**3GPP TSG RAN WG1 Meeting #101 R1-200XXXX**

**e-Meeting, May 25th – June 5th, 2020**

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| *CR-Form-v12.0* |
| **DRAFT CHANGE REQUEST** |
|  |
|  | **36.211** | **CR** |  | **rev** |  | **Current version:** | **15.9.0** |  |
|  |
| *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 scrambling initialization for sub-PRB PUSCH |
|  |  |
| ***Source to WG:*** | ZTE ,Sanechips,Qualcomm Incorporated,Ericsson |
| ***Source to TSG:*** |  |
|  |  |
| ***Work item code:*** | LTE\_eMTC4-Core |  | ***Date:*** | 2020-05-25 |
|  |  |  |  |  |
| ***Category:*** | **F** |  | ***Release:*** | Rel-15 |
|  | *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-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:*** | 1. For sub-PRB allocation, codeword could be transmitted on the physical uplink shared channel in subframes, instead of only one subframe.
2. Current specification about scrambling initialization does not consider the the case with PUSCH transmissions using sub-PRB allocations.
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| ***Summary of change:*** | 1. Clarify that codeword  could be transmited on the physical uplink shared channel in subframe(s) in the case of sub-PRB allocation. 2. Specify the correct scrambling sequence generator in case of PUSCH transmissions using sub-PRB allocations. |
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| ***Consequences if not approved:*** | The spec for sub-PRB scrambling in TS 36.211 is not correct. |
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| ***Clauses affected:*** | 5.3.1 |
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|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **X** |  Other core specifications  |  |
| ***affected:*** |  | **X** |  Test specifications |  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications |  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

### 5.3.1 Scrambling

**<Unchanged parts are omitted>**

For each codeword , the block of bits , where  is the number of bits transmitted in codeword  on the physical uplink shared channel in subframe(s)/slot/subslot, shall be scrambled with a UE-specific scrambling sequence prior to modulation, resulting in a block of scrambled bits  according to the following pseudo code

Set *i* = 0

while 

if  // ACK/NACK or Rank Indication placeholder bits



else

if  // ACK/NACK or Rank Indication repetition placeholder bits



else // Data or channel quality coded bits, Rank Indication coded bits or ACK/NACK coded bits



end if

end if

*i* = *i* + 1

end while

where x and y are tags defined in 3GPP TS 36.212 [3] clause 5.2.2.6 and where the scrambling sequence  is given by clause 7.2. The scrambling sequence generator shall be initialised with  at the start of each subframe where  corresponds to the RNTI associated with the PUSCH transmission as described in clause 8 in 3GPP TS 36.213 [4]. For AUL PUSCH,

For BL/CE UEs,

* if the PUSCH transmission is using sub-PRB allocations, the scrambling sequence generator shall be initialised with

at the first valid uplink subframe of every subframes comprising the allocated UL resource unit(s), where, and *N* is the number of BL/CE UL subframes for the PUSCH transmission as determined in subclause 8.0 in [4].

* Otherwise, the same scrambling sequence is applied per subframe to PUSCH for a given block of  subframes. The subframe number of the first subframe in each block of  consecutive subframes, denoted as , satisfies . For the block of  subframes, the scrambling sequence generator shall be initialised with



where



and  is the absolute subframe number of the first uplink subframe intended for PUSCH. The PUSCH transmission spans  consecutive subframes including subframes that are not BL/CE UL subframes where the UE postpones the PUSCH transmission. For a BL/CE UE configured in CEModeA, . For a BL/CE UE configured with CEModeB,  for frame structure type 1 and  for frame structure type 2.

**<Unchanged parts are omitted>**