**3GPP TSG-RAN WG1 Meeting #121** ***R1-25xxxxx***

**St Julian’s, Malta, 19-23 May, 2025**

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| *CR-Form-v12.3* |
| **DRAFT CHANGE REQUEST** |
|  |
|  | **38.212** | **CR** |  | **rev** | **-** | **Current version:** | **18.6.0** |  |
|  |
| *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:***  | Introduction of 32 HARQ process numbers in Rel-19 [TN32HARQ] |
|  |  |
| ***Source to WG:*** | Huawei |
| ***Source to TSG:*** |  |
|  |  |
| ***Work item code:*** | TEI19 |  | ***Date:*** | 2025-05-29 |
|  |  |  |  |  |
| ***Category:*** | **B** |  | ***Release:*** | Rel-19 |
|  | *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-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19) Rel-20 (Release 20)* |
|  |  |
| ***Reason for change:*** | Introduction of 32 HARQ process numbers in Rel-19 [TN32HARQ].  |
|  |  |
| ***Summary of change:*** | Support of Rel-19 [TN32HARQ]. Capture agreements on supporting a maximum of 32 HARQ process numbers for TN in FR1 and FR2-1 in Rel-19.  |
|  |  |
| ***Consequences if not approved:*** | Rel-19 [TN32HARQ] will be incomplete.  |
|  |  |
| ***Clauses affected:*** | 7.3.1.1.2, 7.3.1.1.3, 7.3.1.1.4, 7.3.1.2.2, 7.3.1.2.3, 7.3.1.2.4 |
|  |  |
|  | **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:*** |  |

#### 7.3.1.1 DCI formats for scheduling of PUSCH

< 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.

The following information is transmitted by means of the DCI format 0\_1 with CRC scrambled by C-RNTI or CS-RNTI or SP-CSI-RNTI or MCS-C-RNTI:

- Identifier for DCI formats - 1 bit

- The value of this bit field is always set to 0, indicating an UL DCI format

- Carrier indicator - 0 or 3 bits, as defined in Clause 10.1 of [5, TS38.213]. This field is reserved when this format is carried by PDCCH on the primary cell and the UE is configured for scheduling on the primary cell from an SCell, with the same number of bits as that in this format carried by PDCCH on the SCell for scheduling on the primary cell.

< Unchanged parts are omitted >

- Transform precoder indicator - 0 or 1 bit

- 1 bit if the higher layer parameter *dynamicTransformPrecoderFieldPresenceDCI-0-1* is configured to 'enabled ' and if the UE is configured to monitor DCI format 0\_1 with CRC scrambled by C-RNTI or CS-RNTI or MCS-C-RNTI, where the bit value of 0 indicates that transform precoder is enabled and the bit value of 1 indicates that transform precoder is disabled. For a DCI format 0\_1 with CRC scrambled by CS-RNTI and the value indicated by new data indicator field is 0, or for a DCI format 0\_1 with CRC scrambled by SP-CSI-RNTI, the bit is reserved.

- 0 bit otherwise.

- HARQ process number - 5 bits if higher layer parameter *harq-ProcessNumberSizeDCI-0-1* or *harq-ProcessNumberSizeDCI-0-1-Ext* is configured; otherwise 4 bits

- 1st downlink assignment index - 1, 2 or 4 bits:

- 1 bit for semi-static HARQ-ACK codebook for unicast and multicast if *pdsch-HARQ-ACK-Codebook = semiStatic* is configured for both unicast and multicast and the higher layer parameter *fdmed-ReceptionMulticast* is not configured; otherwise for semi-static HARQ-ACK codebook for unicast;

- 2 bits for dynamic HARQ-ACK codebook for unicast, or for enhanced dynamic HARQ-ACK codebook without *UL-TotalDAI-Included* configured;

- 4 bits for enhanced dynamic HARQ-ACK codebook and with *UL-TotalDAI-Included = true*.

 When two HARQ-ACK codebooks are configured by *pdsch-HARQ-ACK-CodebookList* for the same serving cell and if higher layer parameter *priorityIndicatorDCI-0-1* is configured, if the bit width of the 1st downlink assignment index in DCI format 0\_1 for one HARQ-ACK codebook is not equal to that of the 1st downlink assignment index 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 1st downlink assignment index until the bit width of the 1st downlink assignment index in DCI format 0\_1 for the two HARQ-ACK codebooks are the same.

< 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.

The following information is transmitted by means of the DCI format 0\_2 with CRC scrambled by C-RNTI or CS-RNTI or SP-CSI-RNTI or MCS-C-RNTI:

- Identifier for DCI formats - 1 bit

- The value of this bit field is always set to 0, indicating an UL DCI format

- Carrier indicator - 0, 1, 2 or 3 bits determined by higher layer parameter *carrierIndicatorSizeDCI-0-2*, as defined in Clause 10.1 of [5, TS38.213]. This field is reserved when this format is carried by PDCCH on the primary cell and the UE is configured for scheduling on the primary cell from an SCell, with the same number of bits as that in this format carried by PDCCH on the SCell for scheduling on the primary cell.

< Unchanged parts are omitted >

- Transform precoder indicator - 0 or 1 bit

- 1 bit if the higher layer parameter *dynamicTransformPrecoderFieldPresenceDCI-0-2* is configured to 'enabled' and if the UE is configured to monitor DCI format 0\_2 with CRC scrambled by C-RNTI or CS-RNTI or MCS-C-RNTI, where the bit value of 0 indicates that transform precoder is enabled and the bit value of 1 indicates that transform precoder is disabled. For a DCI format 0\_2 with CRC scrambled by CS-RNTI and the value indicated by new data indicator field is 0, or for a DCI format 0\_2 with CRC scrambled by SP-CSI-RNTI, the bit is reserved.

- 0 bit otherwise.

- HARQ process number - number of bits determined by the following:

- 5 bits determined by higher layer parameter *harq-ProcessNumberSizeDCI-0-2-v1700* if configured;

- 0, 1, 2, 3, 4 or 5 bits determined by higher layer parameter *harq-ProcessNumberSizeDCI-0-2-Ext* if configured;

- otherwise 0, 1, 2, 3 or 4 bits determined by higher layer parameter *harq-ProcessNumberSizeDCI-0-2.*

- Downlink assignment index - 0, 1, 2 or 4 bits

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

- 1, 2, 3, 4, 5 or 6 bits otherwise,

- 1st downlink assignment index - 1 or 2 bits:

- 1 bit for semi-static HARQ-ACK codebook for unicast and multicast if *pdsch-HARQ-ACK-Codebook = semiStatic* is configured for both unicast and multicast and the higher layer parameter *fdmed-ReceptionMulticast* is not configured; otherwise for semi-static HARQ-ACK codebook for unicast;

- 2 bits for dynamic HARQ-ACK codebook for unicast.

- 2nd downlink assignment index - 0 or 2 bits

- 2 bits for dynamic HARQ-ACK codebook with two HARQ-ACK sub-codebooks for unicast;

- 0 bit otherwise.

- 3rd downlink assignment index - 0, 1 or 2 bits

- 1 bit for semi-static HARQ-ACK codebook for multicast if the higher layer parameter *fdmed-ReceptionMulticast* is configured;

- 2 bits for the dynamic HARQ-ACK codebook for multicast;

- 0 bit otherwise.

When two HARQ-ACK codebooks are configured by *pdsch-HARQ-ACK-CodebookList* for the same serving cell and if higher layer parameter *priorityIndicatorDCI-0-2* is configured, if the bit width of the 1st or 2 nd Downlink assignment index in DCI format 0\_2 for one HARQ-ACK codebook is not equal to that of the 1st or 2 nd Downlink assignment index 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 1st or 2 nd Downlink assignment index until the bit width of the 1st or 2 nd Downlink assignment index in DCI format 0\_2 for the two HARQ-ACK codebooks are the same.

When two HARQ-ACK codebooks are configured 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 3rd downlink assignment index in DCI format 0\_2 for one HARQ-ACK codebook is not equal to that of the 3rd downlink assignment index 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 3rd downlink assignment index until the bit width of the 3rd downlink assignment index in DCI format 0\_2 for the two HARQ-ACK codebooks are the same.

- TPC command for scheduled PUSCH - 2 bits as defined in Clause 7.1.1 of [5, TS38.213]

< Unchanged parts are omitted >

##### 7.3.1.1.4 Format 0\_3

DCI format 0\_3 is used for the scheduling of one PUSCH in one cell, or multiple PUSCHs in multiple cells with one PUSCH per cell.

The following information is transmitted by means of the DCI format 0\_3 with CRC scrambled by C-RNTI or MCS-C-RNTI:

- Identifier for DCI formats - 1 bit

- The value of this bit field is always set to 0, indicating an UL DCI format

- Scheduled cell set indicator -$ \left⌈log\_{2}N\_{set}\right⌉$ bits, where $N\_{set}$ is the number of cell sets which are configured by higher layer parameter *mc-DCI-SetofCellsToAddModList* to be respectively scheduled by DCI format 0\_3/1\_3 from the cell on which this format is carried by PDCCH. If present, this field is used to indicate the scheduled cell set according to Table 7.3.1.1.4-1; otherwise, the scheduled cell set is the cell set configured to be scheduled by DCI format 0\_3/1\_3 from the cell by higher layer parameter *mc-DCI-SetofCellsToAddModList*.

- Scheduled cells indicator - number of bits determined by the following:

- 0 bit if the higher layer parameter *scheduledCellComboListDCI-0-3* for the scheduled cell set is not configured;

- otherwise $\left⌈log\_{2}I\_{UL}\right⌉$ bits indicating the scheduled cells in the scheduled cell set according to Table 7.3.1.1.4-2, where $I\_{UL}$ is the number of entries in the higher layer parameter *scheduledCellComboListDCI-0-3.* If only one entry is configured in the higher layer parameter *scheduledCellComboListDCI-0-3*, the scheduled cells are the cells configured by higher layer parameter *scheduledCellComboListDCI-0-3*.

< Unchanged parts are omitted >

- Redundancy version - number of bits determined by the following:

- block number 1, block number 2,…, block number $N\_{cell}^{UL}$

Each block corresponds to the redundancy version for a cell, and the blocks are placed according to an ascending order of a serving cell index, with block number 1 corresponding to the redundancy version for the cell with the smallest serving cell index. Each block is 0, 1 or 2 bits determined by higher layer parameter *numberOfBitsForRV-DCI-0-3* configured for the cell corresponding to the block,

- If 0 bit is configured, *rvid* to be applied is 0;

- 1 bit according to Table 7.3.1.2.3-1;

- 2 bits according to Table 7.3.1.1.1-2.

- HARQ process number - number of bits determined by the following:

- block number 1, block number 2,…, block number $N\_{cell}^{UL}$

Each block corresponds to the HARQ process number for a cell, and the blocks are placed according to an ascending order of a serving cell index, with block number 1 corresponding to the HARQ process number for the cell with the smallest serving cell index. Each block is 0, 1, 2, 3, 4 or 5 bits determined by higher layer parameter *harq-ProcessNumberSizeDCI-0-3* or *harq-ProcessNumberSizeDCI-0-3-Ext* configured for the cell corresponding to the block.

- 1st downlink assignment index - 1 or 2 bits

- 1 bit for semi-static HARQ-ACK codebook;

- 2 bits for dynamic HARQ-ACK codebook.

When two HARQ-ACK codebooks are configured for the same serving cell and if higher layer parameter *priorityIndicatorDCI-0-3* is configured, if the bit width of the 1st downlink assignment index in DCI format 0\_3 for one HARQ-ACK codebook is not equal to that of the 1st downlink assignment index in DCI format 0\_3 for the other HARQ-ACK codebook, a number of most significant bits with value set to '0' are inserted to smaller 1st downlink assignment index until the bit width of the 1st downlink assignment index in DCI format 0\_3 for the two HARQ-ACK codebooks are the same.

< Unchanged parts are omitted >

#### 7.3.1.2 DCI formats for scheduling of PDSCH

##### 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.

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]. This field is reserved when this format is carried by PDCCH on the primary cell and the UE is configured for scheduling on the primary cell from an SCell, with the same number of bits as that in this format carried by PDCCH on the SCell for scheduling on the primary cell.

< Unchanged parts are omitted >

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 if the number of scheduled PDSCH indicated by the Time domain resource assignment field is 1; otherwise 2, 3, 4, 5, 6, 7 or 8 bits determined based on the maximum number of schedulable PDSCH among all entries in the higher layer parameter *pdsch-TimeDomainAllocationListForMultiPDSCH*, where each bit corresponds to one scheduled PDSCH as defined in clause 5.1.3 in [6, TS 38.214].

- Redundancy version - number of bits determined by the following:

- 2 bits as defined in Table 7.3.1.1.1-2 if the number of scheduled PDSCH indicated by the Time domain resource assignment field is 1;

- otherwise 2, 3, 4, 5, 6, 7 or 8 bits determined by the maximum number of schedulable PDSCHs among all entries in the higher layer parameter *pdsch-TimeDomainAllocationListForMultiPDSCH*, where each bit corresponds to one scheduled PDSCH as defined in clause 5.1.3 in [6, TS 38.214] and redundancy version is determined according to Table 7.3.1.1.2-34.

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 - 5 bits if higher layer parameter *harq-ProcessNumberSizeDCI-1-1* or *harq-ProcessNumberSizeDCI-1-1-Ext* is configured; otherwise 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]

< Unchanged parts are omitted >

##### 7.3.1.2.3 Format 1\_2

DCI format 1\_2 is used for the scheduling of PDSCH in one cell.

The following information is transmitted by means of the DCI format 1\_2 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, 1, 2 or 3 bits determined by higher layer parameter *carrierIndicatorSizeDCI-1-2*, as defined in Clause 10.1 of [5, TS38.213]. This field is reserved when this format is carried by PDCCH on the primary cell and the UE is configured for scheduling on the primary cell from an SCell, with the same number of bits as that in this format carried by PDCCH on the SCell for scheduling on the primary cell.

< Unchanged parts are omitted >

- Redundancy version - 0, 1 or 2 bits determined by higher layer parameter *numberOfBitsForRV-DCI-1-2*

- If 0 bit is configured, *rvid* to be applied is 0;

- 1 bit according to Table 7.3.1.2.3-1;

- 2 bits according to Table 7.3.1.1.1-2.

- HARQ process number - number of bits determined by the following:

- 0, 1, 2, 3, 4 or 5 bits determined by higher layer parameter *harq-ProcessNumberSizeDCI-1-2-v1700* or *harq-ProcessNumberSizeDCI-1-2-Ext* if configured;

- otherwise 0, 1, 2, 3 or 4 bits determined by higher layer parameter *harq-ProcessNumberSizeDCI-1-2*

- Downlink assignment index - 0, 1, 2 or 4 bits

- 0 bit if the higher layer parameter *downlinkAssignmentIndexDCI-1-2* is not configured;

- 1, 2 or 4 bits determined by higher layer parameter *downlinkAssignmentIndexDCI-1-2* otherwise,

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

- 4 bits if only 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.

- 1 or 2 bits if only one serving cell is configured in the DL and the higher layer parameter *pdsch-HARQ-ACK-Codebook=dynamic*, 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 1 bit or 2 bits are the counter DAI.

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-1-2* is configured, if the bit width of the Downlink assignment index in DCI format 1\_2 for one HARQ-ACK codebook is not equal to that of the Downlink assignment index in DCI format 1\_2 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\_2 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]

< Unchanged parts are omitted >

##### 7.3.1.2.4 Format 1\_3

DCI format 1\_3 is used for the scheduling of one PDSCH in one cell, or multiple PDSCHs in multiple cells with one PDSCH per cell.

The following information is transmitted by means of the DCI format 1\_3 with CRC scrambled by C-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

- Scheduled cell set indicator - $\left⌈log\_{2}N\_{set}\right⌉ $bits, where $N\_{set}$ is the number of cell sets which are configured by higher layer parameter *mc-DCI-SetofCellsToAddModList* to be respectively scheduled by DCI format 0\_3/1\_3 from the cell on which this format is carried by PDCCH. If present, this field is used to indicate the scheduled cell set according to Table 7.3.1.1.4-1; otherwise, the scheduled cell set is the cell set configured to be scheduled by DCI format 0\_3/1\_3 from the cell by higher layer parameter *mc-DCI-SetofCellsToAddModList*.

- Scheduled cells indicator - number of bits determined by the following:

- 0 bit if the higher layer parameter *scheduledCellComboListDCI-1-3* for the scheduled cell set is not configured;

- otherwise $\left⌈log\_{2}I\_{DL}\right⌉$ bits indicating the scheduled cells in the scheduled cell set according to Table 7.3.1.2.4-1, where $I\_{DL}$ is the number of entries in the higher layer parameter *scheduledCellComboListDCI-1-3.* If only one entry is configured in the higher layer parameter *scheduledCellComboListDCI-1-3*, the scheduled cells are the cells configured by higher layer parameter *scheduledCellComboListDCI-1-3*.

< Unchanged parts are omitted >

For transport block 2:

- Modulation and coding scheme - number of bits determined by the following:

- block number 1, block number 2,…, block number$ N\_{cell}^{DL,3}$

If *scheduledCellComboListDCI-1-3* for the scheduled cell set is configured with more than one entry, $N\_{cell}^{DL,3}$ is the number of scheduled cells indicated by Scheduled cells indicator field and configured with *maxNrofCodeWordsScheduledByDCI = 2*; if *scheduledCellComboListDCI-1-3* for the scheduled cell set is configured with only one entry,$ N\_{cell}^{DL,3}$ is the number of cells configured by higher layer parameter *scheduledCellComboListDCI-1-3* and configured with *maxNrofCodeWordsScheduledByDCI = 2*; otherwise, $N\_{cell}^{DL,3} $is the number of cells configured by higher layer parameter *scheduledCellListDCI-1-3* in the scheduled cell set and configured with *maxNrofCodeWordsScheduledByDCI = 2*. Each block corresponds to the modulation and coding scheme for a cell, and the blocks are placed according to an ascending order of a serving cell index, with block number 1 corresponding to the modulation and coding scheme for the cell with the smallest serving cell index. Each block is 5 bits as defined in Clause 6.1.4.1 of [6, TS 38.214].

- New data indicator - number of bits determined by the following:

- block number 1, block number 2,…, block number $N\_{cell}^{DL,3}$

Each block corresponds to the new data indicator for a cell, and the blocks are placed according to an ascending order of a serving cell index, with block number 1 corresponding to the new data indicator for the cell with the smallest serving cell index. Each block is 1 bit.

- Redundancy version - number of bits determined by the following:

- block number 1, block number 2,…, block number $N\_{cell}^{DL,3}$

Each block corresponds to the redundancy version for a cell, and the blocks are placed according to an ascending order of a serving cell index, with block number 1 corresponding to the redundancy version for the cell with the smallest serving cell index. Each block is 0, 1 or 2 bits determined by higher layer parameter *numberOfBitsForRV-DCI-1-3* configured for the cell corresponding to the block,

- If 0 bit is configured, *rvid* to be applied is 0;

- 1 bit according to Table 7.3.1.2.3-1;

- 2 bits according to 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 - number of bits determined by the following:

- block number 1, block number 2,…, block number $N\_{cell}^{DL}$

Each block corresponds to the HARQ process number for a cell, and the blocks are placed according to an ascending order of a serving cell index, with block number 1 corresponding to the HARQ process number for the cell with the smallest serving cell index. Each block is 0, 1, 2, 3, 4 or 5 bits determined by higher layer parameter *harq-ProcessNumberSizeDCI-1-3* or *harq-ProcessNumberSizeDCI-1-3-Ext* configured for the cell corresponding to the block.

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

- 4 bits if the higher layer parameter *pdsch-HARQ-ACK-Codebook=dynamic*, where the 2 MSB bits are the counter DAI and the 2 LSB bits are the total DAI;

- 0 bits otherwise.

 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-1-3* is configured, if the bit width of the Downlink assignment index in DCI format 1\_3 for one HARQ-ACK codebook is not equal to that of the Downlink assignment index in DCI format 1\_3 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\_3 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]

< Unchanged parts are omitted >