**3GPP TSG-RAN WG1 Meeting #112b-e *R1-23XXXXX***

**E-Meeting, April 17 – 26, 2023**

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| *CR-Form-v12.2* |
| **DRAFT CHANGE REQUEST** |
|  |
|  | **38.213** | **CR** | **XX** | **rev** | **-** | **Current version:** | **17.5.0** |  |
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| *For* [***HELP***](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:***  | Corrections on Type 3 HARQ-ACK codebook  |
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| ***Source to WG:*** | Moderator (Nokia), CATT, Qualcomm, Samsung |
| ***Source to TSG:*** | R1 |
|  |  |
| ***Work item code:*** | NR\_IIOT\_URLLC\_enh-Core |  | ***Date:*** | 2023-04-19 |
|  |  |  |  |  |
| ***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:*** | * For Type-3 HARQ-ACK codebook determination, it is not clear how serving cells and HARQ processes of serving cells are to be included in a Type-3 HARQ-ACK codebook configured with *perCC* or *perHARQ*.
* In the determination of $N\_{HARQ-ACK,c}^{CBG/TB,max}$ the handling of different priority indexes is not clear
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| ***Summary of change:*** | * Clarify the mapping relationship between the bitmap of *perCC* and corresponding serving cell index, the mapping relationship between bitmap of *perHARQ* and corresponding serving cell index and HARQ process number and the meaning of bit 0/1 indicated by *perCC* or *perHARQ.*
* Clarify that for a serving cell the UE is not expected to be configured with a different maximum number of CBGs for different priority indexes
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| ***Consequences if not approved:*** | * Unclear UE behavior for the Type-3 HARQ-ACK codebook determination based on *perCC* or *perHARQ* Type-3 HARQ-ACK codebook configuration.
* Unclear UE behavior for the Type-3 HARQ-ACK codebook determination based on CBG configurations for different priority indexes.
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| ***Clauses affected:*** | 9.1.4 |
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|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **X** |  Other core specifications  |  |
| ***affected:*** |  | **X** |  Test specifications |  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications |  |
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| ***Other comments:*** |  |
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| ***This CR's revision history:*** |  |

9.1.4 Type-3 HARQ-ACK codebook determination

If a UE is provided *pdsch-HARQ-ACK-OneShotFeedback*, the UE determines $\tilde{o}\_{0}^{ACK},\tilde{o}\_{1}^{ACK},…,\tilde{o}\_{O\_{ACK}-1}^{ACK}$ HARQ-ACK information bits, for a total number of $O\_{ACK}$ HARQ-ACK information bits, of a Type-3 HARQ-ACK codebook according to the following procedure. If the UE is provided *pdsch-HARQ-ACK-EnhType3ToAddModList* and a DCI format scheduling PDSCH reception and triggering the Type-3 HARQ-ACK codebook includes an enhanced Type 3 codebook indicator field that provides a value for *pdsch-HARQ-ACK-EnhType3Index*, the UE determines a size of a set of indicated serving cells $N\_{cells}^{DL,ind}$ and a size of a set of indicated HARQ process numbers $N\_{HARQ,c}^{DL,ind}$ for each indicated serving cell and each indicated HARQ process number from the entry in *pdsch-HARQ-ACK-EnhType3ToAddModList* corresponding to the *pdsch-HARQ-ACK-EnhType3Index* value. Each bit from MSB to LSB provided by *perCC* corresponds to a serving cell in ascending order of serving cell index, where value ‘1’ or value ‘0’ indicate HARQ-ACK for the corresponding serving cell is included or not included in the Type 3 HARQ-ACK codebook, respectively. Each bit string provided by *perHARQ* corresponds to a serving cell in ascending order of serving cell index, and each bit from MSB to LSB within a bit string corresponds to a HARQ process number on a corresponding serving cell in ascending order of HARQ process number, where value ‘1’ or value ‘0’ indicate HARQ-ACK for the corresponding HARQ process number on the corresponding serving cell is included or not included in the Type 3 HARQ-ACK codebook, respectively. If the DCI format does not include the enhanced Type 3 codebook indicator field, the *pdsch-HARQ-ACK-EnhType3Index* value is zero.

Set $N\_{cells}^{DL}$ to the number of configured serving cells or, when applicable, to $N\_{cells}^{DL,ind}$

Set $N\_{HARQ,c}^{DL}$ to the value of *nrofHARQ-ProcessesForPDSCH* for serving cell $c$, if provided; else, set $N\_{HARQ,c}^{DL}=8$ . When applicable, set $N\_{HARQ,c}^{DL}$ to $N\_{HARQ,c}^{DL,ind}$

Set $N\_{TB,c}^{DL}$ to the value of *maxNrofCodeWordsScheduledByDCI* for serving cell $c$ if *harq-ACK-SpatialBundlingPUCCH* is provided and $NDI\_{HARQ}=0$, or if *harq-ACK-SpatialBundlingPUCCH* is not provided, or if *maxCodeBlockGroupsPerTransportBlock* is provided for serving cell $c$; else, set $N\_{TB,c}^{DL}=1$

Set $N\_{HARQ-ACK,c}^{CBG/TB,max}$ to the number of HARQ-ACK information bits per TB for PDSCH receptions on serving cell $c$ as described in clause 9.1.1 if *maxCodeBlockGroupsPerTransportBlock* is provided for serving cell $c$ and *pdsch-HARQ-ACK-OneShotFeedbackCBG* or *pdsch-HARQ-ACK-EnhType3CBG* is provided; else, set $N\_{HARQ-ACK,c}^{CBG/TB,max}=0$. A UE provided with *pdsch-HARQ-ACK-OneShotFeedbackCBG* or *pdsch-HARQ-ACK-EnhType3CBG* does not expect to be provided with different values of *maxCodeBlockGroupsPerTransportBlock* for different priority indexes in *pdsch-CodeBlockGroupTransmissionList* for serving cell *c*

Set $NDI\_{HARQ}=0$ if *pdsch-HARQ-ACK-OneShotFeedbackNDI* or *pdsch-HARQ-ACK-EnhType3NDI* is provided; else set $NDI\_{HARQ}=1$

Set $c=0$ – serving cell index in the set of serving cells

Set $h=0$ – HARQ process number index in the set of numbers of HARQ processes

Set $t=0$ – TB index

Set $g=0$ – CBG index

Set $j=0$

< Unchanged parts are omitted >