same.

- SRS request - 0, 1, 2 or 3 bits

- 0 bit if the higher layer parameter *srs-RequestDCI-0-2* is not configured;

- 1 bit as defined by Table 7.3.1.1.3-1 if higher layer parameter *srs-RequestDCI-0-2 = 1* and for UEs not configured with *supplementaryUplink* in *ServingCellConfig* in the cell;

- 2 bits if higher layer parameter *srs-RequestDCI-0-2 = 1* and for UEs configured with *supplementaryUplink* in *ServingCellConfig* in the cell, where the first bit is the non-SUL/SUL indicator as defined in Table 7.3.1.1.1-1 and the second bit is defined by Table 7.3.1.1.3-1;

- 2 bits as defined by Table 7.3.1.1.2-24 if higher layer parameter *srs-RequestDCI-0-2 = 2* and for UEs not configured with *supplementaryUplink* in *ServingCellConfig* in the cell;

- 3 bits if higher layer parameter *srs-RequestDCI-0-2 = 2* and for UEs configured with *supplementaryUplink* in *ServingCellConfig* in the cell, where the first bit is the non-SUL/SUL indicator as defined in Table 7.3.1.1.1-1 and the second and third bits are defined by Table 7.3.1.1.2-24;

- SRS offset indicator - 0, 1 or 2 bits.

- 0 bit if higher layer parameter *AvailableSlotOffset* is not configured for any aperiodic SRS resource set in the scheduled cell, or if higher layer parameter *AvailableSlotOffset* is configured for at least one aperiodic SRS resource set in the scheduled cell and the maximum number of entries of *availableSlotOffsetList* configured for all aperiodic SRS resource set(s) is 1;

- otherwise, bits are used to indicate available slot offset according to Table 7.3.1.1.2-37 and Clause 6.2.1 of [6, TS 38.214], where K is the maximum number of entries of *availableSlotOffsetList* configured for all aperiodic SRS resource set(s) in the scheduled cell;

- CSI request - 0, 1, 2, 3, 4, 5, or 6 bits determined by higher layer parameter *reportTriggerSizeDCI-0-2*.

- PTRS-DMRS association - number of bits determined as follows

- 0 bit if *PTRS-UplinkConfi*g is not configured in either *dmrs-UplinkForPUSCH-MappingTypeA* or *dmrs-UplinkForPUSCH-MappingTypeB* and transform precoder is disabled, or if transform precoder is enabled, or if *maxRankDCI-0-2=1* and neither *multipanelSchemeSDM* nor *multipanelSchemeSFN* is configured, or if *maxRankDCI-0-2=1* and *maxRankSfnDCI-0-2=1*, or if *maxRankDCI-0-2=1* and *maxRankSdmDCI-0-2=1* when two PTRS ports are configured by *maxNrofPortsforSdm*;

- 2 bits otherwise, where Table 7.3.1.1.2-25/7.3.1.1.2-25A/7.3.1.1.2-25B/7.3.1.1.2-26 are used to indicate the association between PTRS port(s) and DMRS port(s), and the DMRS ports are indicated by the Antenna ports field.

- When one PTRS port or two PTRS ports are configured by *maxNrofPorts* in *PTRS-UplinkConfig*, SRS resource set indicator field is absent or SRS resource set indicator field is present and equals "00" or “01” and maxRank*DCI-0-2*<=4, this field indicates the association between PTRS port(s) and DMRS port(s) corresponding to SRS resource indicator field and/or Precoding information and number of layers field according to Table 7.3.1.1.2-25 and 7.3.1.1.2-26.

- When one PTRS port or two PTRS ports are configured by *maxNrofPorts* in *PTRS-UplinkConfig*, the SRS resource set indicator field is present and equals "10" or “11”, *maxRankDCI-0-2=3 or 4* and neither *multipanelSchemeSDM* nor *multipanelSchemeSFN* is not configured, this field indicates the association between PTRS port(s) and DMRS port(s) corresponding to SRS resource indicator field and/or Precoding information and number of layers field according to Table 7.3.1.1.2-25 and 7.3.1.1.2-26.

- When one PTRS port or two PTRS ports are configured by *maxNrofPorts* in *PTRS-UplinkConfig*, the SRS resource set indicator field is present and equals "10" or "11" and *maxRankDCI-0-2=2* and neither *multipanelSchemeSDM* nor *multipanelSchemeSFN* is configured, the MSB of this field indicates the association between PTRS port(s) and DMRS port(s) corresponding to SRS resource indicator field and/or Precoding information and number of layers field, and the LSB of this field indicates the association between PTRS port(s) and DMRS port(s) corresponding to Second SRS resource indicator field and/or Second Precoding information field, according to Table 7.3.1.1.2-25A.

- When two PTRS ports are configured by *maxNrofPorts* in *PTRS-UplinkConfig*, the SRS resource set indicator field is present and equals "10" and *multipanelSchemeSDM* is configured, the MSB of this field indicates the association between PTRS port 0 and DMRS port(s) corresponding to SRS resource indicator field and/or Precoding information and number of layers field, and the LSB of this field indicates the association between PTRS port 1 and DMRS port(s) corresponding to Second SRS resource indicator field and/or Second Precoding information field, according to Table 7.3.1.1.2-25A.

- When one PTRS port is configured by *maxNrofPortsforSDM* in *PTRS-UplinkConfig*, SRS resource set indicator field is present and equals "10" and *multipanelSchemeSDM* is configured, this field indicates the association between PTRS port and DMRS ports corresponding to SRS resource indicator field and Second SRS resource indicator field and/or Precoding information and number of layers field and Second Precoding information field according to Table 7.3.1.1.2-25.

- When one PTRS port or two PTRS ports are configured by *maxNrofPorts* in *PTRS-UplinkConfig,* SRS resource set indicator field is present and equals "10", *multipanelSchemeSFN* is configured, this field indicates the association between PTRS port(s) and DMRS port(s) corresponding to SRS resource indicator field and/or Precoding information and number of layers field according to Table 7.3.1.1.2-25 and 7.3.1.1.2-26.

If "Bandwidth part indicator" field indicates a bandwidth part other than the active bandwidth part and the "PTRS-DMRS association" field is present for the indicated bandwidth part but not present for the active bandwidth part, the UE assumes the "PTRS-DMRS association" field is not present for the indicated bandwidth part.

When the Transform precoder indicator field is present, if the bit width of PTRS-DMRS association field for the case with transform precoder enabled is not equal to that for the case with transform precoder disabled, a number of most significant bits with value set to '0' are inserted to the PTRS-DMRS association field for the case with smaller bit width until the bit width of the PTRS-DMRS association field for the two cases are the same.

- Second PTRS-DMRS association - 2 bits if PTRS-DMRS association field and SRS resource set indicator field are present and *maxRankDCI-0-2>2* and neither *multipanelSchemeSDM* nor *multipanelSchemeSFN* is configured; 0 bit otherwise. Table 7.3.1.1.2-25 and 7.3.1.1.2-26 are used to indicate the association between PTRS port(s) and DMRS port(s) corresponding to Second SRS resource indicator field and/or Second precoding information field when one PT-RS port and two PT-RS ports are configured by *maxNrofPorts* in *PTRS-UplinkConfig* respectively, and the DMRS ports are indicated by the Antenna ports field.

- beta\_offset indicator - 0 bit if the higher layer parameter *betaOffsetsDCI-0-2 = semiStaticDCI-0-2*; otherwise 1 bit if 2 offset indexes are configured by higher layer parameter *dynamicDCI-0-2* as defined by Table 9.3-3A in [5, TS 38.213], and 2 bits if 4 offset indexes are configured by higher layer parameter *dynamicDCI-0-2* as defined by Table 9.3-3 in [5, TS 38.213].

When two HARQ-ACK codebooks are configured by *pdsch-HARQ-ACK-CodebookList* or by *pdsch-HARQ-ACK-CodebookListMulticast* for the same serving cell and if higher layer parameter *priorityIndicatorDCI-0-2* is configured, if the bit width of the beta\_offset indicator in DCI format 0\_2 for one HARQ-ACK codebook is not equal to that of the beta\_offset indicator in DCI format 0\_2 for the other HARQ-ACK codebook, a number of most significant bits with value set to '0' are inserted to smaller beta\_offset indicator until the bit width of the beta\_offset indicator in DCI format 0\_2 for the two HARQ-ACK codebooks are the same.

- DMRS sequence initialization - 0 or 1 bit

- 0 bit if the higher layer parameter *dmrs-SequenceInitializationDCI-0-2* is not configured, or if transform precoder is enabled by higher layers and the Transform precoder indicator field is not present;

- 1 bit if transform precoder is disabled by higher layers and the higher layer parameter *dmrs-SequenceInitializationDCI-0-2* is configured, or if the Transform precoder indicator field is present and the higher layer parameter *dmrs-SequenceInitializationDCI-0-2* is configured. If the Transform precoder indicator field is present and set to '0', the bit is reserved.

- UL-SCH indicator - 1 bit. A value of "1" indicates UL-SCH shall be transmitted on the PUSCH and a value of "0" indicates UL-SCH shall not be transmitted on the PUSCH. If a UE does not support triggering SRS only in DCI, except for DCI format 0\_2 with CRC scrambled by SP-CSI-RNTI, the UE is not expected to receive a DCI format 0\_2 with UL-SCH indicator of "0" and CSI request of all zero(s). If a UE supports triggering SRS only in DCI, except for DCI format 0\_2 with CRC scrambled by SP-CSI-RNTI, the UE is not expected to recerive a DCI format 0\_2 with UL-SCH indicator of "0", CSI request of all zero(s) and SRS request of all zero(s).

- ChannelAccess-CPext-CAPC - 0, 1, 2, 3, 4, 5 or 6 bits. The bitwidth for this field is determined as bits, where *I* is the number of entries in the higher layer parameter *ul-AccessConfigListDCI-0-2* or in Table 7.3.1.1.1-4A if *channelAccessMode-r16* = "*semiStatic*" is provided, for operation in a cell with shared spectrum channel access in frequency range 1, or the number of entries in the high layer parameter *ul-AccessConfigListDCI-0-1* foroperation in frequency range 2-2 if *ChannelAccessMode2-r17* is provided; otherwise 0 bit. One or more entries from Table 7.3.1.1.2-35 are configured by the higher layer parameter *ul-AccessConfigListDCI-0-2* in frequency range 1*.* One or more entries from Table 7.3.1.1.2-35A are configured by the higher layer parameter *ul-AccessConfigListDCI-0-1* in frequency range 2-2*.*

- Open-loop power control parameter set indication - 0 or 1 or 2 bits.

- 0 bit if the higher layer parameter *p0-PUSCH-SetList* is not configured;

- 1 or 2 bits otherwise,

- 1 bit if SRS resource indicator is present in the DCI format 0\_2;

- 1 or 2 bits as determined by higher layer parameter *olpc-ParameterSetDCI-0-2* if SRS resource indicator is not present in the DCI format 0\_2;

- Priority indicator - 0 bit if higher layer parameter *priorityIndicatorDCI-0-2* is not configured; otherwise 1 bit as defined in Clause 9 in [5, TS 38.213].

- Invalid symbol pattern indicator - 0 bit if higher layer parameter *invalidSymbolPatternIndicatorDCI-0-2* is not configured; otherwise 1 bit as defined in Clause 6.1.2.1 in [6, TS 38.214].

- PDCCH monitoring adaptation indication - 0, 1 or 2 bits

- 1 or 2 bits, if *searchSpaceGroupIdList-r17* is not configured and if *pdcch-SkippingDurationList* is configured

- 1 bit if the UE is configured with only one duration by *pdcch-SkippingDurationList;*

- 2 bits if the UE is configured with more than one duration by *pdcch-SkippingDurationList*.

- 1 or 2 bits, if *pdcch-SkippingDurationList* is not configured and if *searchSpaceGroupIdList-r17* is configured

- 1 bit if the UE is configured by *searchSpaceGroupIdList-r17* with search space set(s) with group index 0 and search space set(s) with group index 1, and if the UE is not configured by *searchSpaceGroupIdList-r17* with any search space set with group index 2;

- 2 bits if the UE is configured by *searchSpaceGroupIdList-r17* with search space set(s) with group index 0, search space set(s) with group index 1 and search space set(s) with group index 2;

- 2 bits, if *pdcch-SkippingDurationList* is configured and if *searchSpaceGroupIdList-r17* is configured

- 0 bit, otherwise

A UE does not expect that the bit width of a field in DCI format 0\_2 with CRC scrambled by CS-RNTI is larger than corresponding bit width of same field in DCI format 0\_2 with CRC scrambled by C-RNTI for the same serving cell. If the bit width of a field in the DCI format 0\_2 with CRC scrambled by CS-RNTI is not equal to that of the corresponding field in the DCI format 0\_2 with CRC scrambled by C-RNTI for the same serving cell, a number of most significant bits with value set to '0' are inserted to the field in DCI format 0\_2 with CRC scrambled by CS-RNTI until the bit width equals that of the corresponding field in the DCI format 0\_2 with CRC scrambled by C-RNTI for the same serving cell.

For a UE configured with scheduling on the primary cell from an SCell, if prior to padding the number of information bits in DCI format 0\_2 carried by PDCCH on the primary cell is not equal to the number of information bits in DCI format 0\_2 carried by PDCCH on the SCell for scheduling on the primary cell, zeros shall be appended to the DCI format 0\_2 with smaller size until the payload size is the same.

- If application of step 4B in clause 7.3.1.0 results in additional zero padding for DCI format 0\_2 for scheduling on the primary cell, corresponding zeros shall be appended to both DCI format 0\_2 monitored on the primary cell and DCI format 0\_2 monitored on the SCell for scheduling on the primary cell.

- If the SCell is deactivated and *firstActiveDownlinkBWP-Id* is not set to dormant BWP, the UE determines the number of information bits in DCI format 0\_2 carried by PDCCH on the primary cell based on a DL BWP provided by *firstActiveDownlinkBWP-Id* for the SCell. If the active DL BWP of the SCell is a dormant DL BWP, or if the SCell is deactivated and *firstActiveDownlinkBWP-Id* is set to dormant BWP, the UE determines the number of information bits in DCI format 0\_2 carried by PDCCH on the primary cell based on a DL BWP provided by *firstWithinActiveTimeBWP-Id* for the SCell if provided; otherwise, based on a DL BWP provided by *firstOutsideActiveTimeBWP-Id* for the SCell.

**Table 7.3.1.1.3-1: 1 bit SRS request in DCI format 0\_2 and DCI format 1\_2**

|  |  |
| --- | --- |
| **Value of SRS request field** | **Triggered aperiodic SRS resource set(s) for DCI format 0\_2 and 1\_2** |
| 0 | No aperiodic SRS resource set triggered |
| 1 | SRS resource set(s) configured with higher layer parameter *aperiodicSRS-ResourceTrigger* set to 1 or an entry in *aperiodicSRS-ResourceTriggerList* set to 1 |

< Unchanged parts are omitted >

##### 7.3.1.2.2 Format 1\_1

DCI format 1\_1 is used for the scheduling of one or multiple PDSCH in one cell.

< Unchanged parts are omitted >

**Table 7.3.1.2.2-6: Allowed entries for DCI format 1\_1/1\_3 and DCI format 1\_2, configured by higher layer parameter *ul-AccessConfigListDCI-1-1* and *ul-AccessConfigListDCI-1-2*, respectively, in frequency range 1**

|  |  |  |
| --- | --- | --- |
| **Entry index** | **Channel Access Type** | **The CP extension Text index defined in Clause 5.3.1 of [4,TS 38.211]** |
| 0 | Type2C-ULChannelAccess defined in clause 4.2.1.2.3 in TS 37.213 [14] | 0 |
| 1 | Type2C-ULChannelAccess defined in clause 4.2.1.2.3 in TS 37.213 [14] | 2 |
| 2 | Type2B-ULChannelAccess defined in clause 4.2.1.2.2 in TS 37.213 [14] | 0 |
| 3 | Type2B-ULChannelAccess defined in clause 4.2.1.2.2 in TS 37.213 [14] | 2 |
| 4 | Type2A-ULChannelAccess defined in clause 4.2.1.2.1 in TS 37.213 [14] | 0 |
| 5 | Type2A-ULChannelAccess defined in clause 4.2.1.2.1 in TS 37.213 [14] | 1 |
| 6 | Type2A-ULChannelAccess defined in clause 4.2.1.2.1 in TS 37.213 [14] | 3 |
| 7 | Type1-ULChannelAccess defined in clause 4.2.1.1 in TS 37.213 [14] | 0 |
| 8 | Type1-ULChannelAccess defined in clause 4.2.1.1 in TS 37.213 [14] | 1 |
| 9 | Type1-ULChannelAccess defined in clause 4.2.1.1 in TS 37.213 [14] | 2 |
| 10 | Type1-ULChannelAccess defined in clause 4.2.1.1 in TS 37.213 [14] | 3 |

**Table 7.3.1.2.2-6A: Allowed entries for DCI format 1\_1, DCI format 1\_2 and DCI format 1\_3, configured by higher layer parameter *ul-AccessConfigListDCI-1-1* in frequency range 2-2**

|  |  |
| --- | --- |
| **Entry index** | **Channel Access Type** |
| 0 | Type 1 channel access defined in clause 4.4.1 of TS 37.213 [14] |
| 1 | Type 2 channel access defined in clause 4.4.2 of TS 37.213 [14] |
| 2 | Type 3 channel access defined in clause 4.4.3 of TS 37.213 [14] |

< Unchanged parts are omitted >

##### 7.3.1.4.3 Format 3\_2

DCI format 3\_2 is used for scheduling of NR PSCCH and NR SL PRS for a dedicated SL PRS resource pool in one cell.

The following information is transmitted by means of the DCI format 3\_2 with CRC scrambled by SL-PRS-RNTI or SL-PRS-CS-RNTI:

- Resource pool index - bits, where *I* is the total number of dedicated SL PRS resource pools for transmission configured by the higher layer parameter *sl-PRS-TxPoolScheduling*, if configured.

- Time gap - 3 bits determined by higher layer parameter *sl-DCI-ToSL-Trans,* as defined in clause 8.2.4.1.1 of [6, TS 38.214]

- First SL PRS indicator - bits indicating the SL PRS resource ID for the first SL PRS transmission, where the value is the total number of SL PRS resources within a slot in a dedicated SL PRS resource pool and provided by the higher layer parameter *sl-PRS-ResourcesDedicatedSL-PRS-RP*.

- SCI format 1-B fields according to clause 8.3.1.2:

- Time resource assignment

- Resource ID indication

- Configuration index – 0 bit if the UE is not configured to monitor DCI format 3\_2 with CRC scrambled by SL-PRS-CS-RNTI; otherwise 3 bitsas defined in clause 8.2.4.1 of [6, TS 38.214]. If the UE is configured to monitor DCI format 3\_2 with CRC scrambled by SL-PRS-CS-RNTI, this field is reserved for DCI format 3\_2 with CRC scrambled by SL-PRS-RNTI.

- Activation/release indication – 0 bit if the UE is not configured to monitor DCI format 3\_2 with CRC scrambled with SL-PRS-CS-RNTI; otherwise 1 bit, where value 0 indicates release and value 1 indicates activation. If the UE is configured to monitor DCI format 3\_2 with CRC scrambled with SL-PRS-CS-RNTI, this field is reserved for DCI format 3\_2 with CRC scrambled by SL-PRS-RNTI.

- Padding bits, if required.

If the total number of transmit resource pools provided in *sl-PRS-TxPoolScheduling*, if configured, is larger than one, zeros shall be appended to the DCI format 3\_2 until the payload size is equal to the size of a DCI format 3\_2 given by a configuration of the transmit resource pool resulting in the largest number of information bits for DCI format 3\_2.

If the UE is configured to monitor DCI format 3\_0 and/or DCI format 3\_1 and the number of information bits in DCI format 3\_2 is less than the larger payload size of DCI format 3\_0 if configured and DCI format 3\_1 if configured, zeros shall be appended to DCI format 3\_2 until the payload size equals the larger payload size of DCI format 3\_0 if configured and DCI format 3\_1 if configured.

< Unchanged parts are omitted >

##### 7.3.1.5.1 Format 4\_0

DCI format 4\_0 is used for the scheduling of PDSCH for broadcast or for multicast in RRC\_INACTIVE state in DL cell.

The following information is transmitted by means of the DCI format 4\_0 with CRC scrambled by MCCH-RNTI or G-RNTI for broadcast configured by *MBS-SessionInfo,* or by Multicast MCCH-RNTI:

- Frequency domain resource assignment - bits where equals to

- the size of CORESET 0 if CORESET 0 is configured for the cell; and

- the size of initial DL bandwidth part if CORESET 0 is not configured for the cell.

- Time domain resource assignment - 4 bits as defined in Clause 5.1.2.1 of [6, TS38.214]

- VRB-to-PRB mapping - 1 bit according to Table 7.3.1.2.2-5

- Modulation and coding scheme - 5 bits as defined in Clause 5.1.3 of [6, TS38.214]

- Redundancy version - 2 bits as defined in Table 7.3.1.1.1-2

- MCCH change notification - 2 bits as defined in Clause 5.9.1.3 and Clause 5.10.1.3 of [9, TS38.331] if the CRC of the DCI format 4\_0 is scrambled by MCCH-RNTI and Multicast MCCH-RNTI respectively. Otherwise, this bit field is reserved.

- Reserved bits - 14bits