**3GPP TSG-RAN WG1 Meeting #101-eR1-20wxyz**

**e-Meeting, May 25 – June 5, 2020**

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| *CR-Form-v12.0* |
| **CHANGE REQUEST** |
|  |
|  | **36.212** | **CR** |  | **rev** |  | **Current version:** | **16.1.0** |  |
|  |
| *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:***  | Miscellaneous corrections for Rel-16 eMTC features in 36.212 |
|  |  |
| ***Source to WG:*** | FUTUREWEI |
| ***Source to TSG:*** |  |
|  |  |
| ***Work item code:*** | LTE\_eMTC5-Core |  | ***Date:*** | 2020-6-11 |
|  |  |  |  |  |
| ***Category:*** | F |  | ***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)* |
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| ***Reason for change:*** | Corrections are needed for the multi-TB scheduling PUR features of Rel-16 eMTC in 36.212 |
|  |  |
| ***Summary of change:*** | 1. [101-e-LTE-eMTC5-PUR-01] / endorsed TP#2 in R1-2004800

Add the missing support of sub-PRB for PUR.1. [101-e-LTE-eMTC5-Multi-TB-01] / endorsed TP in R1-2004876

The HARQ-ACK bundling for multiple TB in TDD follows the same procedure as FDD, so the DAI field is reserved in this case.1. [101-e-LTE-eMTC5-Multi-TB-02] / endorsed TP in R1-2004877

Clarify the behaviour for simultaneous configuration of multi-TB and SPS by adding that when multi-TB is configured, a DCI scrambled with SPS C-RNTI shall schedule a single TB.1. Editor update per NB-IoT in [101-e-LTE-NB\_IoTenh3-Multi-TB-02] / endorsed TP in R1-2004956

Mirroring the change in NB-IoT, DCI format 6-1A and 6-1B only schedules one codeword in non-multi-TB, so “per-TTI” is added to the DCI preamble.1. Update of a few RRC parameter names to align with 36.331.
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| ***Consequences if not approved:*** | Rel-16 eMTC feature is incomplete |
|  |  |
| ***Clauses affected:*** | 5.3.3.1.10, 5.3.3.1.11, 5.3.3.1.12, 5.3.3.1.13 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** | **X** |  |  Other core specifications  | TS 36.211, 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:*** |  |

##### 5.3.3.1.10 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 C-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 C-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 as defined in clause 8.0 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, 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, 8 and 8.4 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

- 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 higher layer parameter *resourceReservationDedicatedUL*is configured 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 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, 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.

##### 5.3.3.1.11 Format 6-0B

DCI format 6-0B 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 6-0B:

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

- Flag for sub-PRB resource allocation – 1 bit, where value 1 indicates the format 6-0B DCI uses sub-PRB resource allocation and value 0 indicates the format 6-0B DCI does not use sub-PRB resource allocation. 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 C-RNTI as defined in [3] and the UE is configured with higher layer parameter *subPRB-Allocation* = ‘true’.

- Modulation and coding scheme – 4 bits as defined in clause 8.6 of [3]. The field is only present if format 6-0B CRC is scrambled by PUR C-RNTI and for not sub-PRB resource allocation.

- Resource block assignment – The field is not present if format 6-0B CRC is scrambled by PUR C-RNTI and Modulation and coding scheme is set to all ones for not sub-PRB resource allocation.

- If the flag for sub-PRB resource allocation is set to 1:

- +4 bits for PUSCH as defined in [3]

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

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

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

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

- 3 bits provide the resource allocation within the indicated narrowband as specified in clause 8.1.3 of [3]

If format 6-0B CRC is scrambled by PUR C-RNTI and Resource block assignment is set to all ones for sub-PRB resource allocation or Modulation and coding scheme is set to all ones for not sub-PRB resource allocation, 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 – 3 bits as defined in clause 8.0 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 6-0B 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 flag for sub-PRB resource allocation is present and set to 1, otherwise the 4-bit field applies. 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], or if format 6-0B CRC is scrambled by PUR C-RNTI and for not sub-PRB resource allocation.

- Number of resource units – 1 bit as defined in clause 8.1.6 of [3]. This field is present when the flag for sub-PRB resource allocation is present and is reserved when the flag for sub-PRB resource allocation is set to 0.

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

- HARQ process number – 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].

- 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].

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

- Scheduling TBs for Unicast – 10 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].

- If one TB is scheduled

- 3 bits set to zero

- Modulation and coding scheme – 4 bits

- HARQ process number – 2 bits

- New data indicator – 1 bit

- If two TBs are scheduled

- 1 bit set to zero

- Modulation and coding scheme with offset – 4 bits provide the Modulation and coding scheme + offset, with an offset of +3

- HARQ index – 3 bits provide the 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

- If three TBs are scheduled

- Modulation and coding scheme with offset – 5 bits provide the Modulation and coding scheme + offset, with an offset of +15

- HARQ index – 2 bits provide the HARQ index as defined in 8.0 of [3]

- New data indicators – 3 bits, one for each scheduled TB in increasing order of HARQ process ID

- If four TBs are scheduled

- Modulation and coding scheme with offset – 6 bits provide the Modulation and coding scheme + offset, with an offset of +52

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

- Resource reservation – 1 bit as defined in clause 8.0 of [3]. This field is only present if higher layer parameter *resourceReservationDedicatedUL*is configured 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 Modulation and coding scheme in format 6-0B is 4 bits and set to all ones, or *ce-PUSCH-MultiTB-Config*is enabled and the 6 MSB bits of the Scheduling TBs for Unicast Field are set to '111111', format 6-0B is used for the indication of ACK feedback, and all the remaining bits except Flag for format 6-0B/format 6-1B differentiation and DCI subframe repetition number are set to zero.

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

##### 5.3.3.1.12 Format 6-1A

DCI format 6-1A is used for the compact scheduling of one PDSCH codeword per TTI in one cell, random access procedure initiated by a PDCCH order, notifying SC-MCCH change, operation on preconfigured UL resources, and direct indication. The DCI corresponding to a PDCCH order can be carried by MPDCCH.

The following information is transmitted by means of the DCI format 6-1A:

Format 6-1A is used for direction indication only if the DCI CRC is scrambled by SI-RNTI and *ce-ETWS-CMAS-RxInConn*is configured by higher layers, and all the remaining fields are set as follows:

- Direct Indication information – 8 bits provide direct indication of fields, as defined in [6]

- Zeros are added until the size is equal to that of format 6-1A scrambled with C-RNTI when format 6-1A is mapped onto the common search space

Otherwise,

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

Format 6-1A is used for random access procedure initiated by a PDCCH order only if format 6-1A CRC is scrambled with C-RNTI and all the remaining fields are set as follows:

- Resource block assignment – +5 bits, where all bits shall be set to 1

- Preamble Index – 6 bits

- PRACH Mask Index – 4 bits, [5]

- Starting CE level – 2 bits provide the PRACH starting CE level as defined in [5]

- All the remaining bits in format 6-1A for compact scheduling assignment of one PDSCH codeword are set to zero

Otherwise,

- 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 6.4.1 of [2]. If the UE is configured with 64QAM for PDSCH and the repetition number field indicates no PDSCH repetition, this field is the MSB bit of the extended Modulation and coding scheme field, as specified in Table 7.1.7.1-1 of [3]. The field is not present if *ce-PDSCH-MultiTB-Config* is enabled and the DCI is mapped onto the UE-specific search space given by C-RNTI as defined in [3].

- Resource block assignment flag – 1 bit. This field is only present when the higher layer parameter *ce-pdsch-maxBandwidth-config* is configured and set to 20 MHz and the DCI is mapped onto the UE-specific search space given by the C-RNTI as defined in [3].

- Resource block assignment –

- If *ce-pdsch-maxBandwidth-config* is set to 5 MHz or *mpdcch-PDSCH-MaxBandwidth-SC-MTCH* is set to 24 PRBs or the resource block assignment flag is set to 1, and the DCI is mapped onto the UE-specific search space given by the C-RNTI as defined in [3],

- If , bits for PDSCH as defined in [3]:

- MSB bits provide the starting narrowband index as defined in clause 6.2.7 of [2]

- 3 bit bitmap provides additional allocated narrowbands among the three narrowbands following the starting narrowband. The order of the bitmap to narrowband index mapping is such that the first narrowband after the starting narrowband to the third narrowband after the starting narrowband are mapped to MSB to LSB of the bitmap.

- 5 bits provide the same resource allocation using DL resource allocation type 2 within each of the allocated narrowbands.

- Else if , + 5 bits for PDSCH as defined below:

- MSB bits provide a bitmap of allocated narrowbands. The order of the bitmap to narrowband index mapping is such that narrowband index to are mapped to MSB to LSB of the bitmap.

- 5 bits provide the same resource allocation using DL resource allocation type 2 within each of the allocated narrowbands

- Otherwise, 5 bits for PDSCH as defined below:

- 5 bits provide resource allocation using DL resource allocation type 2

- Else if the resource block assignment flag is set to 0:

- bits provide the RBG bitmap as defined in clause 7.1.6.1 of [3], where *S* = 9 if and *S* = 6 otherwise

- Reserved information bits are added until the size is equal to the size of the resource block assignment with resource block assignment flag is set to 1

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

- MSB bits provide the narrowband index as defined in clause 6.2.7 of [2]

- 5 bits provide the resource allocation using DL resource allocation type 2 within the indicated narrowband

- Modulation and coding scheme – 4 bits as defined in clause 7.1.7 of [3]

- Repetition number – 2 bits as defined in clause 7.1.11 of [3]

- Number of scheduled TB for SC-MTCH – 3 bits, indicating from 1 to 8 TBs. This field is only present if higher layer parameter *multi-TB-SC-MTCH-config* is enabled and the CRC of the DCI is scrambled by G-RNTI.

- HARQ process number – 3 bits (for cases with FDD primary cell), 4 bits (for cases with TDD primary cell, or for cases with FDD primary cell when *ce-pdsch-tenProcesses-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]). This field is not present when the format 6-1A CRC is scrambled with G-RNTI, or if *ce-PDSCH-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. This field is not present when the format 6-1A CRC is scrambled with G-RNTI, or if *ce-PDSCH-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-PDSCH-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 PUCCH – 2 bits as defined in clause 5.1.2.1 of [3] . This field is not present when the format 6-1A CRC is scrambled with G-RNTI.

- If the format 6-1A CRC is scrambled by RA-RNTI:

- The most significant bit of the TPC command is reserved.

- The least significant bit of the TPC command indicates column of the TBS table defined of [3].

- If least significant bit is 0 then = 2 else = 3.

- Else

- The two bits including the most significant bit indicate the TPC command

- Downlink Assignment Index – number of bits as specified in Table 5.3.3.1.2-2. This field is reserved when *ce-PDSCH-MultiTB-Config* is enabled and multiple TBs are scheduled, or when the configured maximum repetition number is larger than 1 for MPDCCH, and not present when the format 6-1A CRC is scrambled with G-RNTI, or when the higher layer parameter *csi-NumRepetitionCE-r13* indicates more than one subframe.

- Antenna port(s) and scrambling identity – 2 bits indicating the values 0 to 3, as specified in Table 5.3.3.1.5C-1. This field is present only if PDSCH transmission is configured with TM9 for DCI formats scheduling PDSCH which are mapped onto the UE specific search space given by the C-RNTI as defined in [3].

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

- TPMI information for precoding – number of bits as specified in Table 5.3.3.1.3A-1.

- TPMI information indicates which codebook index is used in Table 6.3.4.2.3-1 or Table 6.3.4.2.3-2 of [2] corresponding to the single-layer transmission. This field is present only if PDSCH transmission is configured with TM6 for DCI formats scheduling PDSCH which are mapped onto the UE specific search space given by the C-RNTI as defined in [3].

- PMI confirmation for precoding – 1 bit as specified in Table 5.3.3.1.3A-2. This field is present only if PDSCH transmission is configured with TM6 for DCI formats scheduling PDSCH which are mapped onto the UE specific search space given by the C-RNTI as defined in [3].

- HARQ-ACK resource offset – 0 or 2 bits as defined in clause 10.1 of [3] (this field is 0 bits if Information for SC-MCCH change notification is present)

- Information for SC-MCCH change notification – 2 bits as defined in clause 5.8a of [6] (this field is present if the format 6-1A CRC is scrambled with G-RNTI)

- DCI subframe repetition number – 0 or 2 bits as defined in clause 9.1.5 of [3] (this field is 0 bits if Transport blocks in a bundle is present)

- Transport blocks in a bundle – 0 or 2 bits, where 2 bits indicate from 1 to 4 transport blocks in a bundle (this field is 2 bits when DCI Field "HARQ-ACK bundling flag" is set to 1, and the DCI is mapped onto the UE-specific search space given by the C-RNTI as defined in [3]; otherwise this field is 0 bits).

- HARQ-ACK bundling flag – 1 bit, where value 0 indicates HARQ-ACK bundling is not enabled and value 1 indicates HARQ-ACK bundling is enabled as defined in clause 7.3 of [3]. This field is only present when the higher layer parameter *ce-HarqAckBundling-config* is configured and the DCI is mapped onto the UE-specific search space given by the C-RNTI as defined in [3].

- HARQ-ACK delay – 3 bits as defined in 7.3 of [3]. This field is only present when the higher layer parameter *ce-schedulingEnhancement-config* or *ce-HarqAckBundling-config* is configured and the DCI is mapped onto the UE-specific search space given by the C-RNTI as defined in [3].

- Multi-TB HARQ-ACK bundling size – 2 bits as defined in 7.3 of [3]. This field is only present if higher layer parameter *ce-PDSCH-MultiTB-Config* is configured as enabled and higher layer parameter *multi-TB-DL-HARQ-bundling* is configured and the DCI is mapped onto the UE-specific search space given by C-RNTI as defined in [3].

- Scheduling TBs for Unicast – 12 bits. This field is only present if *ce-PDSCH-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 6.4.1 of [2]. If the UE is configured with 64QAM for PDSCH and the repetition number field indicates no PDSCH repetition, this field is the MSB bit of the extended Modulation and coding scheme field, as specified in Table 7.1.7.1-1 of [3]. If the UE is not configured with 64QAM for PDSCH and 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 7.1.7.2 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 the UE is configured with 64QAM for PDSCH and the repetition number field indicates no PDSCH repetition then this bit is the MSB bit of the extended Modulation and coding scheme field. If Repetition number is > 1 and frequency hopping is enabled by higher layers then this bit is a Frequency hopping flag for the TBs. In these cases 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 7.1.7.2 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 7.1.7.2 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 the UE is configured with 64QAM for PDSCH and the repetition number field indicates no PDSCH repetition then this bit is the MSB bit of the extended Modulation and coding scheme field. If Repetition number is > 1 and frequency hopping is enabled by higher layers then this bit is a Frequency hopping flag for the TBs. In these cases the redundancy version for all TBs starts at 0.

- Multi-TB HARQ processes group – 1 bit, where value 0 indicates that the Scheduling TBs for Unicast Field applies to the first group of 8 HARQ process and value 1 indicates the second group. This field is only present for TDD operation with more than 8 maximum processes and if the Scheduling TBs for Unicast Field is present.

- Resource reservation – 1 bit as defined in clause 7.1 of [3]. This field is only present if higher layer parameter *resourceReservationDedicatedDL* is configured and the DCI is mapped onto the UE-specific search space given by C-RNTI as defined in [3].

When the format 6-1A CRC is scrambled with a RA-RNTI, then the following fields among the fields above are reserved:

- HARQ process number

- New data indicator

- Downlink Assignment Index

- HARQ-ACK resource offset

If the UE is not configured to decode MPDCCH with CRC scrambled by the C-RNTI and the format 6-1A CRC is not scrambled with a G-RNTI, and the number of information bits in format 6-1A is less than that of format 6-0A, zeros shall be appended to format 6-1A until the payload size equals that of format 6-0A.

If the UE is configured to decode MPDCCH with CRC scrambled by the C-RNTI and the format 6-1A CRC is not scrambled with a G-RNTI, and the number of information bits in format 6-1A mapped onto a given search space is less than that of format 6-0A for scheduling the same serving cell and mapped onto the same search space, zeros shall be appended to format 6-1A until the payload size equals that of format 6-0A.

##### 5.3.3.1.13 Format 6-1B

DCI format 6-1B is used for the scheduling of one PDSCH codeword per TTI in one cell, notifying SC-MCCH change, operation on preconfigured UL resources, and direct indication.

The following information is transmitted by means of the DCI format 6-1B:

Format 6-1B is used for direction indication only if the DCI CRC is scrambled by SI-RNTI and *ce-ETWS-CMAS-RxInConn*is configured by higher layers, and all the remaining fields are set as follows:

- Direct Indication information – 8 bits provide direct indication of fields, as defined in [6]

- Zeros are added until the size is equal to 14+ +1 bits

Otherwise,

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

Format 6-1B is used for random access procedure initiated by a PDCCH order only if format 6-1B CRC is scrambled with C-RNTI and all the remaining fields are set as follows:

- Reserved bits – +2 bits, where all bits shall be set to 1

- Preamble Index – 6 bits

- PRACH Mask Index – 4 bits [5]

- Starting CE level – 2 bits provide the PRACH starting CE level as defined in [5]

- All the remaining bits in format 6-1B for compact scheduling assignment of one PDSCH codeword are set to zero

Otherwise,

- Modulation and coding scheme – 4 bits as defined in clause 7.1.7 of [3] . The field is not present if *ce-PDSCH-MultiTB-Config* is enabled and the DCI is mapped onto the UE-specific search space given by C-RNTI as defined in [3].

- Resource block assignment –

- If *ce-pdsch-maxBandwidth-config* is set to 5 MHz or *mpdcch-PDSCH-MaxBandwidth-SC-MTCH* is set to 24 PRBs,

- If , bits for PDSCH as defined in [3]:

- MSB bits provide the wideband index as defined in clause 6.2.7 of [2]

- 4 bits provide a narrowband bitmap for resource allocation within the indicated wideband

- Otherwise, bits for PDSCH as defined below:

- if = 1, 1 bit provides the resource allocation within the narrowband, where value 0 indicates RBs with PRB index {0, 1, 2, 3} and value 1 indicates that all 6 PRBs are used.

- Otherwise, bits provide allocated narrowbands

- Else if *ce-pdsch-maxBandwidth-config* is set to 20 MHz,

- If , bits for PDSCH as defined in [3]:

- bits provide a wideband combination index as defined in clause 7.1.6 of [3]

- 4 bits provide a narrowband bitmap for resource allocation within each indicated wideband

- Otherwise, bits for PDSCH as defined in [3]:

- If = 1, 1 bit provides the resource allocation within the narrowband, where value 0 indicates RBs with PRB index {0, 1, 2, 3} and value 1 indicates that all 6 PRBs are used.

- Otherwise, bits provide a narrowband bitmap for resource allocation

- Otherwise, +1 bits for PDSCH as defined in [3]:

- MSB bits provide the narrowband index as defined in clause 6.2.7 of [2]

- 1 bit provides the resource allocation within the indicated narrowband, where value 0 indicates RBs with PRB index {0, 1, 2, 3} and value 1 indicates that all 6 PRBs are used.

- Repetition number – 3 bits as defined in clause 7.1.11 of [3]

- Number of scheduled TB for SC-MTCH – 3 bits, indicating from 1 to 8 TBs. This field is only present if higher layer parameter *multi-TB-SC-MTCH-config* is enabled and the CRC of the DCI is scrambled by G-RNTI.

- HARQ process number – 1 bit. This field is not present when the format 6-1B CRC is scrambled with G-RNTI, or if *ce-PDSCH-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. This field is not present when the format 6-1B CRC is scrambled with G-RNTI, or if *ce-PDSCH-MultiTB-Config* is enabled and the DCI is mapped onto the UE-specific search space given by C-RNTI as defined in [3].

- HARQ-ACK resource offset – 0 or 2 bits as defined in clause 10.1 of [3] (this field is 0 bits if Information for SC-MCCH change notification is present)

- Information for SC-MCCH change notification – 2 bits as defined in clause 5.8a of [6] (this field is present if the format 6-1B CRC is scrambled with G-RNTI)

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

- Scheduling TBs for Unicast – 10 bits. This field is only present if *ce-PDSCH-MultiTB-Config* is enabled and the DCI is mapped onto the UE-specific search space given by C-RNTI as defined in [3].

- If one TB is scheduled

- 3 bits set to zero

- Modulation and coding scheme – 4 bits

- HARQ process number – 2 bits

- New data indicator – 1 bit

- If two TBs are scheduled

- 1 bit set to zero

- Modulation and coding scheme with offset – 4 bits provide the Modulation and coding scheme + offset, with an offset of +3

- HARQ index – 3 bits provide the HARQ index as defined in 7.1.7.2 of [3]

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

- If three TBs are scheduled

- Modulation and coding scheme with offset – 5 bits provide the Modulation and coding scheme + offset, with an offset of +15

- HARQ index – 2 bits provide the HARQ index as defined in 7.1.7.2 of [3]

- New data indicators – 3 bits, one for each scheduled TB in increasing order of HARQ process ID

- If four TBs are scheduled

- Modulation and coding scheme with offset – 6 bits provide the Modulation and coding scheme + offset, with an offset of +52

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

- Resource reservation – 1 bit as defined in clause 7.1 of [3]. This field is only present if higher layer parameter *resourceReservationDedicatedDL*is configured and the DCI is mapped onto the UE-specific search space given by C-RNTI as defined in [3].

When the format 6-1B CRC is scrambled with a RA-RNTI then the following fields among the fields above are reserved:

- HARQ process number

- New data indicator

- HARQ-ACK resource offset

If the UE is not configured to decode MPDCCH with CRC scrambled by the C-RNTI and the format 6-1B CRC is not scrambled with a G-RNTI, and the number of information bits in format 6-1B is less than that of format 6-0B, zeros shall be appended to format 6-1B until the payload size equals that of format 6-0B.

If the UE is configured to decode MPDCCH with CRC scrambled by the C-RNTI and the format 6-1B CRC is not scrambled with a G-RNTI, and the number of information bits in format 6-1B mapped onto a given search space is less than that of format 6-0B for scheduling the same serving cell and mapped onto the same search space, zeros shall be appended to format 6-1B until the payload size equals that of format 6-0B.

##### 5.3.3.1.14 Format 6-2

DCI format 6-2 is used for paging, direct indication, scheduling of one PDSCH codeword carrying SC-MCCH in one cell, and notifying SC-MCCH change.

The following information is transmitted by means of the DCI format 6-2:

- If the format 6-2 CRC is scrambled by P-RNTI:

- Flag for paging/direct indication differentiation – 1 bit, with value 0 for direct indication and value 1 for paging

- Else if the format 6-2 CRC is scrambled by a SC-RNTI:

- Information for SC-MCCH change notification – 1 bit as defined in clause 5.8a of [6]

- If the format 6-2 CRC is scrambled by P-RNTI and Flag=0:

- Direct Indication information – 8 bits provide direct indication of system information update and other fields, as defined in [6]

- Reserved information bits are added until the size is equal to that of format 6-2 with Flag=1

- If the format 6-2 CRC is scrambled by P-RNTI and Flag=1, or if the format 6-2 CRC is scrambled by SC-RNTI:

- Resource block assignment – bits for the narrowband index as defined in clause 7.1.6 of [3]

- Modulation and coding scheme – 3 bits as defined in clause 7.1.7 of [3]

- Repetition number – 3 bits as defined in clause 7.1.11 of [3]

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