**3GPP TSG RAN WG1#117 R1-240xxxx**

**Fukuoka City, Fukuoka, Japan, May 20th – 24th, 2024**

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| *CR-Form-v12.2* |
| **DRAFT CHANGE REQUEST** |
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|  | **38.213** | **CR** |  | **rev** | **-** | **Current version:** | **18.2.0** |  |
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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:***  | Correction on multiplexing HARQ-ACK in a PUSCH transmission |
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| ***Source to WG:*** | Moderator (Samsung), Ericsson, Nokia, Huawei, HiSilicon |
| ***Source to TSG:*** |  |
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| ***Work item code:*** | NR\_newRAT-Core, TEI16 |  | ***Date:*** | 2024-05-24 |
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| ***Category:*** | F |  | ***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 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:*** | The following agreement made in RAN1#109 meeting is not correctly captured in current RAN1 specifications. AgreementFor Rel-16 UEs, in the scenario with more than one PUSCH (overlapping and non-overlapping) and no overlapping PUCCH with HARQ-ACK within a span on one PUCCH slot (both single carrier and UL CA), for a unified design, the following should be specified:1. Selection of the candidate PUSCH for multiplexing: PUSCHs without UL-TDAI=4 in case Type 2 CB, and without UL-TDAI n.e. 1 in case of Type 1 CB within the PUCCH slot are candidates
2. Prioritization rules to select PUSCH for multiplexing. Prioritization rules are identical to 38.213
3. Limitations for multiplexing
	* UE expects to multiplex HARQ-ACK on only 1 PUSCH selected based on step 2 in the PUCCH slot.
	* All the PUSCHs in the determined candidate set after step 1 have to satisfy Rel-15 UCI multiplexing timeline, defined with respect the starting symbol of the earliest PUSCH transmission in the candidate set.

The above specified behavior is supported subject to a new Rel-16 UE capability [xxxxx]* FFS: the details of the capability signaling

In addition, the case where unicast and multicast are configured with different HARQ-ACK codebook types is not considered in previous discussion and should be added. |
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| ***Summary of change:*** | Clarify that the condition of not multiplexing UCI in a PUSCH is that for any PUSCH among the multiple PUSCHs that is scheduled by a DCI format that indicates a DAI value that is equal to 4 for each DAI value indicated by 2 bits, if any, and is equal to 0 for each DAI value indicated by 1 bit, if any. |
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| ***Consequences if not approved:*** | For Type-2 HARQ-ACK codebook and enhanced Type-2 HARQ-ACK codebook, a UE would not multiplex the HARQ-ACK information in a PUSCH transmission if the UE does not detemine any HARQ-ACK information in a PUCCH slot and the UE detects a DCI format scheduling a PUSCH transmission with one DAI value being 4 and another DAI not being 4 for both single serving cell and multiple serving cells cases. In case of a UE is configured with different HARQ-ACK codebook types for unicast and multicast, a UE would not multiplex the HARQ-ACK information in a PUSCH if the UE does not detemine any HARQ-ACK information in a PUCCH slot and the UE detects a DCI format scheduling a PUSCH transmission with one DAI value being 4 for dynamic HARQ-ACK codebook and another DAI being 1 for semi-static HARQ-ACK codebook or one DAI value being 0 for semi-static HARQ-ACK codebook and another DAI not being 4 for dynamic HARQ-ACK codebook for both single serving cell and multiple serving cells cases.  |
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| ***Clauses affected:*** | 9 |
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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:*** |  |
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| ***This CR's revision history:*** |  |

# 9 UE procedure for reporting control information

\*\*\* Unchanged parts are omitted \*\*\*

If a UE would transmit a single PUSCH scheduled by a DCI format that includes a DAI field on a serving cell in a slot with reference to slots for PUCCH transmissions without any other PUSCH that would be transmitted on any serving cell in the slot and the UE does not determine any PUCCH carrying HARQ-ACK information in the slot, or if the UE indicates the corresponding capability *mux-HARQ-ACK-withoutPUCCH-onPUSCH* and the UE transmits multiple PUSCHs on respective serving cells in a slot with reference to slots for PUCCH transmissions and the UE does not determine any PUCCH carrying HARQ-ACK information in the slot and at least one of the multiple PUSCHs is scheduled by a DCI format that includes a DAI field, the UE selects the single PUSCH or all the multiple PUSCHs in the slot as the candidate PUSCHs for HARQ-ACK multiplexing within the slot except for any PUSCH among the multiple PUSCHs that is scheduled by a DCI format that indicates a DAI value that is equal to 4 for each DAI value indicated by 2 bits, if any, and is equal to 0 for each DAI value indicated by 1 bit, if any.

\*\*\* Unchanged parts are omitted \*\*\*