**3GPP TSG-RAN4 Meeting #111 *R4-2409871***

**Fukuoka, Japan, 20th – 24th May, 2024**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CR-Form-v12.3* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.108** | **CR** | **-** | **rev** | **1** | **Current version:** | **18.2.0** |  |
|  | | | | | | | | |
| *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)*.* | | | | | | | | |
|  | | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network | **x** | Core Network |  |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | | | | | | | | |
| ***Title:*** | Draft CR on performance requirements for PUSCH with DM-RS bundling | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Samsung | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_NTN\_enh-Perf | | | | |  | ***Date:*** | | | 2024-05-10 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***Release:*** | | | Rel-18 |
|  | *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-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)  Rel-20 (Release 20)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | In Rel-18 NTN enhancement WI, it was agreed to introduce the PUSCH requirement with DM-RS bundling. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Add the new section in 8.2.5 for PUSCH requirement with DM-RS bundling | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | The requirement of PUSCH with DM-RS bundling can not be verified well | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 8.2.5 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **x** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | | **X** |  | Test specifications | | | | TS 38.181 | | |
| ***(show related CRs)*** | |  | **x** | O&M Specifications | | | | TS/TR … CR … | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR’s revision history:*** | | Revision of R4-2409483 | | | | | | | | |

#### **<< Unchanged sections omitted >>**

<Start of Change >

### 8.2.5 Requirements for PUSCH with DM-RS bundling

#### 8.2.5.1 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 assume HARQ re-transmissions.

Table: 8.2.5.1-1 Test parameters for testing PUSCH with DM-RS bundling

|  |  |  |
| --- | --- | --- |
| Parameter | | Value |
| Transform precoding | | Disabled |
| Channel bandwidth | | 15kHz SCS: 5MHz 30kHz SCS: 10MHz |
| HARQ | Maximum number of HARQ transmissions | 4 |
| RV sequence | 0, 0, 0, 0 [Note 1] |
| DM-RS | DM-RS configuration type | 1 |
| DM-RS duration | single-symbol DM-RS |
| Additional DM-RS position | pos1 |
| Number of DM-RS CDM group(s) without data | 2 |
| Ratio of PUSCH EPRE to DM-RS EPRE | -3 dB |
| DM-RS port | 0 |
| DM-RS sequence generation | NID0=0, nSCID =0 |
| Time domain resource assignment | PUSCH mapping type | A, B |
| Start symbol | 0 |
| Allocation length | 14 |
| PUSCH aggregation factor | n4 for 15kHz  n8 for 30kHz |
| pusch-TimeDomainWindowLength | | 4 slots for 15kHz  8 slots for 30kHz |
| Frequency domain resource assignment | RB assignment | 6 PRBs in the middle of the test bandwidth |
| Frequency hopping | Disabled |
| Code block group based PUSCH transmission | | Disabled |
| Note 1: The effective RV sequence is {0, 2, 3, 1} with slot aggregation. | | |

#### 8.2.5.2 Minimum requirements

The throughput shall be equal to or larger than the fraction of maximum throughput for the FRCs stated in tables 8.2.5.2-1 to 8.2.5.2-4 at the given SNR for 1Tx. FRCs are defined in annex A.

Table 8.2.5.2-1: Minimum requirements for PUSCH with DM-RS bundling, Type A, 5 MHz channel bandwidth, 15 kHz SCS in FR1-NTN

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Number of TX antennas | Number of RX antennas | Cyclic prefix | Propagation conditions and correlation matrix (Annex D) | Fraction of maximum throughput | FRC (Annex A) | Additional DM-RS position | SNR  (dB) |
| 1 | 1 | Normal | NTN-TDLA100-200 Low | 70% | G-FR1-NTN-A3-7 | pos1 | TBD |
| 2 | Normal | NTN-TDLA100-200 Low | 70% | G-FR1-NTN-A3-7 | pos1 | TBD |

Table 8.2.5.2-2: Minimum requirements for PUSCH with DM-RS bundling, Type A, 10 MHz channel bandwidth, 30 kHz SCS in FR1-NTN

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Number of TX antennas | Number of RX antennas | Cyclic prefix | Propagation conditions and correlation matrix (Annex D) | Fraction of maximum throughput | FRC (Annex A) | Additional DM-RS position | SNR  (dB) |
| 1 | 1 | Normal | NTN-TDLA100-200 Low | 70% | G-FR1-NTN-A3-8 | pos1 | TBD |
| 2 | Normal | NTN-TDLA100-200 Low | 70% | G-FR1-NTN-A3-8 | pos1 | TBD |

Table 8.2.5.2-3: Minimum requirements for PUSCH with DM-RS bundling, Type B, 5 MHz channel bandwidth, 15 kHz SCS in FR1-NTN

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Number of TX antennas | Number of RX antennas | Cyclic prefix | Propagation conditions and correlation matrix (Annex D) | Fraction of maximum throughput | FRC (Annex A) | Additional DM-RS position | SNR  (dB) |
| 1 | 1 | Normal | NTN-TDLA100-200 Low | 70% | G-FR1-NTN-A3-7 | pos1 | TBD |
| 2 | Normal | NTN-TDLA100-200 Low | 70% | G-FR1-NTN-A3-7 | pos1 | TBD |

Table 8.2.5.2-4: Minimum requirements for PUSCH with DM-RS bundling, Type B, 10 MHz channel bandwidth, 30 kHz SCS in FR1-NTN

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Number of TX antennas | Number of RX antennas | Cyclic prefix | Propagation conditions and correlation matrix (Annex D) | Fraction of maximum throughput | FRC (Annex A) | Additional DM-RS position | SNR  (dB) |
| 1 | 1 | Normal | NTN-TDLA100-200 Low | 70% | G-FR1-NTN-A3-8 | pos1 | TBD |
| 2 | Normal | NTN-TDLA100-200 Low | 70% | G-FR1-NTN-A3-8 | pos1 | TBD |

<End of Change >