**3GPP TSG-RAN WG1 Meeting #105-eR1-21xxxxx**

**e-Meeting, May 19-27, 2021**

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| *CR-Form-v12.0* |
| **CHANGE REQUEST** |
|  |
|  | **36.212** | **CR** | **DRAFT** | **rev** |  | **Current version:** | **16.5.0** |  |
|  |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* |
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| ***Proposed change affects:*** | UICC apps |  | ME | **x** | Radio Access Network | **x** | Core Network |  |

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|  |
| ***Title:***  | Correction of erroneous references |
|  |  |
| ***Source to WG:*** | FUTUREWEI |
| ***Source to TSG:*** |  |
|  |  |
| ***Work item code:*** | TBD |  | ***Date:*** | 2021-05-23 |
|  |  |  |  |  |
| ***Category:*** | D |  | ***Release:*** | Rel-16 |
|  | *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 canbe found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | *Use one of the following releases:Rel-8 (Release 8)Rel-9 (Release 9)Rel-10 (Release 10)Rel-11 (Release 11)Rel-12 (Release 12)**Rel-13 (Release 13)Rel-14 (Release 14)Rel-15 (Release 15)Rel-16 (Release 16)* |
|  |  |
| ***Reason for change:*** | Correction of erroneous references to 36.213 related to the UL index DCI field |
|  |  |
| ***Summary of change:*** | Update of references to 36.213 |
|  |  |
| ***Consequences if not approved:*** | Confusion as to why an unrelated section of 36.213 is referenced for UL Index  |
|  |  |
| ***Clauses affected:*** | 5.3.3.1.1, 5.3.3.1.1C, 5.3.3.1.8, 5.3.3.1.10, 5.3.3.1.15, 5.3.3.1.16 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** | **X** |  |  Other core specifications  | TS 36.213 |
| ***affected:*** |  | **X** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

##### 5.3.3.1.1 Format 0

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

The following information is transmitted by means of the DCI format 0:

- Carrier indicator – 0 or 3 bits. This field is present according to the definitions in [3].

- Flag for format0/format1A differentiation – 1 bit, where value 0 indicates format 0 and value 1 indicates format 1A

- Frequency hopping flag – 1 bit as defined in clause 8.4 of [3]. This field is used as the MSB of the corresponding resource allocation field for resource allocation type 1.

- Resource block assignment and hopping resource allocation –  bits

- For PUSCH hopping (resource allocation type 0 only):

- *NUL\_hop* MSB bits are used to obtain the value of  as indicated in clause 8.4 of [3]

-  bits provide the resource allocation of the first slot in the UL subframe

- For non-hopping PUSCH with resource allocation type 0:

-  bits provide the resource allocation in the UL subframe as defined in clause 8.1.1 of [3]

- For non-hopping PUSCH with resource allocation type 1:

- The concatenation of the frequency hopping flag field and the resource block assignment and hopping resource allocation field provides the resource allocation field in the UL subframe as defined in clause 8.1.2 of [3]

- Modulation and coding scheme and redundancy version – 5 bits as defined in clause 8.6 of [3]

- New data indicator – 1 bit

- HARQ process number – 4 bits if higher layer parameter *ul-STTI-Length* is configured for the cell, otherwise 3 bits (this field is present when higher layer parameter *shortProcessingTime* is configured for the cell and the corresponding DCI is mapped onto the UE specific search space given by the C-RNTI as defined in [3])

- Redundancy version – 2 bits (this field is present when higher layer parameter *shortProcessingTime* is configured for the cell and the corresponding DCI is mapped onto the UE specific search space given by the C-RNTI as defined in [3])

- TPC command for scheduled PUSCH – 2 bits as defined in clause 5.1.1.1 of [3]

- Cyclic shift for DM RS and OCC index and IFDMA configuration – 3 bits as defined in clause 5.5.2.1.1 of [2] (this field is not present when the format 0 CRC is scrambled by UL-SPS-V-RNTI)

- UL SPS configuration index – 3 bits as defined in clause 9.2.1 of [3]. (this field is present when the format 0 CRC is scrambled by UL-SPS-V-RNTI)

- UL index – 2 bits as defined in clauses 5.1.1.1, 7.2.1, and 8 of [3] (this field is present only for TDD operation with uplink-downlink configuration 0, or TDD operation with uplink-downlink configuration 6 and special subframe configuration 10 when the higher layer parameter *symPUSCH-UpPts* or *shortProcessingTime* is configured for the cell and the corresponding DCI is mapped onto the UE specific search space given by the C-RNTI as defined in [3])

- Downlink Assignment Index (DAI) – 2 bits as defined in clause 7.3 of [3] (this field is present only for the following cases: 1) TDD primary cell and either TDD operation with uplink-downlink configurations 1-6 or FDD operation; or 2) EN-DC/NE-DC with FDD primary cell and higher layer parameter *subframeAssignment-r15/subframeAssignment-r16* configured and the corresponding DCI is mapped onto the UE specific search space given by the C-RNTI as defined in [3])

- CSI request – 1, 2, 3, 4 or 5 bits as defined in clause 7.2.1 of [3].

If UEs are not configured with CSI-RS-ConfigNZPAperiodic or if UEs are configured with CSI-RS-ConfigNZPAperiodic and numberActivatedAperiodicCSI-RS-Resources=1 for each CSI process,

the 2-bit field applies to UEs configured with no more than five DL cells and to

- UEs that are configured with more than one DL cell and when the corresponding DCI format is mapped onto the UE specific search space given by the C-RNTI as defined in [3];

- UEs that are configured by higher layers with more than one CSI process and when the corresponding DCI format is mapped onto the UE specific search space given by the C-RNTI as defined in [3];

- UEs that are configured with two CSI measurement sets by higher layers with the parameter *csi-MeasSubframeSet,* and when the corresponding DCI format is mapped onto the UE specific search space given by the C-RNTI as defined in [3];

the 3-bit field applies to UEs that are configured with more than five DL cells and when the corresponding DCI format is mapped onto the UE specific search space given by the C-RNTI as defined in [3];

otherwise the 1-bit field applies

If UEs are configured with CSI-RS-ConfigNZPAperiodic and numberActivatedAperiodicCSI-RS-Resources>1 for at least one CSI process,

the 4-bit field applies to UEs configured with no more than five DL cells and to

- UEs that are configured with more than one DL cell and when the corresponding DCI format is mapped onto the UE specific search space given by the C-RNTI as defined in [3];

- UEs that are configured by higher layers with more than one CSI process and when the corresponding DCI format is mapped onto the UE specific search space given by the C-RNTI as defined in [3];

- UEs that are configured with two CSI measurement sets by higher layers with the parameter *csi-MeasSubframeSet,* and when the corresponding DCI format is mapped onto the UE specific search space given by the C-RNTI as defined in [3];

the 5-bit field applies to UEs that are configured with more than five DL cells and when the corresponding DCI format is mapped onto the UE specific search space given by the C-RNTI as defined in [3];

otherwise the 3-bit field applies.

- SRS request – 0 or 1 bit. This field can only be present in DCI formats scheduling PUSCH which are mapped onto the UE specific search space given by the C-RNTI as defined in [3]. The interpretation of this field is provided in clause 8.2 of [3]

- Resource allocation type – 1 bit. This field is only present if . The interpretation of this field is provided in clause 8.1 of [3]

- Cyclic Shift Field mapping table for DMRS – 1 bit as defined in clause 5.5.2.1.1 of [2]. The 1-bit field applies to UEs that are configured with higher layer parameter *UL-DMRS-IFDMA*, and when the corresponding DCI format is mapped onto the UE-specific search space given by the C-RNTI as defined in [3]. When the format 0 CRC is scrambled by SPS C-RNTI, this field is set to zero.

If the number of information bits in format 0 mapped onto a given search space is less than the payload size of format 1A for scheduling the same serving cell and mapped onto the same search space (including any padding bits appended to format 1A), zeros shall be appended to format 0 until the payload size equals that of format 1A.

\*\* Unrelated text is skipped \*\*

##### 5.3.3.1.1C Format 0C

DCI format 0C is used for the scheduling of PUSCH in one UL cell.

The following information is transmitted by means of the DCI format 0C:

- Flag for format 0C/format1A differentiation – 1 bit, where value 0 indicates format 0C and value 1 indicates format 1A

- Resource allocation type – 1 bit. This field is only present if . The interpretation of this field is provided in clause 8.1 of [3]

- Frequency hopping flag – 1 bit as defined in clause 5.3.4 of [2]. This field is used as the MSB of the corresponding resource allocation field for resource allocation type 1.

- Resource block assignment –  bits

- For PUSCH with resource allocation type 0:

- bits provide the resource allocation in the UL subframe as defined in clause 8.1.1 of [3]

- For non-hopping PUSCH with resource allocation type 1:

- The concatenation of the frequency hopping flag field and the resource block assignment field provides the resource allocation field in the UL subframe as defined in clause 8.1.2 of [3]

- Modulation and coding scheme – 5 bits as defined in clause 8.6 of [3]

- Repetition number – 3 bits as defined in clause 8.0 of [3]

- HARQ process number – 3 bits

- New data indicator – 1 bit

- Redundancy version – 2 bits

- TPC command for scheduled PUSCH – 2 bits as defined in clause 5.1.1.1 of [3]

- Cyclic shift for DM RS and OCC index – 3 bits as defined in clause 5.5.2.1.1 of [2]

- UL index – 2 bits as defined in clauses 5.1.1.1, 7.2.1, and 8 of [3] (this field is present only for TDD operation with uplink-downlink configuration 0, or TDD operation with uplink-downlink configuration 6 and special subframe configuration 10 when the higher layer parameter *symPUSCH-UpPts* is configured)

- Downlink Assignment Index (DAI) – 2 bits as defined in clause 7.3 of [3] (This field is present only for the following cases: 1) TDD primary cell and either TDD operation with uplink-downlink configurations 1-6 or FDD operation; or 2) EN-DC/NE-DC with FDD primary cell and higher layer parameter *subframeAssignment-r15/subframeAssignment-r16* configured)

- CSI request – 1, 2 or 3 bits as defined in clause 7.2.1 of [3]. The 2-bit field applies to UEs configured with no more than five DL cells and to

- UEs that are configured with more than one DL cell and when the corresponding DCI format is mapped onto the UE specific search space given by the C-RNTI as defined in [3];

- UEs that are configured by higher layers with more than one CSI process and when the corresponding DCI format is mapped onto the UE specific search space given by the C-RNTI as defined in [3];

- UEs that are configured with two CSI measurement sets by higher layers with the parameter *csi-MeasSubframeSet,* and when the corresponding DCI format is mapped onto the UE specific search space given by the C-RNTI as defined in [3];

the 3-bit field applies to UEs that are configured with more than five DL cells and when the corresponding DCI format is mapped onto the UE specific search space given by the C-RNTI as defined in [3];

otherwise the 1-bit field applies

- SRS request –1 bit. The interpretation of this field is provided in clause 8.2 of [3]

- Modulation order override – 1 bit as defined in clause 8.6.1 of [3]

- Precoding information: number of bits as specified in Table 5.3.3.1.8-1. This field is present only if the higher layer parameter *transmissionModeUL* is configured to be transmission mode 2. Bit field as shown in Table 5.3.3.1.8-2 and Table 5.3.3.1.8-3, where only codeword 0 is enabled and the indexes corresponding to 1 layer are used. Note that TPMI for 2 antenna ports indicates which codebook index is to be used in Table 5.3.3A.2-1 of [2], and TPMI for 4 antenna ports indicates which codebook index is to be used in Table 5.3.3A.2-2, Table 5.3.3A.2-3, Table 5.3.3A.2-4 and Table 5.3.3A.2-5 of [2]. The transport block is mapped to codeword 0.

If the number of information bits in format 0C mapped onto a given search space is less than the payload size of format 1A for scheduling the same serving cell and mapped onto the same search space (including any padding bits appended to format 1A), zeros shall be appended to format 0C until the payload size equals that of format 1A.

\*\* Unrelated text is skipped \*\*

##### 5.3.3.1.8 Format 4

DCI format 4 is used for the scheduling of PUSCH in one UL cell with multi-antenna port transmission mode,

The following information is transmitted by means of the DCI format 4:

- Carrier indicator – 0 or 3 bits. The field is present according to the definitions in [3].

- Resource block assignment -  bits, where *P* is the UL RBG size as defined in clause 8.1.2 of [3]

- For resource allocation type 0:

- The LSBs provide the resource allocation in the UL subframe as defined in clause 8.1.1 of [3]

- For resource allocation type 1:

- The  LSBs provide the resource allocation in the UL subframe as defined in clause 8.1.2 of [3]

- TPC command for scheduled PUSCH – 2 bits as defined in clause 5.1.1.1 of [3]

- Cyclic shift for DM RS and OCC index and IFDMA configuration – 3 bits as defined in clause 5.5.2.1.1 of [2]

- UL index – 2 bits as defined in clauses 5.1.1.1, 7.2.1, and 8 of [3] (this field is present only for TDD operation with uplink-downlink configuration 0, or TDD operation with uplink-downlink configuration 6 and special subframe configuration 10 when the higher layer parameter *symPUSCH-UpPts* or *shortProcessingTime* is configured for the cell)

- Downlink Assignment Index (DAI) – 2 bits as defined in clause 7.3 of [3] (this field is present only for the following cases: 1) TDD primary cell and either TDD operation with uplink-downlink configurations 1-6 or FDD operation; or 2) EN-DC/NE-DC with FDD primary cell and higher layer parameter *subframeAssignment-r15/subframeAssignment-r16* configured)

- CSI request – 1, 2, 3, 4 or 5 bits as defined in clause 7.2.1 of [3].

If UEs are not configured with CSI-RS-ConfigNZPAperiodic or if UEs are configured with CSI-RS-ConfigNZPAperiodic and numberActivatedAperiodicCSI-RS-Resources=1 for each CSI process,

the 2-bit field applies to UEs configured with no more than five DL cells and to

- UEs that are configured with more than one DL cell;

- UEs that are configured by higher layers with more than one CSI process;

- UEs that are configured with two CSI measurement sets by higher layers with the parameter *csi-MeasSubframeSet*;

the 3-bit field applies to UEs that are configured with more than five DL cells;

otherwise the 1-bit field applies

If UEs are configured with CSI-RS-ConfigNZPAperiodic and numberActivatedAperiodicCSI-RS-Resources>1 for at least one CSI process,

the 4-bit field applies to UEs configured with no more than five DL cells and to

- UEs that are configured with more than one DL cell;

- UEs that are configured by higher layers with more than one CSI process;

- UEs that are configured with two CSI measurement sets by higher layers with the parameter *csi-MeasSubframeSet*;

the 5-bit field applies to UEs that are configured with more than five DL cells;

otherwise the 3-bit field applies.

- SRS request – 2 bits as defined in clause 8.2 of [3]

- Resource allocation type – 1 bit as defined in clause 8.1 of [3]

- Cyclic Shift Field mapping table for DMRS – 1 bit as defined in clause 5.5.2.1.1 of [2]. The 1-bit field applies to UEs that are configured with higher layer parameter *UL-DMRS-IFDMA*.

- HARQ process number – 4 bits if higher layer parameter *ul-STTI-Length* is configured for the cell, otherwise 3 bits (this field is present when higher layer parameter *shortProcessingTime* is configured for the cell)

- Redundancy version – 2 bits (this field is present when higher layer parameter *shortProcessingTime* is configured for the cell)

In addition, for transport block 1:

- Modulation and coding scheme and redundancy version – 5 bits as defined in clause 8.6 of [3]

- New data indicator – 1 bit

In addition, for transport block 2:

- Modulation and coding scheme and redundancy version – 5 bits as defined in clause 8.6 of [3]

- New data indicator – 1 bit

Precoding information and number of layers: number of bits as specified in Table 5.3.3.1.8-1. Bit field as shown in Table 5.3.3.1.8-2 and Table 5.3.3.1.8- 3. Note that TPMI for 2 antenna ports indicates which codebook index is to be used in Table 5.3.3A.2-1 of [2], and TPMI for 4 antenna ports indicates which codebook index is to be used in Table 5.3.3A.2-2, Table 5.3.3A.2-3, Table 5.3.3A.2-4 and Table 5.3.3A.2-5 of [2]. If both transport blocks are enabled, transport block 1 is mapped to codeword 0; and transport block 2 is mapped to codeword 1. In case one of the transport blocks is disabled, the transport block to codeword mapping is specified according to Table 5.3.3.1.5-2. For a single enabled codeword, indices 24 to 39 in Table 5.3.3.1.8-3 are only supported for retransmission of the corresponding transport block if that transport block has previously been transmitted using two layers.

Table 5.3.3.1.8-1: Number of bits for precoding information

|  |  |
| --- | --- |
| Number of antenna ports at UE | Number of bits for precoding information |
| 2 | 3 |
| 4 | 6 |

Table 5.3.3.1.8-2: Content of precoding information field for 2 antenna ports

|  |  |
| --- | --- |
| One codeword: Codeword 0 enabledCodeword 1 disabled | Two codewords: Codeword 0 enabledCodeword 1 enabled |
| **Bit field mapped to index** | **Message** | **Bit field mapped to index** | **Message** |
| 0 | 1 layer: TPMI=0 | 0 | 2 layers: TPMI=0 |
| 1 | 1 layer: TPMI=1 | 1-7 | reserved |
| 2 | 1 layer: TPMI=2 |  |  |
| … | … |  |  |
| 5 | 1 layer: TPMI=5 |  |  |
| 6-7 | reserved |  |  |

Table 5.3.3.1.8-3: Content of precoding information field for 4 antenna ports

|  |  |
| --- | --- |
| One codeword: Codeword 0 enabledCodeword 1 disabled | Two codewords: Codeword 0 enabledCodeword 1 enabled |
| **Bit field mapped to index** | **Message** | **Bit field mapped to index** | **Message** |
| 0 | 1 layer: TPMI=0 | 0 | 2 layers: TPMI=0 |
| 1 | 1 layer: TPMI=1 | 1 | 2 layers: TPMI=1 |
| … | … | … | … |
| 23 | 1 layer: TPMI=23 | 15 | 2 layers: TPMI=15 |
| 24 | 2 layers: TPMI=0 | 16 | 3 layers: TPMI=0 |
| 25 | 2 layers: TPMI=1 | 17 | 3 layers: TPMI=1 |
| … | … | … | … |
| 39 | 2 layers: TPMI=15 | 27 | 3 layers: TPMI=11 |
| 40-63 | reserved | 28 | 4 layers: TPMI=0 |
|  |  | 29 - 63 | Reserved |

If the number of information bits in format 4 is equal to the payload size for DCI format 1, 2, 2A, 2B, 2C or 2D associated with the configured DL transmission mode in the same serving cell, one zero bit shall be appended to format 4.

\*\* Unrelated text is skipped \*\*

##### 5.3.3.1.10 Format 6-0A

DCI format 6-0A is used for the scheduling of PUSCH in one UL cell, for the indication of ACK feedback, and operation on preconfigured UL resources.

The following information is transmitted by means of the DCI format 6-0A:

- Flag format 6-0A/format 6-1A differentiation – 1 bit, where value 0 indicates format 6-0A and value 1 indicates format 6-1A

- Frequency hopping flag – 1 bit, where value 0 indicates frequency hopping is not enabled and value 1 indicates frequency hopping is enabled as defined in clause 5.3.4 of [2]. The field is not present if *ce-PUSCH-MultiTB-Config* is enabled and the DCI is mapped onto the UE-specific search space given by C-RNTI as defined in [3].

- Number of resource units – 2 bits, where value '00' indicates the format 6-0A DCI uses PRB resource allocation, otherwise the DCI format 6-0A uses sub-PRB resource allocation as defined in clause 8.1.6 of [3]. This field is present when *ce-PUSCH-SubPRB-Config* is configured by higher layers and the DCI is mapped onto the UE-specific search space given by C-RNTI as defined in [3], or when the DCI is mapped onto the UE-specific search space given by PUR-RNTI as defined in [3] and the UE is not configured with higher layer parameter *numRUs* = '00'.

- Resource block assignment –

- If the format 6-0A DCI uses sub-PRB resource allocation:

- +6 bits for PUSCH as defined in [3]

-  MSB bits provide the narrowband index as defined in clause 5.2.4 of [2]

- 6 bits provide the resource allocation within the indicated narrowband using UL resource allocation type 5 as defined in clause 8.1.6 of [3]

- Else if flexible starting PRB for PUSCH resource allocation is enabled by higher layers with  equal to , $\left⌈log\_{2}(6N\_{RB}^{UL})\right⌉$ bits for FDD PUSCH and $\left⌈log\_{2}(5N\_{RB}^{UL})\right⌉$ bits for TDD PUSCH provide the resource allocation using UL resource allocation type 0 as defined in clause 8.1.1 of [3]

- Otherwise,+5 bits for PUSCH as defined in [3]:

- If the 5 LSB bits indicate a value not larger than 20

-  MSB bits provide the narrowband index as defined in clause 5.2.4 of [2]

- 5 bits provide the resource allocation using UL resource allocation type 0 within the indicated narrowband

- Otherwise,

- +5 bits provide the resource allocation using UL resource allocation type 4 as defined in clause 8.1.5 of[ 3]

If format 6-0A CRC is scrambled by PUR-RNTI and Resource block assignment is set to all ones, the remaining fields are set as follows:

- ACK or Fallback indicator – 1 bit, where value 0 indicates ACK and value 1 indicates fallback as defined in clause 9.1.5.3 of [3]

- PUSCH repetition adjustment – 2 bits, this field refers to indices *n*1, *n*2, …, *n*4 in Table 8-2b of [3]

- Timing advance adjustment – 6 bits as defined in clause 4.2.3 of [3]. The field is only present if ACK or Fallback indicator is set to 0.

- All the remaining bits in format 6-0A are set to zero

Otherwise

- Modulation and coding scheme – 3 or 4 bits as defined in clause 8.6 of [3] . The 3-bit field applies when the format 6-0A DCI uses sub-PRB resource allocation, otherwise the 4-bit field applies.

- Repetition number – 2 or 3 bits as defined in clause 8.0 of [3]. The 3-bit field applies when *ce-pdsch-puschEnhancement-config* is configured by higher layers and the DCI is mapped onto the UE-specific search space given by the C-RNTI as defined in [3], otherwise the 2-bit field applies.

- HARQ process number – 3 bits. The field is not present if *ce-PUSCH-MultiTB-Config* is enabled and the DCI is mapped onto the UE-specific search space given by C-RNTI as defined in [3].

- New data indicator – 1 bit. The field is not present if *ce-PUSCH-MultiTB-Config* is enabled and the DCI is mapped onto the UE-specific search space given by C-RNTI as defined in [3].

- Redundancy version – 2 bits. The field is not present if *ce-PUSCH-MultiTB-Config* is enabled and the DCI is mapped onto the UE-specific search space given by C-RNTI as defined in [3].

- TPC command for scheduled PUSCH – 2 bits as defined in clause 5.1.1.1 of [3]

- UL index – 2 bits as defined in clauses 5.1.1.1, 7.2.1, and 8 of [3] (this field is present only for TDD operation with uplink-downlink configuration 0)

- Downlink Assignment Index (DAI) – 2 bits as defined in clause 7.3 of [3] (This field is present only for cases with TDD primary cell and either TDD operation with uplink-downlink configurations 1-6 or FDD operation. This field is reserved when the configured maximum repetition number is larger than 1 for MPDCCH, or when the higher layer parameter *csi-NumRepetitionCE-r13* indicates more than one subframe)

- CSI request – 1 bit as defined in clause 7.2.1 of [3]. This field is reserved if the format 6-0A DCI uses sub-PRB resource allocation.

- SRS request –1 bit. The interpretation of this field is provided in clause 8.2 of [3]

- DCI subframe repetition number – 2 bits as defined in clause 9.1.5 of [3]

- Modulation order override – 1 bit as defined in clause 8.6.1 of [3]. This field is only present when *ce-pdsch-puschEnhancement-config* is configured by higher layers and the DCI is mapped onto the UE-specific search space given by the C-RNTI as defined in [3]

- Scheduling TBs for Unicast – 12 bits. This field is only present if *ce-PUSCH-MultiTB-Config* is enabled and the DCI is mapped onto the UE-specific search space given by C-RNTI as defined in [3]. This field schedules one TB if the CRC of the DCI is scrambled by SPS C-RNTI.

- If one TB is scheduled

- 5 bits set to zero

- HARQ process number – 3 bits

- New data indicator – 1 bit

- Redundancy version – 2 bits

- Frequency hopping flag – 1 bit, where value 0 indicates frequency hopping is not enabled and value 1 indicates frequency hopping is enabled as defined in clause 5.3.4 of [2]. If frequency hopping is not enabled by higher layers, this field is set to 0.

- If two TBs are scheduled

- 2 bits set to zero

- HARQ index with offset – 6 bits provide the HARQ index + offset, with an offset of +8 and HARQ index as defined in 8.0 of [3]

- New data indicators – 2 bits, one for each scheduled TB in increasing order of HARQ process ID

- Redundancy version for TB 1 – 1 bit

- Redundancy version for TB 2 – 1 bit. If Repetition number is > 1 and frequency hopping is enabled by higher layers then this bit is a Frequency hopping flag for the TBs, and TB2 uses the redundancy version for TB1.

- If four TBs are scheduled

- 1 bit set to zero

- HARQ index with offset – 7 bits provide the HARQ index + offset, with an offset of +36 and HARQ index as defined in 8.0 of [3]

- New data indicators – 4 bits, one for each scheduled TB in increasing order of HARQ process ID

- If six TBs are scheduled

- HARQ index with offset – 6 bits provide the HARQ index + offset, with an offset of +27 and HARQ index as defined in 8.0 of [3]

- New data indicators – 6 bits, one for each scheduled TB in increasing order of HARQ process ID

- If eight TBs are scheduled

- 3 bits set to one

- New data indicators – 8 bits, one for each scheduled TB in increasing order of HARQ process ID

- Redundancy version for all TBs – 1 bit. If Repetition number is > 1 and frequency hopping is enabled by higher layers then this bit is a Frequency hopping flag for the TBs, and the redundancy version for all TBs starts at 0.

- Resource reservation – 1 bit as defined in clause 8.0 of [3]. This field is only present if UL resource reservation is enabled for the UE as specified in [6] and the DCI is mapped onto the UE-specific search space given by C-RNTI as defined in [3].

If *ce-PUSCH-MultiTB-Config* is not enabled and the Resource block assignment in format 6-0A is set to all ones, or *ce-PUSCH-MultiTB-Config* is enabled and *mpdcch-UL-HARQ-ACK-FeedbackConfig* is configured and the 6 MSB bits of the Scheduling TBs for Unicast Field are set to '110111', format 6-0A is used for the indication of ACK feedback. 8 bits including the 6 LSB bits of the Scheduling TBs for Unicast Field and 2 MSB bits of Repetition number are used to indicate HARQ-ACK by bitmap, where the order of the bitmap to HARQ process index mapping is such that HARQ process indices are mapped in ascending order from MSB to LSB of the bitmap. For each bit of the bitmap, value 1 indicates ACK, and value 0 is reserved. And all the remaining bits except Flag format 6-0A/format 6-1A differentiation and DCI subframe repetition number are set to zero.

If the number of information bits in format 6-0A mapped onto a given search space is less than the payload size of format 6-1A for scheduling the same serving cell and mapped onto the same search space (including any padding bits appended to format 6-1A), zeros shall be appended to format 6-0A until the payload size equals that of format 6-1A.

\*\* Unrelated text is skipped \*\*

##### 5.3.3.1.15 Format 7-0A

DCI format 7-0A is used for the scheduling of PUSCH with slot or subslot duration in one UL cell.

The following information is transmitted by means of the DCI format 7-0A:

- Flag for UL/DL differentiation – 1 bit, where value 0 indicates format 7-0A and value 1 indicates format 7-1A/B/C/D/E/F/G depending on the configured downlink transmission mode

- Resource block assignment – $(\left⌈log\_{2}(\left⌈N\_{RB}^{UL}/P\right⌉(\left⌈N\_{RB}^{UL}/P\right⌉+1)/2)\right⌉)$ bits provide the resource allocation in the UL slot or subslot as defined in clause 8.1.1 of [3], where $P=4$ if $N\_{RB}^{UL}>15$, and $P=1$ otherwise.

- Modulation and coding scheme – 5 bits as defined in clause 8.6 of [3]

- HARQ process number – 4 bits

- New data indicator – 1 bit

- Redundancy version – 2 bits

- TPC command for scheduled PUSCH – 2 bits as defined in clause 5.1.1.1 of [3]

- DMRS pattern – 2 bits as defined in clause 5.5.2.1.2 in [2] (The field is present only for PUSCH with subslot duration)

- Cyclic shift for DMRS and IFDMA configuration – 1 bit as defined in clause 5.5.2.1.1 of [2]

- UL index – 2 bits as defined in clauses 5.1.1.1, 7.2.1, and 8 of [3] (this field is present only for TDD operation with uplink-downlink configuration 0, or TDD operation with uplink-downlink configuration 6 and special subframe configuration 0, 5, 9 or 10)

- Downlink Assignment Index (DAI) – 2 bits as defined in clause 7.3 of [3] (this field is present only for cases with TDD primary cell and either TDD operation with uplink-downlink configurations 1-6 or FDD operation)

- CSI request – 1, 2 or 3 bits as defined in clause 7.2.1 of [3]:

The 2-bit field applies to UEs configured with no more than five DL cells and to

- UEs that are configured with more than one DL cell;

- UEs that are configured by higher layers with more than one CSI process;

- UEs that are configured with two CSI measurement sets by higher layers with the parameter *csi-MeasSubframeSet*;

the 3-bit field applies to UEs that are configured with more than five DL cells;

otherwise the 1-bit field applies

- SRS request – 0 or 1 bit as defined in clause 8.2 of [3] (this field is present only for TDD operation, if the UE has indicated the capability *srs-DCI7-Triggering-FS2-r15* and the UE is configured with higher layer parameter *srs-DCI7-TriggeringConfig-r15*)

- Beta offet indicator – 1 bit as defined in clause 8.6.3 of [3] (this field is present only if UE is configured with *ul-STTI-Length*=subslot).

- Cyclic Shift Field mapping table for DMRS – 1 bit as defined in clause 5.5.2.1.1 of [2].

If the number of information bits in format 7-0A mapped onto a given search space is less than the payload size of format 7-1A/B/C/D/E/F/G depending on the configured downlink transmission mode for scheduling the same serving cell and mapped onto the same search space (including any padding bits appended to format 7-1A/B/C/D/E/F/G), zeros shall be appended to format 7-0A until the payload size equals that of format 7-1A/B/C/D/E/F/G.

If the number of information bits in format 7-0A carried by PDCCH is equal to the payload size of a configured format 0/0C/1/1A/1B/1D/2/2A/2B/2C/2D/4 mapped onto the UE specific search space given by C-RNTI or SPS C-RNTI as defined in [3] (including any padding bits appended to format 0/0C/1/1A/1B/1D/2/2A/2B/2C/2D/4), one or more zero bit(s) shall be appended to format 7-0A until the payload size is not equal to that of a configured format 0/0C/1/1A/1B/1D/2/2A/2B/2C/2D/4.

##### 5.3.3.1.16 Format 7-0B

DCI format 7-0B is used for the scheduling of PUSCH with slot or subslot duration in one UL cell with multi-antenna port transmission mode.

The following information is transmitted by means of the DCI format 7-0B:

- Flag for UL/DL differentiation – 1 bit, where value 0 indicates format 7-0B and value 1 indicates format 7-1A/B/C/D/E/F/G depending on the configured downlink transmission mode

- Resource block assignment – $(\left⌈log\_{2}(\left⌈N\_{RB}^{UL}/P\right⌉(\left⌈N\_{RB}^{UL}/P\right⌉+1)/2)\right⌉)$ bits provide the resource allocation in the UL slot or subslot as defined in clause 8.1.1 of [3], where $P=4$ if $N\_{RB}^{UL}>15$, and $P=1$ otherwise.

- Modulation and coding scheme – 5 bits as defined in clause 8.6 of [3]

- HARQ process number – 4 bits

- New data indicator – 1 bit

- Redundancy version – 2 bits

- TPC command for scheduled PUSCH – 2 bits as defined in clause 5.1.1.1 of [3]

- DMRS pattern – 2 bits as defined in clause 5.5.2.1.2 in [2] (The field is present only for PUSCH with subslot duration)

- Cyclic shift for DMRS and IFDMA configuration – 1 bit as defined in clause 5.5.2.1.1 of [2]

- UL index – 2 bits as defined in clauses 5.1.1.1, 7.2.1, and 8 of [3] (this field is present only for TDD operation with uplink-downlink configuration 0, or TDD operation with uplink-downlink configuration 6 and special subframe configuration 0, 5, 9 or 10)

- Downlink Assignment Index (DAI) – 2 bits as defined in clause 7.3 of [3] (this field is present only for cases with TDD primary cell and either TDD operation with uplink-downlink configurations 1-6 or FDD operation)

- CSI request – 1, 2 or 3 bits as defined in clause 7.2.1 of [3]:

The 2-bit field applies to UEs configured with no more than five DL cells and to

- UEs that are configured with more than one DL cell;

- UEs that are configured by higher layers with more than one CSI process;

- UEs that are configured with two CSI measurement sets by higher layers with the parameter *csi-MeasSubframeSet*;

the 3-bit field applies to UEs that are configured with more than five DL cells;

otherwise the 1-bit field applies

- SRS request – 2 bits as defined in clause 8.2 of [3] (this field is present only for TDD operation, if the UE has indicated the capability *srs-DCI7-Triggering-FS2-r15* and the UE is configured with higher layer parameter *srs-DCI7-TriggeringConfig-r15*)

- Beta offet indicator – 1 bit as defined in clause 8.6.3 of [3] (this field is present only if UE is configured with *ul-STTI-Length*=subslot).

- Cyclic Shift Field mapping table for DMRS – 1 bit as defined in clause 5.5.2.1.1 of [2].

- Precoding information and number of layers: number of bits as specified in Table 5.3.3.1.8-1. Bit field are shown in Table 5.3.3.1.16-1 and Table 5.3.3.1.16- 2. Note that TPMI for 2 antenna ports indicates which codebook index is to be used in Table 5.3.3A.2-1 of [2], and TPMI for 4 antenna ports indicates which codebook index is to be used in Table 5.3.3A.2-2, Table 5.3.3A.2-3, Table 5.3.3A.2-4 and Table 5.3.3A.2-5 of [2].

Table 5.3.3.1.16-1: Content of precoding information field for 2 antenna ports

|  |  |
| --- | --- |
| **Bit field mapped to index** | **Message** |
| 0 | 1 layer: TPMI=0 |
| 1 | 1 layer: TPMI=1 |
| 2 | 1 layer: TPMI=2 |
| … | … |
| 5 | 1 layer: TPMI=5 |
| 6 | 2 layers: TPMI=0 |
| 7 | reserved |

Table 5.3.3.1.16-2: Content of precoding information field for 4 antenna ports

|  |  |
| --- | --- |
| **Bit field mapped to index** | **Message** |
| 0 | 1 layer: TPMI=0 |
| 1 | 1 layer: TPMI=1 |
| … | … |
| 23 | 1 layer: TPMI=23 |
| 24 | 2 layers: TPMI=0 |
| 25 | 2 layers: TPMI=1 |
| … | … |
| 39 | 2 layers: TPMI=15 |
| 40 | 3 layers: TPMI=0 |
| 41 | 3 layers: TPMI=1 |
| … | … |
| 51 | 3 layers: TPMI=11 |
| 52 | 4 layers: TPMI=0 |
| 53-63 | reserved |

If the number of information bits in format 7-0B mapped onto a given search space is less than the payload size of format 7-1A/B/C/D/E/F/G depending on the configured downlink transmission mode for scheduling the same serving cell and mapped onto the same search space (including any padding bits appended to format 7-1A/B/C/D/E/F/G), zeros shall be appended to format 7-0B until the payload size equals that of format 7-1A/B/C/D/E/F/G.

If the number of information bits in format 7-0B carried by PDCCH is equal to the payload size of a configured format 0/0C/1/1A/1B/1D/2/2A/2B/2C/2D/4 mapped onto the UE specific search space given by C-RNTI or SPS C-RNTI as defined in [3] (including any padding bits appended to format 0/0C/1/1A/1B/1D/2/2A/2B/2C/2D/4), one or more zero bit(s) shall be appended to format 7-0B until the payload size is not equal to that of a configured format 0/0C/1/1A/1B/1D/2/2A/2B/2C/2D/4.