**3GPP TSG-RAN4 Meeting #97-e *R4-2017518***

**Online, , 2nd Nov 2020 - 13th Nov 2020**

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| *CR-Form-v12.1* |
| **CHANGE REQUEST** |
|  |
|  | **38.141-1** | **CR** | **0155** | **rev** | **1** | **Current version:** | **16.5.0** |  |
|  |
| *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 |  | Radio Access Network | **X** | Core Network |  |

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|  |
| ***Title:***  | FRCs for URLLC |
|  |  |
| ***Source to WG:*** | Ericsson |
| ***Source to TSG:*** | R4 |
|  |  |
| ***Work item code:*** | NR\_L1enh\_URLLC-Perf |  | ***Date:*** | 2020-10-23 |
|  |  |  |  |  |
| ***Category:*** | **B** |  | ***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-15 (Release 15)Rel-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)* |
|  |  |
| ***Reason for change:*** | This CR to introduce URLLC into the performance specifications is created according to the CR work split agreed at RAN4#95-e. The following areas are covered FRCA draft CR with the same content was endorsed in R4-2012654 at RAN4#96-e |
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| ***Summary of change:*** | FRCs introduced (also for low latency) |
|  |  |
| ***Consequences if not approved:*** | Incomplete introduction of URLLC |
|  |  |
| ***Clauses affected:*** | A.3A, A.3B |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** | **X** |  |  Other core specifications  | TS/TR 38.104 CR ...  |
| ***affected:*** | **X** |  |  Test specifications | TS/TR 38.141-2 CR ...  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

# A.3A Fixed Reference Channels for performance requirements (QPSK, R=99/1024)

The parameters for the reference measurement channel are specified in table A.3A-1 for FR1 PUSCH performance requirements:

- FRC parameters are specified in table A.3A-1 for FR1 PUSCH with transform precoding disabled, additional DM-RS position = pos1 and 1 transmission layer.

Table A.3A-1: FRC parameters for FR1 PUSCH performance requirements, transform precoding disabled, additional DM-RS position = pos1 and 1 transmission layer (QPSK, R=99/1024)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Reference channel | G-FR1-A3A-1 | G-FR1-A3A-2 | G-FR1-A3A-3 | G-FR1-A3A-4 |
| Subcarrier spacing (kHz) | 15 | 15 | 30 | 30 |
| Allocated resource blocks | 25 | 52 | 24 | 106 |
| CP-OFDM Symbols per slot (Note 1) | 12 | 12 | 12 | 12 |
| Modulation | QPSK | QPSK | QPSK | QPSK |
| Code rate (Note 2) | 99/1024 | 99/1024 | 99/1024 | 99/1024 |
| Payload size (bits) | 704 | 1480 | 672 | 2976 |
| Transport block CRC (bits) | 16 | 16 | 16 | 16 |
| Code block CRC size (bits) | - | - | - | - |
| Number of code blocks - C | 1 | 1 | 1 | 1 |
| Code block size including CRC (bits) (Note 2) | 720 | 1496 | 688 | 2992 |
| Total number of bits per slot | 7200 | 14976 | 6912 | 30528 |
| Total symbols per slot | 3600 | 7488 | 3456 | 15264 |
| NOTE 1: DM-RS configuration type= 1 with DM-RS duration = single-symbol DM-RS and the number of DM-RS CDM groups without data is 2, additional DM-RS position = pos1, *l0* = 2 and *l* = 11 for PUSCH mapping type A, *l0*= 0 and *l* =10 for PUSCH mapping type B as per table 6.4.1.1.3-3 of TS 38.211 [17].NOTE 2: Code block size including CRC (bits) equals to *K'* in subclause 5.2.2 of TS 38.212 [16]. |

# A.3B Fixed Reference Channels for performance requirements (QPSK, R=308/1024)

The parameters for the reference measurement channel is specified in table A.3B-1 for FR1 PUSCH performance requirements:

- FRC parameters are specified in table A.3B-1 for FR1 PUSCH with transform precoding disabled, additional DM-RS position = pos0 and 1 transmission layer.

Table A.3B-1: FRC parameters for FR1 PUSCH performance requirements, transform precoding disabled, additional DM-RS position = pos0 and 1 transmission layer (QPSK, R=308/1024)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Reference channel | G-FR1-A3B-1 | G-FR1-A3B-2 | G-FR1-A3B-3 | G-FR1-A3B-4 |
| Subcarrier spacing (kHz) | 15 | 15 | 30 | 30 |
| Allocated resource blocks | 25 | 52 | 24 | 106 |
| CP-OFDM Symbols per slot (Note 1) | 1 | 1 | 1 | 1 |
| Modulation | QPSK | QPSK | QPSK | QPSK |
| Code rate (Note 2) | 308/1024 | 308/1024 | 308/1024 | 308/1024 |
| Payload size (bits) | 176 | 368 | 168 | 768 |
| Transport block CRC (bits) | 16 | 16 | 16 | 16 |
| Code block CRC size (bits) | - | - | - | - |
| Number of code blocks - C | 1 | 1 | 1 | 1 |
| Code block size including CRC (bits) (Note 2) | 192 | 384 | 184 | 784 |
| Total number of bits per slot | 600 | 1248 | 576 | 2544 |
| Total symbols per slot | 300 | 624 | 288 | 1272 |
| NOTE 1: DM-RS configuration type= 1 with DM-RS duration = single-symbol DM-RS and the number of DM-RS CDM groups without data is 2, additional DM-RS position = pos0, *l0*= 0 as per table 6.4.1.1.3-3 of TS 38.211 [17].NOTE 2: Code block size including CRC (bits) equals to *K'* in subclause 5.2.2 of TS 38.212 [16]. |