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

**e-Meeting, 16th – 27th August 2021**

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| *CR-Form-v12.0* | | | | | | | | |
| **DRAFT CHANGE REQUEST** | | | | | | | | |
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|  | **38.214** | **CR** | **xxxx** | **rev** | **--** | **Current version:** | **16.6.0** |  |
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| *For* [**HE****LP**](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* <http://www.3gpp.org/Change-Requests>*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network | **X** | Core Network |  |

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| ***Title:*** | Processing of unicast PDSCH scheduled by DCI format 1\_0 in DL cell configured with capability 2 processing time and no additional DMRS by higher layers | | | | | | | | | |
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| ***Source to WG:*** |  | | | | | | | | | |
| ***Source to TSG:*** |  | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_newRAT-Core | | | | |  | ***Date:*** | | | 2021-08-23 |
|  |  | | | |  | |  | | |  |
| ***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 can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) Rel-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:*** | | Minimum UE processing time for processing PDSCH with *ld > 7* or *ld > 4* for PDSCH mapping types A or B respectively, scheduled by a DCI format 1\_0, in a DL cell with *processingType2Enabled* set to ‘enable’ needs to be clarified for UE indicating capability [FG22-12]. | | | | | | | | |
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| ***Summary of change:*** | | For a UE indicating [FG22-12], it is specified that:   * UE defaults to capability 1 processing time for processing PDSCH with *ld > 7* or *ld > 4* for PDSCH mapping types A or B respectively, scheduled by a DCI format 1\_0, in a DL cell with *processingType2Enabled* set to ‘enable’*.* * UE is not expected to decode a unicast PDSCH with last symbol within *N1 + d1,1* symbols before the start of a PDSCH that is scheduled to follow capability 2 processing time, if the PDSCH is scheduled by DCI format 1\_0 following capability 1 processing time, where the values of *N1* for SCS 15kHz, 30kHz, and 60kHz are given by the right column of Table 5.3-1 in TS38.214, and *d1,1* is as defined in TS38.214, Section 5.3 and corresponds to the PDSCH scheduled by DCI 1\_0. | | | | | | | | |
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| ***Consequences if not approved:*** | | UE behavior corresponding to [FG22-12] is not captured in the specification. | | | | | | | | |
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| ***Clauses affected:*** | | 5.3 | | | | | | | | |
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|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
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| ***Other comments:*** | | This CR has isolated impact, and affects only the behavior for UEs indicating [FG22-12] and configured with *processingType2Enabled* in *PDSCH-ServingCellConfig*. This CR does not impact operation for UEs not configured with *processingType2Enabled* or UEs configured with processingType2Enabled and not indicating [FG22-12]. | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

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## 5.3 UE PDSCH processing procedure time

If the first uplink symbol of the PUCCH which carries the HARQ-ACK information, as defined by the assigned HARQ-ACK timing *K1* and the PUCCH resource to be used and including the effect of the timing advance, starts no earlier than at symbol *L1*, where *L1* is defined as the next uplink symbol with its CP starting after  after the end of the last symbol of the PDSCH carrying the TB being acknowledged, then the UE shall provide a valid HARQ-ACK message.

*- N1* is based on *µ* of table 5.3-1 and table 5.3-2 for UE processing capability 1 and 2 respectively, where *µ* corresponds to the one of (*µPDCCH*, *µPDSCH*, *µUL*) resulting with the largest *Tproc,1*, where the *µPDCCH* corresponds to the subcarrier spacing of the PDCCH scheduling the PDSCH, the *µPDSCH* corresponds to the subcarrier spacing of the scheduled PDSCH, and *µUL* corresponds to the subcarrier spacing of the uplink channel with which the HARQ-ACK is to be transmitted, and κ is defined in clause 4.1 of [4, TS 38.211].

*-* For operation with shared spectrum channel access, is calculated according to [4, TS 38.211], otherwise =0.

*-* If the PDSCH DM-RS position for the additional DM-RS in Table 7.4.1.1.2-3 in clause 7.4.1.1.2 of [4, TS 38.211] is then *N1,0=14* inTable 5.3-1*,* otherwise *N1,0=13.*

- If the UE is configured with multiple active component carriers, the first uplink symbol which carries the HARQ-ACK information further includes the effect of timing difference between the component carriers as given in [11, TS 38.133].

- For the PDSCH mapping type A as given in clause 7.4.1.1 of [4, TS 38.211]: if the last symbol of PDSCH is on the *i-*th symbol of the slot where *i* < 7, then *d1,1 = 7 - i*, otherwise *d1,1 = 0*

- If a PUCCH of a larger priority index would overlap with PUCCH/PUSCH of a smaller priority index, *d2* for the PUCCH of a larger priority is set as reported by the UE; otherwise *d2 = 0.*

- For UE processing capability 1: If the PDSCH is mapping type B as given in clause 7.4.1.1 of [4, TS 38.211], and

- if the number of PDSCH symbols allocated is *L* ≥ 7, then *d1,1* = 0,

- if the number of PDSCH symbols allocated is *L* ≥ 4 and *L* ≤ 6, then *d1,1* = 7- *L.*

- if the number of PDSCH symbols allocated is *L* = *3* then *d1,1 = 3 +* min *(d,1)*, where *d* is the number of overlapping symbols of the scheduling PDCCH and the scheduled PDSCH.

- if the number of PDSCH symbols allocated is 2, then *d1,1* = 3*+d*, where *d* is the number of overlapping symbols of the scheduling PDCCH and the scheduled PDSCH.

- For UE processing capability 2: If the PDSCH is mapping type B as given in clause 7.4.1.1 of [4, TS 38.211],

- if the number of PDSCH symbols allocated is *L* ≥ 7, then *d1,1* = 0,

- if the number of PDSCH symbols allocated is *L* ≥ 3 and *L* ≤ 6, then *d1,1* is the number of overlapping symbols of the scheduling PDCCH and the scheduled PDSCH,

- if the number of PDSCH symbols allocated is 2,

- if the scheduling PDCCH was in a 3-symbol CORESET and the CORESET and the PDSCH had the same starting symbol, then *d1,1* = 3,

- otherwise *d1,1* is the number of overlapping symbols of the scheduling PDCCH and the scheduled PDSCH.

- For UE processing capability 2 with scheduling limitation when *µPDSCH* = 1, if the scheduled RB allocation exceeds 136 RBs, the UE defaults to capability 1 processing time. The UE may skip decoding a number of PDSCHs with last symbol within 10 symbols before the start of a PDSCH that is scheduled to follow Capability 2, if any of those PDSCHs are scheduled with more than 136 RBs with 30kHz SCS and following Capability 1 processing time.

- For a UE that supports capability 2 on a given cell, the processing time according to UE processing capability 2 is applied if the high layer parameter *processingType2Enabled* in *PDSCH-ServingCellConfig* is configured for the cell and set to 'enable'.

- If this PUCCH resource is overlapping with another PUCCH or PUSCH resource, then HARQ-ACK is multiplexed following the procedure in clause 9.2.5 of [6, TS 38.213], otherwise the HARQ-ACK message is transmitted on PUCCH.

- For UE processing capability 2 and UE indicating [FG22-12], when scheduled by DCI format 1\_0 to receive PDSCH with *ld > 7* or *ld > 4* for PDSCH mapping types A or B respectively in a DL cell with *processingType2Enabled* set to ‘enable’, the UE defaults to capability 1 processing time. The UE is not expected to receive a unicast PDSCH, scheduled by DCI format 1\_0, with last symbol within *[N1 + d1,1]* symbols before the start of a second PDSCH that is scheduled to follow capability 2 processing time, if the unicast PDSCH, scheduled by DCI format 1\_0, is to follow capability 1 processing time, where the values of *N1* for SCS 15kHz, 30kHz, and 60kHz are given by the right column of Table 5.3-1, and the value of *d1,1*corresponds to the PDSCH scheduled by DCI 1\_0.

Otherwise the UE may not provide a valid HARQ-ACK corresponding to the scheduled PDSCH. The value of *Tproc,1* is used both in the case of normal and extended cyclic prefix.

For a PDSCH that consists of two PDSCH transmission occasions in time domain in one slot, *d1,1* is calculated based on the first PDSCH transmission occasion in the slot, and as described above.

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