**3GPP TSG RAN WG1 #104b-e R1-2103146**

**e-Meeting, April 12th – 20th, 2021**

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| *CR-Form-v12.0* | | | | | | | | |
| **Draft CHANGE REQUEST** | | | | | | | | |
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|  | **3** | **CR** |  | **rev** |  | **Current version:** | **16.5.0** |  |
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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:*** | CR to TS 38.213 on clarifying DAPS HO impact on PUCCH repetition counting | | | | | | | | | |
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| ***Source to WG:*** | Qualcomm | | | | | | | | | |
| ***Source to TSG:*** | R1 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** |  | | | | |  | ***Date:*** | | | 2021-04-16 |
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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 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-12 (Release 12)* *Rel-13 (Release 13) Rel-14 (Release 14) Rel-15 (Release 15) Rel-16 (Release 16)* | |
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| ***Reason for change:*** | | For DAPS HO, PUCCH transmission to the source cell may be cancelled due to overlapping in time with uplink transmission to the target cell. When PUCCH repetition is transmitted to the source cell, an entire PUCCH repetition may be cancelled. Such PUCCH repetition cancellation impacts UE behavior on how the PUCCH repetition number is counted. However, such UE behavior is not defined in the specification yet. | | | | | | | | |
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| ***Summary of change:*** | | Clarify that source cell PUCCH repetition cancellation due to overlapping in time with uplink transmission to the target cell during DAPS HO does not impact PUCCH repetition counting in Subclause 9.2.6 of TS 38.213. This is similar to the UE behavior on PUCCH repetition counting defined for the case where PUCCH repetition overlaps with another PUCCH transmission in a slot for a cell. | | | | | | | | |
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| ***Consequences if not approved:*** | | UE behavior on PUCCH repetition counting is undefined when a PUCCH repetition transmission to the source cell in a slot is cancelled due to overlapping in time with uplink transmission to the target cell during DAPS HO. | | | | | | | | |
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| ***Clauses affected:*** | | 4.2 | | | | | | | | |
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|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **x** | Other core specifications | | | |  | | |
| ***affected:*** | |  |  | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  |  | O&M Specifications | | | | TS/TR ... CR ... | | |
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| ***Other comments:*** | | **Isolated Impact Analysis:**  UE that has implemented this CR connected gNB that has not implemented this CR:   * gNB may not count a PUCCH repetition transmission to the source cell in a slot cancelled due to overlapping in time with uplink transmission to the target cell during DAPS HO towards the total number of repetitions, and therefore may result in incorrect repetition counting at gNB.   UE that has not implemented this CR connected to gNB that has implemented this CR:   * UE may not count a PUCCH repetition transmission to the source cell in a slot cancelled due to overlapping in time with uplink transmission to the target cell during DAPS HO towards the total number of repetitions, and therefore may result in incorrect repetition counting at gNB. | | | | | | | | |
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| ***This CR's revision history:*** | |  | | | | | | | | |

### 9.2.6 PUCCH repetition procedure

For PUCCH formats 1, 3, or 4, a UE can be configured a number of slots, , for repetitions of a PUCCH transmission by respective *nrofSlots*. If a UE is provided a *PUCCH-config* that includes *subslotLengthForPUCCH,* the UE does not expect the *PUCCH-config* to include *nrofSlots*.

For ,

- the UE repeats the PUCCH transmission with the UCI over slots

- a PUCCH transmission in each of the slots has a same number of consecutive symbols, as provided by *nrofSymbols* in *PUCCH-format1*, *nrofSymbols* in *PUCCH-format3*, or *nrofSymbols* in *PUCCH-format4*

- a PUCCH transmission in each of the slots has a same first symbol, as provided by *startingSymbolIndex* in *PUCCH-format1*, *startingSymbolIndex* in *PUCCH-format3*, or *startingSymbolIndex* in *PUCCH-format4*

- the UE is configured by *interslotFrequencyHopping* whether or not to perform frequency hopping for PUCCH transmissions in different slots

- if the UE is configured to perform frequency hopping for PUCCH transmissions across different slots

- the UE performs frequency hopping per slot

- the UE transmits the PUCCH starting from a first PRB, provided by *startingPRB*, in slots with even number and starting from the second PRB, provided by *secondHopPRB*, in slots with odd number. The slot indicated to the UE for the first PUCCH transmission has number 0 and each subsequent slot until the UE transmits the PUCCH in slots is counted regardless of whether or not the UE transmits the PUCCH in the slot

- the UE does not expect to be configured to perform frequency hopping for a PUCCH transmission within a slot

- If the UE is not configured to perform frequency hopping for PUCCH transmissions across different slots and if the UE is configured to perform frequency hopping for a PUCCH transmission within a slot, the frequency hopping pattern between the first PRB and the second PRB is same within each slot

If the UE determines that, for a PUCCH transmission in a slot, the number of symbols available for the PUCCH transmission is smaller than the value provided by *nrofSymbols* for the corresponding PUCCH format, the UE does not transmit the PUCCH in the slot.

A SS/PBCH block symbol is a symbol of an SS/PBCH block with candidate SS/PBCH block index corresponding to the SS/PBCH block index indicated to a UE by *ssb-PositionsInBurst* in *SIB1* or *ssb-PositionsInBurst* in *ServingCellConfigCommon*, as described in Clause 4.1.

For unpaired spectrum, the UE determines the slots for a PUCCH transmission starting from a slot indicated to the UE as described in Clause 9.2.3 for HARQ-ACK reporting, or a slot determined as described in Clause 9.2.4 for SR reporting or in Clause 5.2.1.4 of [6, TS 38.214] for CSI reporting and having

- an UL symbol, as described in Clause 11.1, or flexible symbol that is not SS/PBCH block symbol provided by *startingSymbolIndex* in *PUCCH-format1*, or in *PUCCH-format3*, or in *PUCCH-format4* as a first symbol, and

- consecutive UL symbols, as described in Clause 11.1, or flexible symbols that are not SS/PBCH block symbols, starting from the first symbol, equal to or larger than a number of symbols provided by *nrofsymbols* in *PUCCH-format1*, or in *PUCCH-format3*, or in *PUCCH-format4*

For paired spectrum, the UE determines the slots for a PUCCH transmission as the consecutive slots starting from a slot indicated to the UE as described in Clause 9.2.3 for HARQ-ACK reporting, or a slot determined as described in Clause 9.2.4 for SR reporting or in Clause 5.2.1.4 of [6, TS 38.214] for CSI reporting.

If a UE would transmit a PUCCH over a first number of slots and the UE would transmit a PUSCH with repetition Type A over a second number of slots, and the PUCCH transmission would overlap with the PUSCH transmission in one or more slots, and the conditions in Clause 9.2.5 for multiplexing the UCI in the PUSCH are satisfied in the overlapping slots, the UE transmits the PUCCH and does not transmit the PUSCH in the overlapping slots.

If a UE would transmit a PUCCH over a first number of slots and the UE would transmit a PUSCH with repetition Type B over a second number of slots, and the PUCCH transmission would overlap with actual PUSCH repetitions in one or more slots, and the conditions in Clause 9.2.5 for multiplexing the UCI in the PUSCH are satisfied for the overlapping actual PUSCH repetitions, the UE transmits the PUCCH and does not transmit the overlapping actual PUSCH repetitions.

A UE does not multiplex different UCI types in a PUCCH transmission with repetitions over 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 does not expect the first PUCCH and any of the second PUCCHs to start at a same slot and include a UCI type with same priority

- if the first PUCCH and any of the second PUCCHs include a UCI type with same priority, the UE transmits the PUCCH starting at an earlier slot and does not transmit the PUCCH starting at a later slot

- if the first PUCCH and any of the second PUCCHs do not include a UCI type with same priority, the UE transmits the PUCCH that includes the UCI type with higher priority and does not transmit the PUCCH that include the UCI type with lower priority

A UE does not expect a PUCCH that is in response to a DCI format detection to overlap with any other PUCCH that does not satisfy the corresponding timing conditions in Clause 9.2.5.

If a UE would transmit a PUCCH over slots and the UE does not transmit the PUCCH in a slot from the slots due to overlapping with another PUCCH transmission in the slot, the UE counts the slot in the number of slots.

For DAPS operation, if a UE would transmit a PUCCH over slots on the source MCG and the UE does not transmit the PUCCH in a slot from the slots due to overlapping in time with UE transmission on the target MCG in the slot, the UE counts the slot in the number of slots.