**3GPP TSG-WG1 Meeting #107-eR1-21xxxxx**

**e-meeting, November 11-19, 2021**

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

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|  |
| ***Title:***  | Introduction of Rel-17 NB-IoT and eMTC features |
|  |  |
| ***Source to WG:*** | FUTUREWEI |
| ***Source to TSG:*** |  |
|  |  |
| ***Work item code:*** |  |  | ***Date:*** | 2021-11-23 |
|  |  |  |  |  |
| ***Category:*** |  |  | ***Release:*** |  |
|  | *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-15 (Release 15)Rel-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)* |
|  |  |
| ***Reason for change:*** | Introduction of Rel-17 NB-IoT and eMTC features into 36.212 |
|  |  |
| ***Summary of change:*** | Additions of 16 QAM for NB-IoT and 14 HARQ processes for eMTC |
|  |  |
| ***Consequences if not approved:*** | 16 QAM is not supported for NB-IoT14 HARQ processes is not supported for eMTC |
|  |  |
| ***Clauses affected:*** | 5.3.3.1.12, 6.4.3.1, 6.4.3.2 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** | **X** |  |  Other core specifications  | TS36.213, TS36.211  |
| ***affected:*** |  | **X** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

##### 5.3.3.1.12 Format 6-1A

DCI format 6-1A is used for the 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 *sc-MTCH-InfoList-MultiTB-r16* 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* or *ce-PDSCH-14HARQ-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] and the field “PDSCH scheduling delay and HARQ-ACK delay for 14 HARQ” is not present.

- PDSCH scheduling delay and HARQ-ACK delay for 14 HARQ – 5 or 7 bits as defined in Table 5.3.3.1.12-1 and Table 5.3.3.1.12-2. This field is only present when the higher layer parameter *ce-PDSCH-14HARQ-Config* is configured and the DCI is mapped onto the UE-specific search space given by the C-RNTI as defined in [3]. The field is 5 bits when *ce-HARQ-AckDelay* is Alt-2e and 7 bits when *ce-HARQ-AckDelay* is Alt-1.

- 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 *harq-AckBundling* 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 DL 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].

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 or PUR-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 or PUR-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.

Table 5.3.3.1.12-1: Content of "PDSCH scheduling delay and HARQ-ACK delay for 14 HARQ" for *ce-HARQ-AckDelay* = Alt-2e

|  |  |  |
| --- | --- | --- |
| **Bit field mapped to index** | **PDSCH scheduling delay option****(Table 5.3.3.1.12-3)** | **HARQ-ACK delay****(subframes)** |
| 0 | 0 | 4 |
| 1 | 0 | 5 |
| 2 | 0 | 6 |
| 3 | 0 | 7 |
| 4 | 0 | 8 |
| 5 | 0 | 9 |
| 6 | 0 | 10 |
| 7 | 0 | 11 |
| 8 | 0 | 12 |
| 9 | 0 | 13 |
| 10 | 0 | 15 |
| 11 | 0 | 17 |
| 12 | 1 | 4 |
| 13 | 1 | 5 |
| 14 | 1 | 10 |
| 15 | 1 | 12 |
| 16 | 1 | 13 |
| 17 | 1 | 14 |
| 18 | 1 | 15 |
| 19 | 1 | 16 |
| 20 | 1 | 17 |
| 21 | 1 | 18 |
| 22 | 2 | 4 |
| 23 | 2 | 5 |
| 24 | 2 | 10 |
| 25 | 2 | 12 |
| 26 | 2 | 13 |
| 27 | 2 | 14 |
| 28 | 2 | 15 |
| 29 | 2 | 16 |
| 30 | 2 | 17 |
| 31 | 2 | 18 |

Table 5.3.3.1.12-2: Content of "PDSCH scheduling delay and HARQ-ACK delay for 14 HARQ" for *ce-HARQ-AckDelay* = Alt-1

|  |  |  |
| --- | --- | --- |
| **Bit field mapped to index** | **PDSCH scheduling delay option****(Table 5.3.3.1.12-3)** | **HARQ-ACK delay**(y) BL/CE DL subframes + 1 subframe + (z) BL/CE UL subframes |
| **y** | **z** |
| 0 | 0 | 0 | 1 |
| … | … | … | … |
| 11 | 0 | 11 | 1 |
| 12 | 0 | 0 | 2 |
| … | … | … | … |
| 23 | 0 | 11 | 2 |
| 24 | 0 | 0 | 3 |
| … | … | … | … |
| 35 | 0 | 11 | 3 |
| 36 | 1 | 0 | 1 |
| … | … | … | … |
| 47 | 1 | 11 | 1 |
| 48 | 1 | 0 | 2 |
| … | … | … | … |
| 59 | 1 | 11 | 2 |
| 60 | 1 | 0 | 3 |
| … | … | … | … |
| 71 | 1 | 11 | 3 |
| 72 | 2 | 0 | 1 |
| … | … | … | … |
| 83 | 2 | 11 | 1 |
| 84 | 2 | 0 | 2 |
| … | … | … | … |
| 95 | 2 | 11 | 2 |
| 96 | 2 | 0 | 3 |
| … | … | … | … |
| 107 | 2 | 11 | 3 |
| 108-127 | reserved |

Table 5.3.3.1.12-3: PDSCH scheduling delay options

|  |  |
| --- | --- |
| **Option** | **Description** |
| 0 | 2 BL/CE DL subframes |
| 1 | 1 BL/CE DL subframe + 1 subframe + 3 BL/CE UL subframes + 1 subframe + 1 BL/CE DL subframe |
| 2 | 1 subframe + 3 BL/CE UL subframes + 1 subframe + 2 BL/CE DL subframes |

\*\*\* unchanged text is omitted \*\*\*

#### 6.4.3.1 DCI Format N0

DCI format N0 is used for the scheduling of NPUSCH and operation on preconfigured UL resources in one UL cell.

The following information is transmitted by means of the DCI format N0:

- Flag for format N0/format N1 differentiation – 1 bit, where value 0 indicates format N0 and value 1 indicates format N1

- Modulation and coding scheme – 4 bits as defined in clause 16.5.1.2 of [3]. This field is only present if format N0 CRC is scrambled by PUR-RNTI.

If format N0 CRC is scrambled by PUR-RNTI and Modulation and coding scheme is set to '1110', 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 16.6.4 of [3]

- NPUSCH repetition adjustment – 3 bits refer to  in Table 16.5.1.1-3 of [3]

- Timing advance adjustment – 6 bits as defined in clause 16.1.2 of [3]. The field is only present if ACK or Fallback indicator is set to 0.

- All the remaining bits in format N0 are set to one

Otherwise

- Subcarrier indication – 6 bits as defined in clause 16.5.1.1 of [3]

- Resource assignment – 3 bits as defined in clause 16.5.1.1 of [3]

- Scheduling delay – 2 bits as defined in clause 16.5.1 of [3]

- Modulation and coding scheme – 4 bits as defined in clause 16.5.1.2 of [3]. This field is not present if format N0 CRC is scrambled by PUR-RNTI. If *npusch-16QAM-Config* is configured and the value is ‘1111’, it functions as 16QAM indicator.

- Redundancy version – 1 bit as defined in clause 16.5.1.2 of [3]

- Repetition number – 3 bits as defined in clause 16.5.1.1 of [3]. If 16QAM is indicated, it functions as Modulation and coding scheme for 16QAM as defined in 16.5.1.2 of [3].

- New data indicator – 1 bit. If multiple TB are scheduled, it functions as New data indicator for the first TB.

- DCI subframe repetition number – 2 bits as defined in clause 16.6 in [3]

- Number of scheduled TB for Unicast – 1 bit, where value 0 indicates a single TB is scheduled and value 1 indicates multiple TB are scheduled. This field is only present if higher layer parameter *npusch-MultiTB-Config* is enabled and the corresponding DCI is mapped onto the UE specific search space given by the C-RNTI as defined in [3]. The field is set to 0 if the CRC of the DCI is scrambled by SPS C-RNTI.

- HARQ process number – 1 bit. This field is only present if 2 HARQ processes are configured and the corresponding DCI format is mapped onto the UE specific search space given by the C-RNTI as defined in [3], or if Number of scheduled TB for Unicast is present. If multiple TB are scheduled, it functions as New data indicator for the second TB.

- Resource reservation – 1 bit as defined in clause 16.5 of [3]. This field is only present if higher layer parameter *resourceReservationConfigUL* is configured and the DCI is mapped onto the UE-specific search space given by C-RNTI as defined in [3].

If the number of information bits in format N0 mapped onto the UE specific search space given by the C-RNTI as defined in [3] is less than that of format N1 in the same search space, zeros shall be appended to format N0 until the payload size equals that of format N1.

#### 6.4.3.2 DCI Format N1

DCI format N1 is used for the scheduling of one NPDSCH codeword per TTI in one cell, random access procedure initiated by a NPDCCH order, notifying SC-MCCH change, and operation on preconfigured UL resources. The DCI corresponding to a NPDCCH order is carried by NPDCCH.

The following information is transmitted by means of the DCI format N1:

- If the format N1 CRC is scrambled by C-RNTI or RA-RNTI or PUR-RNTI:

- Flag for format N0/format N1 differentiation – 1 bit, where value 0 indicates format N0 and value 1 indicates format N1

- NPDCCH order indicator – 1 bit

- Else if the format N1 CRC is scrambled by a G-RNTI:

- Information for SC-MCCH change notification – 2 bits as defined in clause 5.8a of [6]

Format N1 is used for random access procedure initiated by a NPDCCH order only if NPDCCH order indicator is set to '1', format N1 CRC is scrambled with C-RNTI, and all the remaining fields are set as follows:

- Preamble format indicator – 1 bit, where value 0 indicates preamble format 0/1 and value 1 indicates preamble format 2. This field is only present if *nprach-ParametersListFmt2* is configured and the UE indicates the *nprach-Format2* capability.

- Starting number of NPRACH repetitions – 2 bits as defined in clause 16.3.2 of [3]

- Subcarrier indication of NPRACH – 6 or 8 bits, this field is 8 bits only if Preamble format indicator is present and set to 1, as defined in clause 16.3.2 of [3]

- Carrier indication of NPRACH – 4 bits as defined in clause 16.3.2 of [3]. This field is only present if *ul-ConfigList* is configured and the UE indicates the *multiCarrier-NPRACH* capability.

- All the remaining bits in format N1 are set to one

Otherwise,

- Scheduling delay – 3 bits as defined in clause 16.4.1 of [3]

- Resource assignment – 3 bits as defined in clause 16.4.1.3 of [3]

- Modulation and coding scheme – 4 bits as defined in clause 16.4.1.5 of [3]. If *npdsch-16QAM-Config* is configured and the value is ‘1111’, it functions as 16QAM indicator.

- Repetition number – 4 bits as defined in clause 16.4.1.3 of [3]. If 16 QAM is indicated, it functions as Modulation and coding scheme for 16QAM as defined in 16.4.1.5 of [3].

- New data indicator – 1 bit. If multiple TB are scheduled, it functions as New data indicator for the first TB.

- HARQ-ACK resource – 4 bits as defined in clause 16.4.2 of [3].

- DCI subframe repetition number – 2 bits as defined in clause 16.6 in [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 *sc-mtch-InfoListMultiTB-r16* is enabled and the CRC of the DCI is scrambled by G-RNTI.

- Number of scheduled TB for Unicast – 1 bit, where value 0 indicates a single TB is scheduled and value 1 indicates multiple TB are scheduled. This field is only present if higher layer parameter *npdsch-MultiTB-Config* is enabled and the corresponding DCI is mapped onto the UE specific search space given by the C-RNTI as defined in [3]

- HARQ process number – 1 bit. This field is only present if 2 HARQ processes are configured and the corresponding DCI format is mapped onto the UE specific search space given by the C-RNTI as defined in [3], or if Number of scheduled TB for Unicast is present. If multiple TB are scheduled, it functions as New data indicator for the second TB.

- Resource reservation – 1 bit as defined in clause 16.4 of [3]. This field is only present if higher layer parameter *resourceReservationConfigDL* is configured and the DCI is mapped onto the UE-specific search space given by C-RNTI as defined in [3].

When the format N1 CRC is scrambled with a RA-RNTI or a G-RNTI, then the following fields among the fields above are reserved for RA-RNTI and not present for G-RNTI:

- New data indicator

- HARQ-ACK resource

If the number of information bits in format N1 mapped onto the same search space is less than that of format N0 and the format N1 CRC is not scrambled by G-RNTI, zeros shall be appended to format N1 until the payload size equals that of format N0.