**3GPP TSG RAN WG1 Meeting # 110bis-e *R1-22XXXXX***

**E-meeting, October 10th – 19th, 2022**

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| *CR-Form-v12.2* |
| **CHANGE REQUEST** |
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|  | **38.213** | **CR** | **DRAFT** | **rev** |  | **Current version:** | **16.11.0** |  |
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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:***  | Correction on overlapping PUCCHs with repetitions of a same priority |
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| ***Source to WG:*** | Moderator (Samsung) , Huawei, HiSilicon, OPPO, CATT, vivo, Intel, ZTE |
| ***Source to TSG:*** | R1 |
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| ***Work item code:*** | NR\_L1enh\_URLLC-Core |  | ***Date:*** | 2022-10-19 |
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| ***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 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 agreements are not captured in the specAgreementConfirm the following working assumption.Working AssumptionFor resolving overlapping PUCCHs with repetitions of a same priority in Rel-16, a UE performs the following steps* Step 1-2-1: the UE determines a set of overlapping PUCCHs.
* Step 1-2-2: the UE performs prioritization among PUCCHs in the set of overlapping PUCCHs.
	+ The priority order for different UCI types is defined as: HARQ-ACK > SR > CSI with higher priority > CSI with lower priority
	+ For overlapping PUCCHs of the same UCI priority, the priority order for a same UCI type is defined as：PUCCH starting at an earlier slot > PUCCH starting at a later slot

Step 1-2-3: the UE repeats step 1-2-1 and step 1-2-2 until the overlapping PUCCHs with repetitions is resolved.AgreementFor resolving overlapping PUCCHs with repetitions of a same priority in Rel-16, a set of overlapping PUCCHs consist of a reference PUCCH and all the PUCCHs overlapping with the reference PUCCH.-        A UE first determines a reference PUCCH and then determines all the PUCCHs overlapping with the reference PUCCH.-        The reference PUCCH is a PUCCH overlaps with at least another PUCCH.-        FFS: The reference PUCCH is a PUCCH with repetitions.AgreementFor resolving overlapping PUCCHs with repetitions of a same priority in Rel-16, UE transmits the PUCCH with the highest priority when performing prioritization among PUCCHs in a set of overlapping PUCCHs.-        The priority order for different UCI types is defined as: HARQ-ACK > SR > CSI with higher priority > CSI with lower priority-        For overlapping PUCCHs of the same UCI priority, the priority order for a same UCI type is defined as: PUCCH starting at an earlier slot > PUCCH starting at a later slot AgreementFor resolving overlapping PUCCHs with repetitions of a same priority in Rel-16, the PUCCH resources are ordered as following for determining the reference PUCCH.-     a resource with earlier first symbol is placed before a resource with later first symbol-     for two resources with same first symbol, the resource with longer duration is placed before the resource with shorter duration-     for two resources with same first symbol and same duration, the placement is arbitraryNote: the above does not imply that the reference PUCCH is with or without repetitions.AgreementFor resolving overlapping PUCCHs with repetitions of a same priority in Rel-16, a set of overlapping PUCCHs consist of a reference PUCCH with repetitions and all the PUCCHs overlapping with the reference PUCCH.  |
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| ***Summary of change:*** | Capture the following agreement in TS 38.213 clause 9.2.6AgreementConfirm the following working assumption.For resolving overlapping PUCCHs with repetitions of a same priority in Rel-16, a UE performs the following steps* Step 1-2-1: the UE determines a set of overlapping PUCCHs.
* Step 1-2-2: the UE performs prioritization among PUCCHs in the set of overlapping PUCCHs.
	+ The priority order for different UCI types is defined as: HARQ-ACK > SR > CSI with higher priority > CSI with lower priority
	+ For overlapping PUCCHs of the same UCI priority, the priority order for a same UCI type is defined as：PUCCH starting at an earlier slot > PUCCH starting at a later slot

Step 1-2-3: the UE repeats step 1-2-1 and step 1-2-2 until the overlapping PUCCHs with repetitions is resolved.AgreementFor resolving overlapping PUCCHs with repetitions of a same priority in Rel-16, a set of overlapping PUCCHs consist of a reference PUCCH and all the PUCCHs overlapping with the reference PUCCH.-        A UE first determines a reference PUCCH and then determines all the PUCCHs overlapping with the reference PUCCH.-        The reference PUCCH is a PUCCH overlaps with at least another PUCCH.-        FFS: The reference PUCCH is a PUCCH with repetitions.AgreementFor resolving overlapping PUCCHs with repetitions of a same priority in Rel-16, UE transmits the PUCCH with the highest priority when performing prioritization among PUCCHs in a set of overlapping PUCCHs.-        The priority order for different UCI types is defined as: HARQ-ACK > SR > CSI with higher priority > CSI with lower priority-        For overlapping PUCCHs of the same UCI priority, the priority order for a same UCI type is defined as: PUCCH starting at an earlier slot > PUCCH starting at a later slot AgreementFor resolving overlapping PUCCHs with repetitions of a same priority in Rel-16, the PUCCH resources are ordered as following for determining the reference PUCCH.-     a resource with earlier first symbol is placed before a resource with later first symbol-     for two resources with same first symbol, the resource with longer duration is placed before the resource with shorter duration-     for two resources with same first symbol and same duration, the placement is arbitraryNote: the above does not imply that the reference PUCCH is with or without repetitions.AgreementFor resolving overlapping PUCCHs with repetitions of a same priority in Rel-16, a set of overlapping PUCCHs consist of a reference PUCCH with repetitions and all the PUCCHs overlapping with the reference PUCCH. |
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| ***Consequences if not approved:*** | UE behaviour is not clear when there are more than two overlapping PUCCHs with repetitions in a slot |
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| ***Clauses affected:*** | 9.2.6 |
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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:*** |  |

\*\*\* Unchanged text is omitted \*\*\*

**9.2.6 PUCCH repetition procedure**

\*\*\* Unchanged text is omitted \*\*\*

A UE does not multiplex different UCI types in a PUCCH transmission with repetitions over $N\_{PUCCH}^{repeat}>1$ slots. If a UE would transmit a first PUCCH over more than one slot and at least a second PUCCH over one or more slots, and the transmissions of the first PUCCH and the second PUCCH would overlap in a number of slots then, for each slot of the number of slots and with UCI type priority of HARQ-ACK > SR > CSI with higher priority > CSI with lower priority, the UE determines an earliest first PUCCH in a slot with the order of earliest starting symbol followed by longest duration and the second PUCCHs overlapping with the earliest first PUCCH, and then performs the following

- the UE does not expect more than one PUCCH from the first PUCCH and the second PUCCHs to start at a same slot and include a UCI type with same priority

- if more than one PUCCH from the first PUCCH and the second PUCCHs include a UCI type with the same highest priority, the UE transmits the PUCCH with the highest priority starting at an earliest slot and does not transmit the other PUCCHs, otherwise, the UE transmits the PUCCH that includes the UCI type with the highest priority and does not transmit the PUCCHs that include the UCI type with lower priority

The UE repeats the above procedure until there is no PUCCH overlapping with any PUCCH with repetitions in the slot.

\*\*\* Unchanged text is omitted \*\*\*