**3GPP TSG-RAN4 Meeting #97-e *draftR4-2017524***

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

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.104** | **CR** | **0244** | **rev** | **1** | **Current version:** | **16.5.0** |  |
|  | | | | | | | | |
| *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 |  | Radio Access Network | **x** | Core Network |  |

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|  | | | | | | | | | | |
| ***Title:*** | CR for 38.104: Low latency BS demodulation requirements | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Nokia, Nokia Shanghai Bell | | | | | | | | | |
| ***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 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-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | Endorsed draftCR in last meeting.  Errors in configuration tables. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Implements the changes from RAN4#96e endorsed draftCR [R4-2012659].  Additional changes are highlighted and are:  - Correction in Table 8.2.8.1-1: Number of DM-RS CDM group(s) without data = 2  - Adapted tables to go along with new “unmerged row style” of 38.104 V16.5 (change done by MCC between agreement of draftCR and creation of V16.5) | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Low latency requirements are missing from specification. Rel-15 URLLC functionality does not have requirements. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 8.2.8 (new), A.3B (new) | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **x** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | | **x** |  | Test specifications | | | | TS 38.141-1, TS 38.141-2 | | |
| ***(show related CRs)*** | |  | **x** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | | Submitted to AI: 7.8.1.2.2 | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | | R4-2015097 | | | | | | | | |

**<<Start of first change>>**

### 8.2.8 Requirements for PUSCH mapping Type B with non-slot transmission

#### 8.2.8.1 General

The performance requirement of PUSCH is determined by a minimum required throughput for a given SNR. The required throughput is expressed as a fraction of maximum throughput for the FRCs listed in annex A. The performance requirements do not assume HARQ retransmissions.

Table: 8.2.8.1-1 Test parameters for testing PUSCH mapping Type B with non-slot transmission

|  |  |  |
| --- | --- | --- |
| Parameter | | Value |
| Transform precoding | | Disabled |
| Default TDD UL-DL pattern (Note 1) | | 15 kHz SCS:  3D1S1U, S=10D:2G:2U  30 kHz SCS:  7D1S2U, S=6D:4G:4U |
| HARQ | Maximum number of HARQ transmissions | 1 |
|  | RV sequence | 0 |
| DM-RS | DM-RS configuration type | 1 |
|  | DM-RS duration | single-symbol DM-RS |
|  | Additional DM-RS position | Pos0 |
|  | Number of DM-RS CDM group(s) without data | 2 |
|  | Ratio of PUSCH EPRE to DM-RS EPRE | -3 dB |
|  | DM-RS port(s) | {0} |
|  | DM-RS sequence generation | NID0=0, nSCID =0 |
| Time domain | PUSCH mapping type | B |
| resource | Start symbol | 0 |
| assignment | Allocation length | 2 |
| Frequency domain resource | RB assignment | Full applicable test bandwidth |
| assignment | Frequency hopping | Disabled |
| Code block group based PUSCH transmission | | Disabled |
| Note 1: The same requirements are applicable to FDD and TDD with different UL-DL patterns. | | |

#### 8.2.8.2 Minimum requirements

The throughput shall be equal to or larger than the fraction of maximum throughput for the FRCs stated in tables 8.2.4.8-1 to 8.2.4.8-4 at the given SNR for 1Tx. FRCs are defined in annex A. Unless stated otherwise, the MIMO correlation matrices for the gNB are defined in annex G for low correlation.

Table 8.2.8.2-1: Minimum requirements for PUSCH with 2 symbols, Type B, 5 MHz channel bandwidth, 15 kHz SCS

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Number of TX antennas | Number of RX antennas | Cyclic prefix | Propagation conditions  (Annex G) | Fraction of maximum throughput | FRC (Annex A) | Additional DM-RS position | SNR  (dB) |
| 1 | 2 | Normal | TDLC300-100 | 70 % | G-FR1-A3B-1 | pos0 | [0.6] |

Table 8.2.8.2-2: Minimum requirements for PUSCH with 2 symbols, Type B, 10 MHz channel bandwidth, 15 kHz SCS

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Number of TX antennas | Number of RX antennas | Cyclic prefix | Propagation conditions  (Annex G) | Fraction of maximum throughput | FRC (Annex A) | Additional DM-RS position | SNR  (dB) |
| 1 | 2 | Normal | TDLC300-100 | 70 % | G-FR1-A3B-2 | pos0 | [0.2] |

Table 8.2.8.2-3: Minimum requirements for PUSCH with 2 symbols, Type B, 10 MHz channel bandwidth, 30 kHz SCS

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Number of TX antennas | Number of RX antennas | Cyclic prefix | Propagation conditions  (Annex G) | Fraction of maximum throughput | FRC (Annex A) | Additional DM-RS position | SNR  (dB) |
| 1 | 2 | Normal | TDLC300-100 | 70 % | G-FR1-A3B-3 | pos0 | [0.4] |

Table 8.2.8.2-4: Minimum requirements for PUSCH with 2 symbols, Type B, 40 MHz channel bandwidth, 30 kHz SCS

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Number of TX antennas | Number of RX antennas | Cyclic prefix | Propagation conditions  (Annex G) | Fraction of maximum throughput | FRC (Annex A) | Additional DM-RS position | SNR  (dB) |
| 1 | 2 | Normal | TDLC300-100 | 70 % | G-FR1-A3B-4 | pos0 | [-0.1] |

**<<End of first change>>**

**<<Start of second change>>**

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

The parameters for the reference measurement channel are 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 |
| Data bearing 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 resource elements 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 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 clause 5.2.2 of TS 38.212 [16]. | | | | |

**<<End of second change>>**