**3GPP TSG-RAN WG1 Meeting #106bis-e *R1-210xxxx***

**e-Meeting, October 11–19, 2021**

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **38.212** | **CR** |  | **rev** | **-** | **Current version:** | **16.7.0** |  |
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| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network | **x** | Core Network |  |

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| ***Title:*** | Introduction of NR Multicast and Broadcast Services | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Huawei | | | | | | | | | |
| ***Source to TSG:*** | R1 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_MBS | | | | |  | ***Date:*** | | | 2021-11-01 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***Release:*** | | | Rel-17 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) … Rel-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | Inclusion of Rel-17 NR Multicast and Broadcast Services | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Support of Rel-17 NR Multicast and Broadcast Services | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | NR Multicast and Broadcast Services in Rel-17 will be incomplete | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | | **X** |  | Other core specifications | | | | TS 38.211, TS 38.213, TS 38.214 | | |
| ***affected:*** | |  | **X** | Test specifications | | | |  | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | |  | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

#### 7.3.1.2 DCI formats for scheduling of PDSCH

##### 7.3.1.2.1 Format 1\_0

DCI format 1\_0 is used for the scheduling of PDSCH in one DL cell.

The following information is transmitted by means of the DCI format 1\_0 with CRC scrambled by C-RNTI or CS-RNTI or MCS-C-RNTI:

- Identifier for DCI formats – 1 bits

- The value of this bit field is always set to 1, indicating a DL DCI format

- Frequency domain resource assignment –  bits where  is given by clause 7.3.1.0

If the CRC of the DCI format 1\_0 is scrambled by C-RNTI and the "Frequency domain resource assignment" field are of all ones, the DCI format 1\_0 is for random access procedure initiated by a PDCCH order, with all remaining fields set as follows:

- Random Access Preamble index – 6 bits according to *ra-PreambleIndex* in Clause 5.1.2 of [8, TS38.321]

- UL/SUL indicator – 1 bit. If the value of the "Random Access Preamble index" is not all zeros and if the UE is configured with *supplementaryUplink* in *ServingCellConfig* in the cell, this field indicates which UL carrier in the cell to transmit the PRACH according to Table 7.3.1.1.1-1; otherwise, this field is reserved

- SS/PBCH index – 6 bits. If the value of the "Random Access Preamble index" is not all zeros, this field indicates the SS/PBCH that shall be used to determine the RACH occasion for the PRACH transmission; otherwise, this field is reserved.

- PRACH Mask index – 4 bits. If the value of the "Random Access Preamble index" is not all zeros, this field indicates the RACH occasion associated with the SS/PBCH indicated by "SS/PBCH index" for the PRACH transmission, according to Clause 5.1.1 of [8, TS38.321]; otherwise, this field is reserved

- Reserved bits – 12 bits for operation in a cell with shared spectrum channel access; otherwise 10 bits

Otherwise, all remaining fields are set as follows:

- Time domain resource assignment – 4 bits as defined in Clause 5.1.2.1 of [6, TS 38.214]

- 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, TS 38.214]

- New data indicator – 1 bit

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

- HARQ process number – 4 bits

- Downlink assignment index – 2 bits as defined in Clause 9.1.3 of [5, TS 38.213], as counter DAI

- TPC command for scheduled PUCCH – 2 bits as defined in Clause 7.2.1 of [5, TS 38.213]

- PUCCH resource indicator – 3 bits as defined in Clause 9.2.3 of [5, TS 38.213]

- PDSCH-to-HARQ\_feedback timing indicator – 3 bits as defined in Clause 9.2.3 of [5, TS38.213]

- ChannelAccess-CPext – 2 bits indicating combinations of channel access type and CP extension as defined in Table 7.3.1.1.1-4, or Table 7.3.1.1.1-4A if *ChannelAccessMode-r16* = "*semistatic*" is provided, for operation in a cell with shared spectrum channel access; 0 bits otherwise

The following information is transmitted by means of the DCI format 1\_0 with CRC scrambled by P-RNTI:

- Short Messages Indicator – 2 bits according to Table 7.3.1.2.1-1.

- Short Messages – 8 bits, according to Clause 6.5 of [9, TS38.331]. If only the scheduling information for Paging is carried, this bit field is reserved.

- Frequency domain resource assignment – bits. If only the short message is carried, this bit field is reserved.

-  is the size of CORESET 0

- Time domain resource assignment – 4 bits as defined in Clause 5.1.2.1 of [6, TS38.214]. If only the short message is carried, this bit field is reserved.

- VRB-to-PRB mapping – 1 bit according to Table 7.3.1.2.2-5. If only the short message is carried, this bit field is reserved.

- Modulation and coding scheme – 5 bits as defined in Clause 5.1.3 of [6, TS38.214], using Table 5.1.3.1-1. If only the short message is carried, this bit field is reserved.

- TB scaling – 2 bits as defined in Clause 5.1.3.2 of [6, TS38.214]. If only the short message is carried, this bit field is reserved.

- Reserved bits – 8 bits for operation in a cell with shared spectrum channel access; otherwise 6 bits

The following information is transmitted by means of the DCI format 1\_0 with CRC scrambled by SI-RNTI:

- Frequency domain resource assignment – bits

-  is the size of CORESET 0

- 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], using Table 5.1.3.1-1

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

- System information indicator – 1 bit as defined in Table 7.3.1.2.1-2

- Reserved bits – 17 bits for operation in a cell with shared spectrum channel access; otherwise 15 bits

The following information is transmitted by means of the DCI format 1\_0 with CRC scrambled by RA-RNTI or MsgB-RNTI:

- Frequency domain resource assignment – bits

-  is the size of CORESET 0 if CORESET 0 is configured for the cell and  is 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], using Table 5.1.3.1-1

- TB scaling – 2 bits as defined in Clause 5.1.3.2 of [6, TS38.214]

- LSBs of SFN – 2 bits for the DCI format 1\_0 with CRC scrambled by MsgB-RNTI as defined in Clause 8.2A of [5, TS 38.213] if *msgB-responseWindow* is configured to be larger than 10 ms; or 2 bits for the DCI format 1\_0 with CRC scrambled by RA-RNTI as defined in Clause 8.2 of [5, TS 38.213] for operation in a cell with shared spectrum channel access if *ra-ResponseWindow or ra-ResponseWindow-v1610* is configured to be larger than 10 ms; 0 bit otherwise

- Reserved bits – (16 – *A*) bits for operation in a cell without shared spectrum access, (18 – *A*) for operation in a cell with shared spectrum access, where the value of *A* is the number of bits for the field of 'LSBs of SFN' as defined above

The following information is transmitted by means of the DCI format 1\_0 with CRC scrambled by TC-RNTI:

- Identifier for DCI formats – 1 bit

- The value of this bit field is always set to 1, indicating a DL DCI format

- Frequency domain resource assignment – bits

-  is the size of CORESET 0

- 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], using Table 5.1.3.1-1

- New data indicator – 1 bit

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

- HARQ process number – 4 bits

- Downlink assignment index – 2 bits, reserved

- TPC command for scheduled PUCCH – 2 bits as defined in Clause 7.2.1 of [5, TS38.213]

- PUCCH resource indicator – 3 bits as defined in Clause 9.2.3 of [5, TS38.213]

- PDSCH-to-HARQ\_feedback timing indicator – 3 bits as defined in Clause 9.2.3 of [5, TS38.213]

- ChannelAccess-CPext – 2 bits indicating combinations of channel access type and CP extension as defined in Table 7.3.1.1.1-4, or Table 7.3.1.1.1-4A if *ChannelAccessMode-r16* = "*semistatic*" is provided, for operation in a cell with shared spectrum channel access; otherwise 0 bit

The following information is transmitted by means of the DCI format 1\_0 with CRC scrambled by G-RNTI configured by *G-RNTI-Config* or G-CS-RNTI:

- Frequency domain resource assignment – bits where equals to as given by clause 7.3.1.0

- 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]

- New data indicator – 1 bit

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

- HARQ process number – 4 bits

- Downlink assignment index – 2 bits as defined in Clause 9.1.3 of [5, TS 38.213], as counter DAI

- PUCCH resource indicator – 3 bits as defined in Clause 9.2.3 of [5, TS38.213]

- PDSCH-to-HARQ\_feedback timing indicator – 3 bits as defined in Clause 9.2.3 of [5, TS38.213]

- Reserved bits – 3 bits

The following information is transmitted by means of the DCI format 1\_0 with CRC scrambled by MCCH-RNTI or G-RNTI configured by *MBS-SessionInfo*:

- Frequency domain resource assignment – bits where equals to as given by clause 7.3.1.0

- 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 xxx of [5, TS38.213] if the CRC of the DCI format 1\_0 is scrambled by MCCH-RNTI. Otherwise, this bit field is reserved.

- Reserved bits – [14] bits

Table 7.3.1.2.1-1: Short Message indicator

|  |  |
| --- | --- |
| Bit field | Short Message indicator |
| 00 | Reserved |
| 01 | Only scheduling information for Paging is present in the DCI |
| 10 | Only short message is present in the DCI |
| 11 | Both scheduling information for Paging and short message are present in the DCI |

Table 7.3.1.2.1-2: System information indicator

|  |  |
| --- | --- |
| Bit field | System information indicator |
| 0 | SIB1 [9, TS38.331, Clause 5.2.1] |
| 1 | SI message [9, TS38.331, Clause 5.2.1] |

##### 7.3.1.2.2 Format 1\_1

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

The following information is transmitted by means of the DCI format 1\_1 with CRC scrambled by C-RNTI or CS-RNTI or MCS-C-RNTI:

- Identifier for DCI formats – 1 bits

- The value of this bit field is always set to 1, indicating a DL DCI format

- Carrier indicator – 0 or 3 bits as defined in Clause 10.1 of [5, TS 38.213].

- Bandwidth part indicator – 0, 1 or 2 bits as determined by the number of DL BWPs  configured by higher layers, excluding the initial DL bandwidth part. The bitwidth for this field is determined as bits, where

-  if , in which case the bandwidth part indicator is equivalent to the ascending order of the higher layer parameter *BWP-Id*;

- otherwise , in which case the bandwidth part indicator is defined in Table 7.3.1.1.2-1;

If a UE does not support active BWP change via DCI, the UE ignores this bit field.

- Frequency domain resource assignment – number of bits determined by the following, where  is the size of the active DL bandwidth part:

-  bits if only resource allocation type 0 is configured, where  is defined in Clause 5.1.2.2.1 of [6, TS38.214],

- bits if only resource allocation type 1 is configured, or

-  bits if *resourceAllocation* is configured as '*dynamicSwitch'*.

- If *resourceAllocation* is configured as '*dynamicSwitch'*, the MSB bit is used to indicate resource allocation type 0 or resource allocation type 1, where the bit value of 0 indicates resource allocation type 0 and the bit value of 1 indicates resource allocation type 1.

- For resource allocation type 0, the LSBs provide the resource allocation as defined in Clause 5.1.2.2.1 of [6, TS 38.214].

- For resource allocation type 1, the  LSBs provide the resource allocation as defined in Clause 5.1.2.2.2 of [6, TS 38.214]

If "Bandwidth part indicator" field indicates a bandwidth part other than the active bandwidth part and if *resourceAllocation* is configured as '*dynamicSwitch'* for the indicated bandwidth part, the UE assumes resource allocation type 0 for the indicated bandwidth part if the bitwidth of the "Frequency domain resource assignment" field of the active bandwidth part is smaller than the bitwidth of the "Frequency domain resource assignment" field of the indicated bandwidth part.

- Time domain resource assignment – 0, 1, 2, 3, or 4 bits as defined in Clause 5.1.2.1 of [6, TS 38.214]. The bitwidth for this field is determined as bits, where *I* is the number of entries in the higher layer parameter *pdsch-TimeDomainAllocationList* if the higher layer parameter is configured; otherwise *I* is the number of entries in the default table.

- VRB-to-PRB mapping – 0 or 1 bit:

- 0 bit if only resource allocation type 0 is configured or if interleaved VRB-to-PRB mapping is not configured by high layers;

- 1 bit according to Table 7.3.1.2.2-5 otherwise, only applicable to resource allocation type 1, as defined in Clause 7.3.1.6 of [4, TS 38.211].

- PRB bundling size indicator – 0 bit if the higher layer parameter *prb-BundlingType* is not configured or is set to 'staticBundling', or 1 bit if the higher layer parameter *prb-BundlingType* is set to 'dynamicBundling' according to Clause 5.1.2.3 of [6, TS 38.214].

- Rate matching indicator – 0, 1, or 2 bits according to higher layer parameters *rateMatchPatternGroup1* and *rateMatchPatternGroup2*, where the MSB is used to indicate *rateMatchPatternGroup1* and the LSB is used to indicate *rateMatchPatternGroup2* when there are two groups.

- ZP CSI-RS trigger – 0, 1, or 2 bits as defined in Clause 5.1.4.2 of [6, TS 38.214]. The bitwidth for this field is determined as bits, where is the number of aperiodic ZP CSI-RS resource sets configured by higher layer.

For transport block 1:

- Modulation and coding scheme – 5 bits as defined in Clause 5.1.3.1 of [6, TS 38.214]

- New data indicator – 1 bit

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

For transport block 2 (only present if *maxNrofCodeWordsScheduledByDCI* equals 2):

- Modulation and coding scheme – 5 bits as defined in Clause 5.1.3.1 of [6, TS 38.214]

- New data indicator – 1 bit

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

If "Bandwidth part indicator" field indicates a bandwidth part other than the active bandwidth part and the value of *maxNrofCodeWordsScheduledByDCI* for the indicated bandwidth part equals 2 and the value of *maxNrofCodeWordsScheduledByDCI* for the active bandwidth part equals 1, the UE assumes zeros are padded when interpreting the "Modulation and coding scheme", "New data indicator", and "Redundancy version" fields of transport block 2 according to Clause 12 of [5, TS38.213], and the UE ignores the "Modulation and coding scheme", "New data indicator", and "Redundancy version" fields of transport block 2 for the indicated bandwidth part.

- HARQ process number – 4 bits

- Downlink assignment index – number of bits as defined in the following

- 6 bits if more than one serving cell are configured in the DL and the higher layer parameter *nfi-TotalDAI-Included* is configured. The 4 MSB bits are the counter DAI and the total DAI for the scheduled PDSCH group, and the 2 LSB bits are the total DAI for the non-scheduled PDSCH group.

- 4 bits if only one serving cell is configured in the DL and the higher layer parameter *nfi-TotalDAI-Included* is configured*.* The 2 MSB bits are the counter DAI for the scheduled PDSCH group, and the 2 LSB bits are the total DAI for the non-scheduled PDSCH group;

- 4 bits if more than one serving cell are configured in the DL, the higher layer parameter *pdsch-HARQ-ACK-Codebook=dynamic* or *pdsch-HARQ-ACK-Codebook-r16= enhancedDynamic*, and *nfi-TotalDAI-Included* is not configured, where the 2 MSB bits are the counter DAI and the 2 LSB bits are the total DAI;

- 4 bits if one serving cell is configured in the DL, and the higher layer parameter *pdsch-HARQ-ACK-Codebook=dynamic*, and the UE is not provided *coresetPoolIndex* or is provided *coresetPoolIndex* with value 0 for one or more first CORESETs and is provided *coresetPoolIndex* with value 1 for one or more second CORESETs, and is provided *ackNackFeedbackMode = joint*, where the 2 MSB bits are the counter DAI and the 2 LSB bits are the total DAI;

- 2 bits if only one serving cell is configured in the DL, the higher layer parameter *pdsch-HARQ-ACK-Codebook=dynamic* or *pdsch-HARQ-ACK-Codebook-r16=enhancedDynamic*, and *nfi-TotalDAI-Included* is not configured, when the UE is not configured with *coresetPoolIndex* or the value of *coresetPoolIndex* is the same for all CORESETs if *coresetPoolIndex* is provided or the UE is not configured with *ackNackFeedbackMode = joint*, where the 2 bits are the counter DAI;

- 0 bits otherwise.

If the UE is configured with a PUCCH-SCell, the number of serving cells is determined within a PUCCH group.

If the UE is configured with a PUCCH-SCell, *pdsch-HARQ-ACK-Codebook* is replaced by *pdsch-HARQ-ACK-Codebook-secondaryPUCCHgroup-r16* if present for the secondary PUCCH group.

If higher layer parameter *priorityIndicatorDCI-1-1* is configured, if the bit width of the Downlink assignment index in DCI format 1\_1 for one HARQ-ACK codebook is not equal to that of the Downlink assignment index in DCI format 1\_1 for the other HARQ-ACK codebook, a number of most significant bits with value set to '0' are inserted to smaller Downlink assignment index until the bit width of the Downlink assignment index in DCI format 1\_1 for the two HARQ-ACK codebooks are the same.

- TPC command for scheduled PUCCH – 2 bits as defined in Clause 7.2.1 of [5, TS 38.213]

- PUCCH resource indicator – 3 bits as defined in Clause 9.2.3 of [5, TS 38.213]

- PDSCH-to-HARQ\_feedback timing indicator – 0, 1, 2, or 3 bits as defined in Clause 9.2.3 of [5, TS 38.213]. The bitwidth for this field is determined as bits, where *I* is the number of entries in the higher layer parameter *dl-DataToUL-ACK.*

If higher layer parameter *priorityIndicatorDCI-1-1* is configured, if the bit width of the PDSCH-to-HARQ\_feedback timing indicator in DCI format 1\_1 for one HARQ-ACK codebook is not equal to that of the PDSCH-to-HARQ\_feedback timing indicator in DCI format 1\_1 for the other HARQ-ACK codebook, a number of most significant bits with value set to '0' are inserted to smaller PDSCH-to-HARQ\_feedback timing indicator until the bit width of the PDSCH-to-HARQ\_feedback timing indicator in DCI format 1\_1 for the two HARQ-ACK codebooks are the same.

- One-shot HARQ-ACK request – 0 or 1 bit.

- 1 bit if higher layer parameter *pdsch-HARQ-ACK-OneShotFeedback-r16* is configured;

- 0 bit otherwise.

- PDSCH group index – 0 or 1 bit.

- 1 bit if the higher layer parameter *pdsch-HARQ-ACK-Codebook-r16=* *enhancedDynamic*;

- 0 bit otherwise.

- New feedback indicator – 0, 1 or 2 bits.

- 1 bit if the higher layer parameter *pdsch-HARQ-ACK-Codebook-r16=* *enhancedDynamic* and the higher layer parameter *nfi-TotalDAI-Included* is not configured;

- 2 bits if the higher layer parameter *pdsch-HARQ-ACK-Codebook-r16=* *enhancedDynamic* and the higher layer parameter *nfi-TotalDAI-Included=true*; the MSB corresponds to the scheduled PDSCH group, and the LSB corresponds to the non-scheduled PDSCH group, as defined in [TS38.213] clause 9.1.3.3

- 0 bit otherwise.

- Number of requested PDSCH group(s) – 0 or 1 bit.

- 1 bit if the higher layer parameter *pdsch-HARQ-ACK-Codebook-r16=* *enhancedDynamic*;

- 0 bit otherwise.

- Antenna port(s) – 4, 5, or 6 bits as defined by Tables 7.3.1.2.2-1/2/3/4 and Tables 7.3.1.2.2-1A/2A/3A/4A, where the number of CDM groups without data of values 1, 2, and 3 refers to CDM groups {0}, {0,1}, and {0, 1,2} respectively. The antenna ports  shall be determined according to the ordering of DMRS port(s) given by Tables 7.3.1.2.2-1/2/3/4 or Tables 7.3.1.2.2-1A/2A/3A/4A. When a UE receives an activation command that maps at least one codepoint of DCI field '*Transmission Configuration Indication*' to two TCI states, the UE shall use Table 7.3.1.2.2-1A/2A/3A/4A; otherwise, it shall use Tables 7.3.1.2.2-1/2/3/4. The UE can receive an entry with DMRS ports equals to 1000, 1002, 1003 when two TCI states are indicated in a codepoint of DCI field '*Transmission Configuration Indication*'.

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

- Transmission configuration indication – 0 bit if higher layer parameter *tci-PresentInDCI* is not enabled; otherwise 3 bits as defined in Clause 5.1.5 of [6, TS38.214].

If "Bandwidth part indicator" field indicates a bandwidth part other than the active bandwidth part,

- if the higher layer parameter *tci-PresentInDCI* is not enabled for the CORESET used for the PDCCH carrying the DCI format 1\_1,

- the UE assumes *tci-PresentInDCI* is not enabled for all CORESETs in the indicated bandwidth part;

- otherwise,

- the UE assumes *tci-PresentInDCI* is enabled for all CORESETs in the indicated bandwidth part.

- 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].

- CBG transmission information (CBGTI) – 0 bit if higher layer parameter *codeBlockGroupTransmission* for PDSCH is not configured, otherwise, 2, 4, 6, or 8 bits as defined in Clause 5.1.7 of [6, TS38.214], determined by the higher layer parameters *maxCodeBlockGroupsPerTransportBlock* and *maxNrofCodeWordsScheduledByDCI* for the PDSCH.

If higher layer parameter *priorityIndicatorDCI-1-1* is configured, if the bit width of the CBG transmission information in DCI format 1\_1 for one HARQ-ACK codebook is not equal to that of the CBG transmission information in DCI format 1\_1 for the other HARQ-ACK codebook, a number of most significant bits with value set to '0' are inserted to smaller CBG transmission information until the bit width of the CBG transmission information in DCI format 1\_1 for the two HARQ-ACK codebooks are the same.

- CBG flushing out information (CBGFI) – 1 bit if higher layer parameter *codeBlockGroupFlushIndicator* is configured as "TRUE", 0 bit otherwise.

If higher layer parameter *priorityIndicatorDCI-1-1* is configured, if the bit width of the CBG flushing out information in DCI format 1\_1 for one HARQ-ACK codebook is not equal to that of the CBG flushing out information in DCI format 1\_1 for the other HARQ-ACK codebook, a number of most significant bits with value set to '0' are inserted to smaller CBG flushing out information until the bit width of the CBG flushing out information in DCI format 1\_1 for the two HARQ-ACK codebooks are the same.

- DMRS sequence initialization – 1 bit.

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

- ChannelAccess-CPext – 0, 1, 2, 3 or 4 bits. The bitwidth for this field is determined as bits, where *I* is the number of entries in the higher layer parameter *ul-AccessConfigListDCI-1-1* 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; otherwise 0 bit. One or more entries from Table 7.3.1.2.2-6 are configured by the higher layer parameter *ul-AccessConfigListDCI-1-1.*

- Minimum applicable scheduling offset indicator – 0 or 1 bit

- 0 bit if higher layer parameter *minimumSchedulingOffsetK0* is not configured;

- 1 bit if higher layer parameter *minimumSchedulingOffsetK0* is configured. The 1 bit indication is used to determine the minimum applicable K0 for the active DL BWP and the minimum applicable K2 value for the active UL 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 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. 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.

If one-shot HARQ-ACK request is not present or set to '0', and all bits of frequency domain resource assignment are set to 0 for resource allocation type 0 or set to 1 for resource allocation type 1 or set to 0 or 1 for dynamic switch resource allocation type, this field is reserved and the following fields among the fields above are used for SCell dormancy indication, where each bit corresponds to one of the configured SCell(s), with MSB to LSB of the following fields concatenated in the order below corresponding to the SCell with lowest to highest SCell index

- Modulation and coding scheme of transport block 1

- New data indicator of transport block 1

- Redundancy version of transport block 1

- HARQ process number

- Antenna port(s)

- DMRS sequence initialization

The following information is transmitted by means of the DCI format 1\_1 with CRC scrambled by G-RNTI configured by *G-RNTI-Config* or G-CS-RNTI:

- [Carrier indicator – 0 or 3 bits as defined in Clause 10.1 of [5, TS 38.213].]

- [Bandwidth part indicator – 0, 1 or 2 bits as determined by the number of DL BWPs configured by higher layers, excluding the initial DL bandwidth part. The bitwidth for this field is determined as bits, where

- if , in which case the bandwidth part indicator is equivalent to the ascending order of the higher layer parameter *BWP-Id*;

- otherwise , in which case the bandwidth part indicator is defined in Table 7.3.1.1.2-1;

If a UE does not support active BWP change via DCI, the UE ignores this bit field.]

- Frequency domain resource assignment – number of bits determined by the following, where is the size of the common frequency resource as configured by higher layer parameter *locationAndBandwidth-Multicast*:

- bits if only resource allocation type 0 is configured, where is defined in Clause 5.1.2.2.1 of [6, TS38.214],

- bits if only resource allocation type 1 is configured, or

- bits if *resourceAllocation* in *PDSCH-Config-Multicast* is configured as '*dynamicSwitch'*.

- If *resourceAllocation* in *PDSCH-Config-Multicast* is configured as '*dynamicSwitch'*, the MSB bit is used to indicate resource allocation type 0 or resource allocation type 1, where the bit value of 0 indicates resource allocation type 0 and the bit value of 1 indicates resource allocation type 1.

- For resource allocation type 0, the LSBs provide the resource allocation as defined in Clause 5.1.2.2.1 of [6, TS 38.214].

- For resource allocation type 1, the LSBs provide the resource allocation as defined in Clause 5.1.2.2.2 of [6, TS 38.214]

[If "Bandwidth part indicator" field indicates a bandwidth part other than the active bandwidth part and if *resourceAllocation* in *PDSCH-Config-Multicast* is configured as '*dynamicSwitch'* for the indicated bandwidth part, the UE assumes resource allocation type 0 for the indicated bandwidth part if the bitwidth of the "Frequency domain resource assignment" field of the active bandwidth part is smaller than the bitwidth of the "Frequency domain resource assignment" field of the indicated bandwidth part.]

- Time domain resource assignment – 0, 1, 2, 3, or 4 bits as defined in Clause 5.1.2.1 of [6, TS 38.214]. The bitwidth for this field is determined as bits, where *I* is the number of entries in the higher layer parameter *pdsch-TimeDomainAllocationList* if the higher layer parameter is configured in *PDSCH-Config-Multicast*; [otherwise *I* is the number of entries in the default table].

- VRB-to-PRB mapping – 0 or 1 bit:

- 0 bit if only resource allocation type 0 is configured or if *vrb-ToPRB-Interleaver* in *PDSCH-Config-Multicast* is not configured;

- 1 bit according to Table 7.3.1.2.2-5 otherwise, only applicable to resource allocation type 1, as defined in Clause 7.3.1.6 of [4, TS 38.211].

- PRB bundling size indicator – 0 bit if the higher layer parameter *prb-BundlingType* is not configured in *PDSCH-Config-Multicast* or is set to 'staticBundling', or 1 bit if the higher layer parameter *prb-BundlingType* in *PDSCH-Config-Multicast* is set to 'dynamicBundling' according to Clause 5.1.2.3 of [6, TS 38.214].

- Rate matching indicator – 0, 1, or 2 bits according to higher layer parameters *rateMatchPatternGroup1* and *rateMatchPatternGroup2* in *PDSCH-Config-Multicast*, where the MSB is used to indicate *rateMatchPatternGroup1* and the LSB is used to indicate *rateMatchPatternGroup2* when there are two groups.

- [ZP CSI-RS trigger – 0, 1, or 2 bits as defined in Clause 5.1.4.2 of [6, TS 38.214]. The bitwidth for this field is determined as bits, where is the number of aperiodic ZP CSI-RS resource sets configured by *PDSCH-Config-Multicast*.]

For transport block 1:

- Modulation and coding scheme – 5 bits as defined in Clause 5.1.3.1 of [6, TS 38.214]

- New data indicator – 1 bit

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

[For transport block 2 (only present if *maxNrofCodeWordsScheduledByDCI* in *PDSCH-Config-Multicast* equals 2):

- Modulation and coding scheme – 5 bits as defined in Clause 5.1.3.1 of [6, TS 38.214]

- New data indicator – 1 bit

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

[If "Bandwidth part indicator" field indicates a bandwidth part other than the active bandwidth part and the value of *maxNrofCodeWordsScheduledByDCI* in *PDSCH-Config-Multicast* for the indicated bandwidth part equals 2 and the value of *maxNrofCodeWordsScheduledByDCI* in *PDSCH-Config-Multicast* for the active bandwidth part equals 1, the UE assumes zeros are padded when interpreting the "Modulation and coding scheme", "New data indicator", and "Redundancy version" fields of transport block 2 according to Clause 12 of [5, TS38.213], and the UE ignores the "Modulation and coding scheme", "New data indicator", and "Redundancy version" fields of transport block 2 for the indicated bandwidth part.]

- HARQ process number – 4 bits

- [Downlink assignment index – number of bits as defined in the following

- 4 bits if more than one serving cell are configured in the DL and the higher layer parameter *pdsch-HARQ-ACK-Codebook-Multicast=dynamic*, where the 2 MSB bits are the counter DAI and the 2 LSB bits are the total DAI;

- 2 bits if only one serving cell is configured in the DL and the higher layer parameter *pdsch-HARQ-ACK-Codebook-Multicast=dynamic*, where the 2 bits are the counter DAI;

- 0 bits otherwise. ]

[If the UE is configured with a PUCCH-SCell, the number of serving cells is determined within a PUCCH group.

If the UE is configured with a PUCCH-SCell, *pdsch-HARQ-ACK-Codebook* is replaced by *pdsch-HARQ-ACK-Codebook-secondaryPUCCHgroup-r16* if present for the secondary PUCCH group.]

If higher layer parameter *priorityIndicatorDCI-1-1* is configured in *PDSCH-Config-Multicast*, if the bit width of the Downlink assignment index in DCI format 1\_1 for one HARQ-ACK codebook is not equal to that of the Downlink assignment index in DCI format 1\_1 for the other HARQ-ACK codebook, a number of most significant bits with value set to '0' are inserted to smaller Downlink assignment index until the bit width of the Downlink assignment index in DCI format 1\_1 for the two HARQ-ACK codebooks are the same.

- PUCCH resource indicator – 3 bits as defined in Clause 9.2.3 of [5, TS 38.213]

- PDSCH-to-HARQ\_feedback timing indicator – 0, 1, 2, or 3 bits as defined in Clause 9.2.3 of [5, TS 38.213]. The bitwidth for this field is determined as bits, where *I* is the number of entries in the higher layer parameter *dl-DataToUL-ACK* in *PUCCH-Config-Multicast1* if configured or *PUCCH-Config-Multicast2* if configured; otherwise, *I* is the number of entries in the higher layer parameter *dl-DataToUL-ACK* in *PUCCH-Config.*

If higher layer parameter *priorityIndicatorDCI-1-1* is configured in *PDSCH-Config-Multicast*, if the bit width of the PDSCH-to-HARQ\_feedback timing indicator in DCI format 1\_1 for one HARQ-ACK codebook is not equal to that of the PDSCH-to-HARQ\_feedback timing indicator in DCI format 1\_1 for the other HARQ-ACK codebook, a number of most significant bits with value set to '0' are inserted to smaller PDSCH-to-HARQ\_feedback timing indicator until the bit width of the PDSCH-to-HARQ\_feedback timing indicator in DCI format 1\_1 for the two HARQ-ACK codebooks are the same.

- [Antenna port(s) – 4, 5, or 6 bits as defined by Tables 7.3.1.2.2-1/2/3/4, where the number of CDM groups without data of values 1, 2, and 3 refers to CDM groups {0}, {0,1}, and {0, 1,2} respectively. The antenna ports shall be determined according to the ordering of DMRS port(s) given by Tables 7.3.1.2.2-1/2/3/4.

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

- Transmission configuration indication – 0 bit if higher layer parameter *tci-PresentInDCI* in *PDCCH-Config-Multicast* is not enabled; otherwise 3 bits as defined in Clause 5.1.5 of [6, TS38.214].

[If "Bandwidth part indicator" field indicates a bandwidth part other than the active bandwidth part,

- if the higher layer parameter *tci-PresentInDCI* in *PDCCH-Config-Multicast* is not enabled for the CORESET used for the PDCCH carrying the DCI format 1\_1,

- the UE assumes *tci-PresentInDCI* in *PDCCH-Config-Multicast* is not enabled for all CORESETs in the indicated bandwidth part;

- otherwise,

- the UE assumes *tci-PresentInDCI* in *PDCCH-Config-Multicast* is enabled for all CORESETs in the indicated bandwidth part.]

- DMRS sequence initialization – 1 bit.

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

- [Minimum applicable scheduling offset indicator – 0 or 1 bit

- 0 bit if higher layer parameter *minimumSchedulingOffsetK0* is not configured in *PDSCH-Config-Multicast*;

- 1 bit if higher layer parameter *minimumSchedulingOffsetK0* is configured in *PDSCH-Config-Multicast*. The 1 bit indication is used to determine the minimum applicable K0 for the active DL BWPaccording to Table 7.3.1.1.2-33.]

- [Enabling/disabling HARQ-ACK feedback indication –1 bit if higher layer parameter *harq-FeedbackEnabler-Multicast* indicates *dci-enabler*; 0 bit, otherwise.]

If DCI formats 1\_1 are monitored in multiple search spaces associated with multiple CORESETs in a BWP for scheduling the same serving cell, zeros shall be appended until the payload size of the DCI formats 1\_1 monitored in the multiple search spaces equal to the maximum payload size of the DCI format 1\_1 monitored in the multiple search spaces.

Table 7.3.1.2.2-1: Antenna port(s) (1000 + DMRS port), *dmrs-Type*=1, *maxLength*=1

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

Table 7.3.1.2.2-1A: Antenna port(s) (1000 + DMRS port), *dmrs-Type*=1, *maxLength*=1

|  |  |  |
| --- | --- | --- |
| **One Codeword:**  **Codeword 0 enabled,**  **Codeword 1 disabled** | | |
| **Value** | **Number of DMRS CDM group(s) without data** | **DMRS port(s)** |
| 0 | 1 | 0 |
| 1 | 1 | 1 |
| 2 | 1 | 0,1 |
| 3 | 2 | 0 |
| 4 | 2 | 1 |
| 5 | 2 | 2 |
| 6 | 2 | 3 |
| 7 | 2 | 0,1 |
| 8 | 2 | 2,3 |
| 9 | 2 | 0-2 |
| 10 | 2 | 0-3 |
| 11 | 2 | 0,2 |
| 12 | 2 | 0,2,3 |
| 13-15 | Reserved | Reserved |

Table 7.3.1.2.2-2: Antenna port(s) (1000 + DMRS port), *dmrs-Type*=1, *maxLength*=2

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **One Codeword:**  **Codeword 0 enabled,**  **Codeword 1 disabled** | | | | **Two Codewords:**  **Codeword 0 enabled,**  **Codeword 1 enabled** | | | |
| **Value** | **Number of DMRS CDM group(s) without data** | **DMRS port(s)** | **Number of front-load symbols** | **Value** | **Number of DMRS CDM group(s) without data** | **DMRS port(s)** | **Number of front-load symbols** |
| 0 | 1 | 0 | 1 | 0 | 2 | 0-4 | 2 |
| 1 | 1 | 1 | 1 | 1 | 2 | 0,1,2,3,4,6 | 2 |
| 2 | 1 | 0,1 | 1 | 2 | 2 | 0,1,2,3,4,5,6 | 2 |
| 3 | 2 | 0 | 1 | 3 | 2 | 0,1,2,3,4,5,6,7 | 2 |
| 4 | 2 | 1 | 1 | 4-31 | reserved | reserved | reserved |
| 5 | 2 | 2 | 1 |  |  |  |  |
| 6 | 2 | 3 | 1 |  |  |  |  |
| 7 | 2 | 0,1 | 1 |  |  |  |  |
| 8 | 2 | 2,3 | 1 |  |  |  |  |
| 9 | 2 | 0-2 | 1 |  |  |  |  |
| 10 | 2 | 0-3 | 1 |  |  |  |  |
| 11 | 2 | 0,2 | 1 |  |  |  |  |
| 12 | 2 | 0 | 2 |  |  |  |  |
| 13 | 2 | 1 | 2 |  |  |  |  |
| 14 | 2 | 2 | 2 |  |  |  |  |
| 15 | 2 | 3 | 2 |  |  |  |  |
| 16 | 2 | 4 | 2 |  |  |  |  |
| 17 | 2 | 5 | 2 |  |  |  |  |
| 18 | 2 | 6 | 2 |  |  |  |  |
| 19 | 2 | 7 | 2 |  |  |  |  |
| 20 | 2 | 0,1 | 2 |  |  |  |  |
| 21 | 2 | 2,3 | 2 |  |  |  |  |
| 22 | 2 | 4,5 | 2 |  |  |  |  |
| 23 | 2 | 6,7 | 2 |  |  |  |  |
| 24 | 2 | 0,4 | 2 |  |  |  |  |
| 25 | 2 | 2,6 | 2 |  |  |  |  |
| 26 | 2 | 0,1,4 | 2 |  |  |  |  |
| 27 | 2 | 2,3,6 | 2 |  |  |  |  |
| 28 | 2 | 0,1,4,5 | 2 |  |  |  |  |
| 29 | 2 | 2,3,6,7 | 2 |  |  |  |  |
| 30 | 2 | 0,2,4,6 | 2 |  |  |  |  |
| 31 | Reserved | Reserved | Reserved |  |  |  |  |

Table 7.3.1.2.2-2A: Antenna port(s) (1000 + DMRS port), *dmrs-Type*=1, *maxLength*=2

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **One Codeword:**  **Codeword 0 enabled,**  **Codeword 1 disabled** | | | | **Two Codewords:**  **Codeword 0 enabled,**  **Codeword 1 enabled** | | | |
| **Value** | **Number of DMRS CDM group(s) without data** | **DMRS port(s)** | **Number of front-load symbols** | **Value** | **Number of DMRS CDM group(s) without data** | **DMRS port(s)** | **Number of front-load symbols** |
| 0 | 1 | 0 | 1 | 0 | 2 | 0-4 | 2 |
| 1 | 1 | 1 | 1 | 1 | 2 | 0,1,2,3,4,6 | 2 |
| 2 | 1 | 0,1 | 1 | 2 | 2 | 0,1,2,3,4,5,6 | 2 |
| 3 | 2 | 0 | 1 | 3 | 2 | 0,1,2,3,4,5,6,7 | 2 |
| 4 | 2 | 1 | 1 | 4-31 | reserved | reserved | reserved |
| 5 | 2 | 2 | 1 |  |  |  |  |
| 6 | 2 | 3 | 1 |  |  |  |  |
| 7 | 2 | 0,1 | 1 |  |  |  |  |
| 8 | 2 | 2,3 | 1 |  |  |  |  |
| 9 | 2 | 0-2 | 1 |  |  |  |  |
| 10 | 2 | 0-3 | 1 |  |  |  |  |
| 11 | 2 | 0,2 | 1 |  |  |  |  |
| 12 | 2 | 0 | 2 |  |  |  |  |
| 13 | 2 | 1 | 2 |  |  |  |  |
| 14 | 2 | 2 | 2 |  |  |  |  |
| 15 | 2 | 3 | 2 |  |  |  |  |
| 16 | 2 | 4 | 2 |  |  |  |  |
| 17 | 2 | 5 | 2 |  |  |  |  |
| 18 | 2 | 6 | 2 |  |  |  |  |
| 19 | 2 | 7 | 2 |  |  |  |  |
| 20 | 2 | 0,1 | 2 |  |  |  |  |
| 21 | 2 | 2,3 | 2 |  |  |  |  |
| 22 | 2 | 4,5 | 2 |  |  |  |  |
| 23 | 2 | 6,7 | 2 |  |  |  |  |
| 24 | 2 | 0,4 | 2 |  |  |  |  |
| 25 | 2 | 2,6 | 2 |  |  |  |  |
| 26 | 2 | 0,1,4 | 2 |  |  |  |  |
| 27 | 2 | 2,3,6 | 2 |  |  |  |  |
| 28 | 2 | 0,1,4,5 | 2 |  |  |  |  |
| 29 | 2 | 2,3,6,7 | 2 |  |  |  |  |
| 30 | 2 | 0,2,4,6 | 2 |  |  |  |  |
| 31 | 2 | 0,2,3 | 1 |  |  |  |  |

Table 7.3.1.2.2-3: Antenna port(s) (1000 + DMRS port), *dmrs-Type*=2, *maxLength*=1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **One codeword:**  **Codeword 0 enabled,**  **Codeword 1 disabled** | | | **Two codewords:**  **Codeword 0 enabled,**  **Codeword 1 enabled** | | |
| **Value** | **Number of DMRS CDM group(s) without data** | **DMRS port(s)** | **Value** | **Number of DMRS CDM group(s) without data** | **DMRS port(s)** |
| 0 | 1 | 0 | 0 | 3 | 0-4 |
| 1 | 1 | 1 | 1 | 3 | 0-5 |
| 2 | 1 | 0,1 | 2-31 | reserved | reserved |
| 3 | 2 | 0 |  |  |  |
| 4 | 2 | 1 |  |  |  |
| 5 | 2 | 2 |  |  |  |
| 6 | 2 | 3 |  |  |  |
| 7 | 2 | 0,1 |  |  |  |
| 8 | 2 | 2,3 |  |  |  |
| 9 | 2 | 0-2 |  |  |  |
| 10 | 2 | 0-3 |  |  |  |
| 11 | 3 | 0 |  |  |  |
| 12 | 3 | 1 |  |  |  |
| 13 | 3 | 2 |  |  |  |
| 14 | 3 | 3 |  |  |  |
| 15 | 3 | 4 |  |  |  |
| 16 | 3 | 5 |  |  |  |
| 17 | 3 | 0,1 |  |  |  |
| 18 | 3 | 2,3 |  |  |  |
| 19 | 3 | 4,5 |  |  |  |
| 20 | 3 | 0-2 |  |  |  |
| 21 | 3 | 3-5 |  |  |  |
| 22 | 3 | 0-3 |  |  |  |
| 23 | 2 | 0,2 |  |  |  |
| 24-31 | Reserved | Reserved |  |  |  |

Table 7.3.1.2.2-3A: Antenna port(s) (1000 + DMRS port), *dmrs-Type*=2, *maxLength*=1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **One codeword:**  **Codeword 0 enabled,**  **Codeword 1 disabled** | | | **Two codewords:**  **Codeword 0 enabled,**  **Codeword 1 enabled** | | |
| **Value** | **Number of DMRS CDM group(s) without data** | **DMRS port(s)** | **Value** | **Number of DMRS CDM group(s) without data** | **DMRS port(s)** |
| 0 | 1 | 0 | 0 | 3 | 0-4 |
| 1 | 1 | 1 | 1 | 3 | 0-5 |
| 2 | 1 | 0,1 | 2-31 | reserved | reserved |
| 3 | 2 | 0 |  |  |  |
| 4 | 2 | 1 |  |  |  |
| 5 | 2 | 2 |  |  |  |
| 6 | 2 | 3 |  |  |  |
| 7 | 2 | 0,1 |  |  |  |
| 8 | 2 | 2,3 |  |  |  |
| 9 | 2 | 0-2 |  |  |  |
| 10 | 2 | 0-3 |  |  |  |
| 11 | 3 | 0 |  |  |  |
| 12 | 3 | 1 |  |  |  |
| 13 | 3 | 2 |  |  |  |
| 14 | 3 | 3 |  |  |  |
| 15 | 3 | 4 |  |  |  |
| 16 | 3 | 5 |  |  |  |
| 17 | 3 | 0,1 |  |  |  |
| 18 | 3 | 2,3 |  |  |  |
| 19 | 3 | 4,5 |  |  |  |
| 20 | 3 | 0-2 |  |  |  |
| 21 | 3 | 3-5 |  |  |  |
| 22 | 3 | 0-3 |  |  |  |
| 23 | 2 | 0,2 |  |  |  |
| 24 | 2 | 0,2,3 |  |  |  |
| 25-31 | Reserved | Reserved |  |  |  |

Table 7.3.1.2.2-4: Antenna port(s) (1000 + DMRS port), *dmrs-Type*=2, *maxLength*=2

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **One codeword:**  **Codeword 0 enabled,**  **Codeword 1 disabled** | | | | **Two Codewords:**  **Codeword 0 enabled,**  **Codeword 1 enabled** | | | |
| **Value** | **Number of DMRS CDM group(s) without data** | **DMRS port(s)** | **Number of front-load symbols** | **Value** | **Number of DMRS CDM group(s) without data** | **DMRS port(s)** | **Number of front-load symbols** |
| 0 | 1 | 0 | 1 | 0 | 3 | 0-4 | 1 |
| 1 | 1 | 1 | 1 | 1 | 3 | 0-5 | 1 |
| 2 | 1 | 0,1 | 1 | 2 | 2 | 0,1,2,3,6 | 2 |
| 3 | 2 | 0 | 1 | 3 | 2 | 0,1,2,3,6,8 | 2 |
| 4 | 2 | 1 | 1 | 4 | 2 | 0,1,2,3,6,7,8 | 2 |
| 5 | 2 | 2 | 1 | 5 | 2 | 0,1,2,3,6,7,8,9 | 2 |
| 6 | 2 | 3 | 1 | 6-63 | Reserved | Reserved | Reserved |
| 7 | 2 | 0,1 | 1 |  |  |  |  |
| 8 | 2 | 2,3 | 1 |  |  |  |  |
| 9 | 2 | 0-2 | 1 |  |  |  |  |
| 10 | 2 | 0-3 | 1 |  |  |  |  |
| 11 | 3 | 0 | 1 |  |  |  |  |
| 12 | 3 | 1 | 1 |  |  |  |  |
| 13 | 3 | 2 | 1 |  |  |  |  |
| 14 | 3 | 3 | 1 |  |  |  |  |
| 15 | 3 | 4 | 1 |  |  |  |  |
| 16 | 3 | 5 | 1 |  |  |  |  |
| 17 | 3 | 0,1 | 1 |  |  |  |  |
| 18 | 3 | 2,3 | 1 |  |  |  |  |
| 19 | 3 | 4,5 | 1 |  |  |  |  |
| 20 | 3 | 0-2 | 1 |  |  |  |  |
| 21 | 3 | 3-5 | 1 |  |  |  |  |
| 22 | 3 | 0-3 | 1 |  |  |  |  |
| 23 | 2 | 0,2 | 1 |  |  |  |  |
| 24 | 3 | 0 | 2 |  |  |  |  |
| 25 | 3 | 1 | 2 |  |  |  |  |
| 26 | 3 | 2 | 2 |  |  |  |  |
| 27 | 3 | 3 | 2 |  |  |  |  |
| 28 | 3 | 4 | 2 |  |  |  |  |
| 29 | 3 | 5 | 2 |  |  |  |  |
| 30 | 3 | 6 | 2 |  |  |  |  |
| 31 | 3 | 7 | 2 |  |  |  |  |
| 32 | 3 | 8 | 2 |  |  |  |  |
| 33 | 3 | 9 | 2 |  |  |  |  |
| 34 | 3 | 10 | 2 |  |  |  |  |
| 35 | 3 | 11 | 2 |  |  |  |  |
| 36 | 3 | 0,1 | 2 |  |  |  |  |
| 37 | 3 | 2,3 | 2 |  |  |  |  |
| 38 | 3 | 4,5 | 2 |  |  |  |  |
| 39 | 3 | 6,7 | 2 |  |  |  |  |
| 40 | 3 | 8,9 | 2 |  |  |  |  |
| 41 | 3 | 10,11 | 2 |  |  |  |  |
| 42 | 3 | 0,1,6 | 2 |  |  |  |  |
| 43 | 3 | 2,3,8 | 2 |  |  |  |  |
| 44 | 3 | 4,5,10 | 2 |  |  |  |  |
| 45 | 3 | 0,1,6,7 | 2 |  |  |  |  |
| 46 | 3 | 2,3,8,9 | 2 |  |  |  |  |
| 47 | 3 | 4,5,10,11 | 2 |  |  |  |  |
| 48 | 1 | 0 | 2 |  |  |  |  |
| 49 | 1 | 1 | 2 |  |  |  |  |
| 50 | 1 | 6 | 2 |  |  |  |  |
| 51 | 1 | 7 | 2 |  |  |  |  |
| 52 | 1 | 0,1 | 2 |  |  |  |  |
| 53 | 1 | 6,7 | 2 |  |  |  |  |
| 54 | 2 | 0,1 | 2 |  |  |  |  |
| 55 | 2 | 2,3 | 2 |  |  |  |  |
| 56 | 2 | 6,7 | 2 |  |  |  |  |
| 57 | 2 | 8,9 | 2 |  |  |  |  |
| 58-63 | Reserved | Reserved | Reserved |  |  |  |  |

Table 7.3.1.2.2-4A: Antenna port(s) (1000 + DMRS port), *dmrs-Type*=2, *maxLength*=2

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **One codeword:**  **Codeword 0 enabled,**  **Codeword 1 disabled** | | | | **Two Codewords:**  **Codeword 0 enabled,**  **Codeword 1 enabled** | | | |
| **Value** | **Number of DMRS CDM group(s) without data** | **DMRS port(s)** | **Number of front-load symbols** | **Value** | **Number of DMRS CDM group(s) without data** | **DMRS port(s)** | **Number of front-load symbols** |
| 0 | 1 | 0 | 1 | 0 | 3 | 0-4 | 1 |
| 1 | 1 | 1 | 1 | 1 | 3 | 0-5 | 1 |
| 2 | 1 | 0,1 | 1 | 2 | 2 | 0,1,2,3,6 | 2 |
| 3 | 2 | 0 | 1 | 3 | 2 | 0,1,2,3,6,8 | 2 |
| 4 | 2 | 1 | 1 | 4 | 2 | 0,1,2,3,6,7,8 | 2 |
| 5 | 2 | 2 | 1 | 5 | 2 | 0,1,2,3,6,7,8,9 | 2 |
| 6 | 2 | 3 | 1 | 6-63 | Reserved | Reserved | Reserved |
| 7 | 2 | 0,1 | 1 |  |  |  |  |
| 8 | 2 | 2,3 | 1 |  |  |  |  |
| 9 | 2 | 0-2 | 1 |  |  |  |  |
| 10 | 2 | 0-3 | 1 |  |  |  |  |
| 11 | 3 | 0 | 1 |  |  |  |  |
| 12 | 3 | 1 | 1 |  |  |  |  |
| 13 | 3 | 2 | 1 |  |  |  |  |
| 14 | 3 | 3 | 1 |  |  |  |  |
| 15 | 3 | 4 | 1 |  |  |  |  |
| 16 | 3 | 5 | 1 |  |  |  |  |
| 17 | 3 | 0,1 | 1 |  |  |  |  |
| 18 | 3 | 2,3 | 1 |  |  |  |  |
| 19 | 3 | 4,5 | 1 |  |  |  |  |
| 20 | 3 | 0-2 | 1 |  |  |  |  |
| 21 | 3 | 3-5 | 1 |  |  |  |  |
| 22 | 3 | 0-3 | 1 |  |  |  |  |
| 23 | 2 | 0,2 | 1 |  |  |  |  |
| 24 | 3 | 0 | 2 |  |  |  |  |
| 25 | 3 | 1 | 2 |  |  |  |  |
| 26 | 3 | 2 | 2 |  |  |  |  |
| 27 | 3 | 3 | 2 |  |  |  |  |
| 28 | 3 | 4 | 2 |  |  |  |  |
| 29 | 3 | 5 | 2 |  |  |  |  |
| 30 | 3 | 6 | 2 |  |  |  |  |
| 31 | 3 | 7 | 2 |  |  |  |  |
| 32 | 3 | 8 | 2 |  |  |  |  |
| 33 | 3 | 9 | 2 |  |  |  |  |
| 34 | 3 | 10 | 2 |  |  |  |  |
| 35 | 3 | 11 | 2 |  |  |  |  |
| 36 | 3 | 0,1 | 2 |  |  |  |  |
| 37 | 3 | 2,3 | 2 |  |  |  |  |
| 38 | 3 | 4,5 | 2 |  |  |  |  |
| 39 | 3 | 6,7 | 2 |  |  |  |  |
| 40 | 3 | 8,9 | 2 |  |  |  |  |
| 41 | 3 | 10,11 | 2 |  |  |  |  |
| 42 | 3 | 0,1,6 | 2 |  |  |  |  |
| 43 | 3 | 2,3,8 | 2 |  |  |  |  |
| 44 | 3 | 4,5,10 | 2 |  |  |  |  |
| 45 | 3 | 0,1,6,7 | 2 |  |  |  |  |
| 46 | 3 | 2,3,8,9 | 2 |  |  |  |  |
| 47 | 3 | 4,5,10,11 | 2 |  |  |  |  |
| 48 | 1 | 0 | 2 |  |  |  |  |
| 49 | 1 | 1 | 2 |  |  |  |  |
| 50 | 1 | 6 | 2 |  |  |  |  |
| 51 | 1 | 7 | 2 |  |  |  |  |
| 52 | 1 | 0,1 | 2 |  |  |  |  |
| 53 | 1 | 6,7 | 2 |  |  |  |  |
| 54 | 2 | 0,1 | 2 |  |  |  |  |
| 55 | 2 | 2,3 | 2 |  |  |  |  |
| 56 | 2 | 6,7 | 2 |  |  |  |  |
| 57 | 2 | 8,9 | 2 |  |  |  |  |
| 58 | 2 | 0,2,3 | 1 |  |  |  |  |
| 59-63 | Reserved | Reserved | Reserved |  |  |  |  |

Table 7.3.1.2.2-5: VRB-to-PRB mapping

|  |  |
| --- | --- |
| **Bit field mapped to index** | **VRB-to-PRB mapping** |
| 0 | Non-interleaved |
| 1 | Interleaved |

Table 7.3.1.2.2-6: Allowed entries for DCI format 1\_1, configured by higher layer parameter *ul-AccessConfigListDCI-1-1*

|  |  |  |
| --- | --- | --- |
| **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 37.213] | 0 |
| 1 | Type2C-ULChannelAccess  defined in [clause 4.2.1.2.3 in 37.213] | 2 |
| 2 | Type2B-ULChannelAccess  defined in [clause 4.2.1.2.3 in 37.213] | 0 |
| 3 | Type2B-ULChannelAccess  defined in [clause 4.2.1.2.3 in 37.213] | 2 |
| 4 | Type2A-ULChannelAccess defined in [clause 4.2.1.2.1 in 37.213] | 0 |
| 5 | Type2A-ULChannelAccess defined in [clause 4.2.1.2.1 in 37.213] | 1 |
| 6 | Type2A-ULChannelAccess defined in [clause 4.2.1.2.1 in 37.213] | 3 |
| 7 | Type1-ULChannelAccess defined in [clause 4.2.1.1 in 37.213] | 0 |
| 8 | Type1-ULChannelAccess defined in [clause 4.2.1.1 in 37.213] | 1 |
| 9 | Type1-ULChannelAccess defined in [clause 4.2.1.1 in 37.213] | 2 |
| 10 | Type1-ULChannelAccess defined in [clause 4.2.1.1 in 37.213] | 3 |

< Unchanged parts are omitted >