**3GPP TSG- Meeting #111**

**, , - , May, 2024**

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| *CR-Form-v12.3* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  |  | **CR** |  | **rev** |  | **Current version:** |  |  |
|  | | | | | | | | |
| *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:*** |  | | | | | | | | | |
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| ***Source to WG:*** |  | | | | | | | | | |
| ***Source to TSG:*** |  | | | | | | | | | |
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| ***Work item code:*** |  | | | | |  | ***Date:*** | | |  |
|  |  | | | |  | |  | | |  |
| ***Category:*** |  |  | | | | | ***Release:*** | | |  |
|  | *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 MIMO Evolution WI, it was agreed to introduce PUSCH requirement with enhanced DMRS port. The draft big CR R4-2405867 was endorsed in RAN4#110bis meeting, | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Add new section for PUSCH requirement with enhanced DMRS port   * Update the clause index based on latest spec * Correction the title index in clause 8.2.X.2 | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | The PUSCH requirement with enhnaced DMRS port can not be verified well | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 8.2.x, 11.2.1.x | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **x** | Other core specifications | | | | TS/TR … CR … | | |
| ***affected:*** | | **x** |  | Test specifications | | | | TS 38.141-1/38.141-2 | | |
| ***(show related CRs)*** | |  | **x** | O&M Specifications | | | | TS/TR … CR … | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | | Based on draft big CR R4-2405867 endorsed in RAN4#110bis meeting | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR’s revision history:*** | |  | | | | | | | | |

<Start of Change 1>

8.2.15 Requirements for PUSCH with enhanced DM-RS

8.2.15.1 General

The performance requirement of PUSCH with enhanced DM-RS 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 retransmissions.

**Table: 8.2.15.1-1 Test parameters for testing PUSCH** **with enhanced DM-RS**

|  |  |  |
| --- | --- | --- |
| **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 | 4 |
| RV sequence | 0, 2, 3, 1 |
| DM-RS | DM-RS configuration type | enhanced DM-RS 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 | {8}, {8,9} |
| DM-RS sequence generation | NID0=0, nSCID =0 |
| Time domain resource assignment | PUSCH mapping type | A, B |
| Start symbol | 0 |
| Allocation length | 14 |
| Frequency domain resource assignment | RB assignment | Full applicable test bandwidth |
| Frequency hopping | Disabled |
| Code block group based PUSCH transmission | | Disabled |
| NOTE 1: The same requirements are applicable to TDD with different UL-DL pattern | | |

8.2.15.2 Minimum requirements

The throughput shall be equal to or larger than the fraction of maximum throughput for the FRCs stated in tables 8.2.15.2-1 to 8.2.15.2-4 at the given SNR for 1Tx and 2Tx two-layer spatial multiplexing transmission. FRCs are defined in annex A.

Table 8.2.15.2-1: Minimum requirements for PUSCH with 70% of maximum throughput, Type A, 5 MHz channel bandwidth, 15 kHz SCS

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Number of TX antennas | Number of RX antennas | Cyclic prefix | Propagation conditions and correlation matrix (Annex G) | Fraction of maximum throughput | FRC (Annex A) | Additional DM-RS position | SNR  (dB) |
| 1 | 2 | Normal | TDLC300-100 Low | 70% | G-FR1-A4-8 | pos1 | 10.1 |
| 2 | 2 | Normal | TDLC300-100 Low | 70% | G-FR1-A4-22 | pos1 | 18.2 |

Table 8.2.15.2-2: Minimum requirements for PUSCH with 70% of maximum throughput, Type A, 10 MHz channel bandwidth, 30 kHz SCS

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Number of TX antennas | Number of RX antennas | Cyclic prefix | Propagation conditions and correlation matrix (Annex G) | Fraction of maximum throughput | FRC (Annex A) | Additional DM-RS position | SNR  (dB) |
| 1 | 2 | Normal | TDLC300-100 Low | 70% | G-FR1-A4-11 | pos1 | 10.2 |
| 2 | 2 | Normal | TDLC300-100 Low | 70% | G-FR1-A4-25 | pos1 | 18.4 |

Table 8.2.15.2-3: Minimum requirements for PUSCH with 70% of maximum throughput, Type B, 5 MHz channel bandwidth, 15 kHz SCS

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Number of TX antennas | Number of RX antennas | Cyclic prefix | Propagation conditions and correlation matrix (Annex G) | Fraction of maximum throughput | FRC (Annex A) | Additional DM-RS position | SNR  (dB) |
| 1 | 2 | Normal | TDLC300-100 Low | 70% | G-FR1-A4-8 | pos1 | 10.2 |
| 2 | 2 | Normal | TDLC300-100 Low | 70% | G-FR1-A4-22 | pos1 | 18.3 |

Table 8.2.15.2-4: Minimum requirements for PUSCH with 70% of maximum throughput, Type B, 10 MHz channel bandwidth, 30 kHz SCS

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Number of TX antennas | Number of RX antennas | Cyclic prefix | Propagation conditions and correlation matrix (Annex G) | Fraction of maximum throughput | FRC (Annex A) | Additional DM-RS position | SNR  (dB) |
| 1 | 2 | Normal | TDLC300-100 Low | 70% | G-FR1-A4-11 | pos1 | 10.1 |
| 2 | 2 | Normal | TDLC300-100 Low | 70% | G-FR1-A4-25 | pos1 | 18.5 |

<End of Change 1>

<Start of Change 2>

11.2.1.14 Requirements for PUSCH for ATG

Apply the requirements for 2Rx defined in clause 8.2.x for 2Rx.

11.2.1.15 Requirements for PUSCH with enhanced DM-RS

Apply the requirements for 2Rx defined in clause 8.2.15 for 2Rx.

<End of Change 2>