**3GPP TSG-RAN WG1 Meeting #114 *R1-23xxxxx***

**Toulouse, France, August 21-25, 2023**

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| *CR-Form-v12.2* | | | | | | | | |
| **Draft CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.212** | **CR** |  | **rev** | **-** | **Current version:** | **17.5.0** |  |
|  | | | | | | | | |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network | **X** | Core Network |  |

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| ***Title:*** | Introduction of Rel-18 NR demodulation performance evoluation | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Huawei | | | | | | | | | |
| ***Source to TSG:*** |  | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_demod\_enh3-Perf | | | | |  | ***Date:*** | | | 2023-09-01 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | B |  | | | | | ***Release:*** | | | Rel-18 |
|  | *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-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | Introduction of Rel-18 NR demodulation performance evolution | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Support of Rel-18 NR demodulation performance evolution. Update DCI format 1\_1 to implement the DCI signaling for advanced reciever on MU-MIMO scenario according to the LS R1-2306361 from RAN4*.* | | | | | | | | |
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| ***Consequences if not approved:*** | | Rel-18 NR demodulation performance evolution will be incomplete. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 7.3.1.2.2 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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:*** | |  | | | | | | | | |

7.3.1.2 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

< Unchanged parts are omitted >

- PUCCH Cell indicator – 0 or 1 bit.

- 1 bit if higher layer parameter *pucch-sSCellDyn* is configured.

- 0 bit otherwise.

If the UE is configured with a PUCCH-SCell, *pucch-sSCellDyn* is replaced by *pucch-sSCellDynSecondaryPUCCHgroup* for the secondary PUCCH group*.*

- Co-scheduled UE information – 0 or 3 bits.

- 3 bits as defined in Table 7.3.1.2.2-12 if higher layer parameter *XYZ* is configured;

- 0 bit otherwise.

If DCI formats 1\_1 are monitored in multiple search spaces associated with multiple CORESETs in a BWP for scheduling the same serving cell, zeros shall be appended until the payload size of the DCI formats 1\_1 monitored in the multiple search spaces equal to the maximum payload size of the DCI format 1\_1 monitored in the multiple search spaces.

If the number of information bits in DCI format 1\_1 scheduling a single PDSCH prior to padding is not equal to the number of information bits in DCI format 1\_1 scheduling multiple PDSCHs for the same serving cell, zeros shall be appended to the DCI format 1\_1 with smaller size until the payload size is the same for scheduling a single PDSCH and multiple PDSCHs.

For a UE configured with scheduling on the primary cell from an SCell, if prior to padding the number of information bits in DCI format 1\_1 carried by PDCCH on the primary cell is not equal to the number of information bits in DCI format 1\_1 carried by PDCCH on the SCell for scheduling on the primary cell, zeros shall be appended to the DCI format 1\_1 with smaller size until the payload size is the same.

- If application of step 4C in clause 7.3.1.0 results in additional zero padding for DCI format 1\_1 for scheduling on the primary cell, corresponding zeros shall be appended to both DCI format 1\_1 monitored on the primary cell and DCI format 1\_1 monitored on the SCell for scheduling on the primary cell.

- If the SCell is deactivated and *firstActiveDownlinkBWP-Id* is not set to dormant BWP, the UE determines the number of information bits in DCI format 1\_1 carried by PDCCH on the primary cell based on a DL BWP provided by *firstActiveDownlinkBWP-Id* for the SCell. If the active DL BWP of the SCell is a dormant DL BWP, or if the SCell is deactivated and *firstActiveDownlinkBWP-Id* is set to dormant BWP, the UE determines the number of information bits in DCI format 1\_1 carried by PDCCH on the primary cell based on a DL BWP provided by *firstWithinActiveTimeBWP-Id* for the SCell if provided; otherwise, based on a DL BWP provided by *firstOutsideActiveTimeBWP-Id* for the SCell.

< Unchanged parts are omitted >

**Table 7.3.1.2.2-6A: Allowed entries for DCI format 1\_1 and DCI format 1\_2, configured by higher layer parameter *ul-AccessConfigListDCI-1-1* in frequency range 2-2**

|  |  |
| --- | --- |
| **Entry index** | **Channel Access Type** |
| 0 | Type 1 channel access defined in clause 4.4.1 of 37.213 |
| 1 | Type 2 channel access defined in clause 4.4.2 of 37.213 |
| 2 | Type 3 channel access defined in clause 4.4.3 of 37.213 |

< Unchanged parts are omitted >

Table 7.3.1.2.2-12: Co-scheduled UE information

|  |  |
| --- | --- |
| **Bit field mapped to index** | **Co-scheduled UE information** |
| 0 | In all the PRBs allocated to the UE, there is no co-scheduled UE or there is co-scheduled UE but with a different root DMRS sequence |
| 1 | In all the PRBs allocated to the UE, all the co-scheduled UE(s), which have the same root DMRS sequence as the UE, are scheduled with modulation scheme QPSK |
| 2 | In all the PRBs allocated to the UE, all the co-scheduled UE(s), which have the same root DMRS sequence as the UE, are scheduled with modulation scheme 16QAM |
| 3 | In all the PRBs allocated to the UE, all the co-scheduled UE(s), which have the same root DMRS sequence as the UE, are scheduled with modulation scheme 64QAM |
| 4 | In all the PRBs allocated to the UE, all the co-scheduled UE(s), which have the same root DMRS sequence as the UE, are scheduled with modulation scheme 256QAM |
| 5 | In all the PRBs allocated to the UE, all the co-scheduled UE(s), which have the same root DMRS sequence as the UE, are scheduled with modulation scheme 1024QAM |
| 6 | In each individual PRB allocated to the UE, all the co-scheduled UE(s), which have the same root DMRS sequence as the UE, are scheduled with the same modulation scheme, except for the cases corresponding to index 0~5 |
| 7 | All cases not covered above |
| Note: Root DMRS sequence is as defined in clause 7.4.1.1.1 of [4, TS 38.211] | |