**3GPP TSG-RAN WG1 Meeting #112bis-e *R1-2304087***

 **E-meeting, 17 – 26 April, 2023**

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| *CR-Form-v12.2* |
| **[DRAFT]CHANGE REQUEST** |
|  |
|  | **38.213** | **CR** | **xxx** | **rev** | **-** | **Current version:** | **17.5.0** |  |
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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*](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:***  | Draft CR on Type-1 HARQ-ACK codebook for multicast |
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| ***Source to WG:*** | Moderator (Huawei), CATT |
| ***Source to TSG:*** | R1 |
|  |  |
| ***Work item code:*** | NR\_MBS-Core |  | ***Date:*** | 2023-04-23 |
|  |  |  |  |  |
| ***Category:*** | **F** |  | ***Release:*** | Rel-17 |
|  | *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-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19)* |
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| ***Reason for change:*** | How to determine the TDRA for the case of UE provided *fdmed-ReceptionMulticast* is missing from the current specification. |
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| ***Summary of change:*** | - the union of row indexes of time domain resource allocation tables for DCI formats the UE is configured to monitor PDCCH for serving cell $c$ if the UE is not configured to monitor PDCCH for multicast DCI formats for serving cell $c$, or is not provided *type1CodebookGenerationMode =* 'mode1' **and is not provided *fdmed-ReceptionMulticast***, or, if any, for the first $K\_{1,UM}$ set-- the union of row indexes of time domain resource allocation tables for DCI format 1\_0 and/or DCI format 1\_1 and/or DCI format 1\_2 for serving cell $c$ **if UE is provided *fdmed-ReceptionMulticast****,* or for the second $K\_{1,U\M}$ set, if any- the union of row indexes of time domain resource allocation tables for multicast DCI formats the UE is configured to monitor PDCCH for serving cell $c$ **if UE is provided *fdmed-ReceptionMulticast, or*** for the third $K\_{1,M\U}$ set, if any |
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| ***Consequences if not approved:*** | UE behavior is unclear in terms of how to determine the TDRA for the case of UE provided *fdmed-ReceptionMulticast.* |
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| ***Clauses affected:*** | 9.1.2.1 |
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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's revision history:*** |  |

#### 9.1.2.1 Type-1 HARQ-ACK codebook in physical uplink control channel

For a serving cell $c$, an active DL BWP, and an active UL BWP, as described in clause 12, the UE determines a set of $M\_{A,c}$ occasions for candidate PDSCH receptions for which the UE can transmit corresponding HARQ-ACK information in a PUCCH in slot $n\_{U}$. If serving cell $c$ is deactivated, the UE uses as the active DL BWP for determining the set of $M\_{A,c}$ occasions for candidate PDSCH receptions a DL BWP provided by *firstActiveDownlinkBWP-Id*. The determination is based:

a) on a set of slot timing values $K\_{1}$ associated with the active UL BWP on the primary cell or, if the PUCCH transmission is indicated by a DCI format to be on the PUCCH-sSCell as described in clause 9A, on a set of slot timing values $K\_{1}$ associated with the active UL BWP on the PUCCH-sSCell

- If the UE is configured to monitor PDCCH for DCI format 1\_0 and is not configured to monitor PDCCH for either DCI format 1\_1 or DCI format 1\_2 for serving cell $c$, or the active DL BWP for serving cell $c$ is dormant BWP, $K\_{1}$ is provided by the slot timing values {1, 2, 3, 4, 5, 6, 7, 8} for SCS configuration of PUCCH transmission $μ\leq 3$, {7, 8, 12, 16, 20, 24, 28, 32} for $μ=5$, and {13, 16, 24, 32, 40, 48, 56, 64} for $μ=6$

- If the UE is configured to monitor PDCCH for DCI format 1\_1 and is not configured to monitor PDCCH for DCI format 1\_2 for serving cell $c$, $K\_{1}$ is provided by *dl-DataToUL-ACK* or *dl-DataToUL-ACK-r16* or *dl-DataToUL-ACK-r17*

- If the UE is configured to monitor PDCCH for DCI format 1\_2 and is not configured to monitor PDCCH for DCI format 1\_1 for serving cell $c$, $K\_{1}$ is provided by *dl-DataToUL-ACK-DCI-1-2* or *dl-DataToUL-ACK-DCI-1-2-r17*

- If the UE is configured to monitor PDCCH for DCI format 1\_1 and DCI format 1\_2 for serving cell $c$, $K\_{1}$ is provided by the union of *dl-DataToUL-ACK* or *dl-DataToUL-ACK-r16* or *dl-DataToUL-ACK-r17* and *dl-DataToUL-ACK-DCI-1-2* or *dl-DataToUL-ACK-DCI-1-2-r17*

- If an inapplicable value in *dl-DataToUL-ACK-r16* or *dl-DataToUL-ACK-r17* is provided, the value is excluded from $K\_{1}$

- If the UE is configured to monitor PDCCH for multicast DCI formats for serving cell $c$

- if the UE is provided *fdmed-ReceptionMulticast*, $K\_{1}$ for multicast is provided by the union of *dl-DataToUL-ACK* from *pucch-ConfigMulticast1/pucch-ConfigurationListMulticast1* or *pucch-ConfigMulticast2/pucch-ConfigurationListMulticast2* and *dl-DataToUL-ACK-MulticastDCI-Format4-1*

- if the UE is not provided *dl-DataToUL-ACK-ForDCI Format4-1*, $K\_{1}$ is provided by the union of *dl-DataToUL-ACK* from *pucch-ConfigurationListMulticast1* or *pucch-ConfigurationListMulticast2* and the slot timing values {1, 2, 3, 4, 5, 6, 7, 8}

- else if the UE is not provided *type1CodebookGenerationMode =* 'mode1', $K\_{1}$ is additionally provided by the union of *dl-DataToUL-ACK* from *pucch-ConfigMulticast1/pucch-ConfigurationListMulticast1* or *pucch-ConfigMulticast2/pucch-ConfigurationListMulticast2* and *dl-DataToUL-ACK-MulticastDCI-Format4-1*

- if the UE is not provided *dl-DataToUL-ACK-MulticastDCI-Format4-1*, $K\_{1}$ is additionally provided by the union of *dl-DataToUL-ACK* from *pucch-ConfigurationListMulticast1 or pucch-ConfigurationListMulticast2* and the slot timing values {1, 2, 3, 4, 5, 6, 7, 8}

- else if the UE is provided *type1CodebookGenerationMode =* 'mode1', the UE

- determines a first $K\_{1,UM}$ set as $K\_{1}∩K\_{1,M}$, where $K\_{1,M}$ is a set of slot timing values for the multicast DCI formats, a second $K\_{1,U\M}$ set as $K\_{1}\K\_{1,UM}$, and a third $K\_{1,M\U}$ set as $K\_{1,M}\K\_{1,UM}$

b) on a set of row indexes $R$ of a table that is associated with the active DL BWP and defining respective sets of slot offsets $K\_{0}$, start and length indicators *SLIV*, and PDSCH mapping types for PDSCH reception as described in [6, TS 38.214], where the row indexes $R$ of the table are provided by

- the union of row indexes of time domain resource allocation tables for DCI formats the UE is configured to monitor PDCCH for serving cell $c$ if the UE is not configured to monitor PDCCH for multicast DCI formats for serving cell $c$, or is not provided *type1CodebookGenerationMode =* 'mode1' and is not provided *fdmed-ReceptionMulticast*, or, if any, for the first $K\_{1,UM}$ set

- the union of row indexes of time domain resource allocation tables for DCI format 1\_0 and/or DCI format 1\_1 and/or DCI format 1\_2 for serving cell $c$ if UE is provided *fdmed-ReceptionMulticast,* or for the second $K\_{1,U\M}$ set, if any

- the union of row indexes of time domain resource allocation tables for multicast DCI formats the UE is configured to monitor PDCCH for serving cell $c$ if UE is provided *fdmed-ReceptionMulticast,* or for the third $K\_{1,M\U}$ set, if any

- if the UE is provided *referenceOfSLIVDCI-1-2*, for each row index with slot offset$K\_{0}=0$ and PDSCH mapping Type B in a set of row indexes of a table for DCI format 1\_2 [6, TS 38.214], for any PDCCH monitoring occasion in any slot where the UE monitors PDCCH for DCI format 1\_2 and with starting symbol $S\_{0}>0$, if $S+S\_{0}+L\leq 14$ for normal cyclic prefix and $S+S\_{0}+L\leq 12$ for extended cyclic prefix, add a new row index in the set of row indexes of the table by replacing the starting symbol $S$ of the row index by $S+S\_{0}$

< Unchanged parts are omitted >