**3GPP TSG-RAN WG4 Meeting #100-eR4-2115768**

**Electronic, 16th– 27th August, 2021**

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.176-1** | **CR** |  | **rev** | **1** | **Current version:** | **16.0.0** |  |
|  | | | | | | | | |
| *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 |  | Core Network |  |

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| ***Title:*** | Draft CR to TS 38.176-1: Correction of applicability rules for demodulation performance requirements | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Intel Corporation | | | | | | | | | |
| ***Source to TSG:*** | RAN4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_IAB-Perf | | | | |  | ***Date:*** | | | 2021-08-06 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | F |  | | | | | ***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:*** | | Applicability rules agreed for IAB performacnce verification are not captured in specification. Wrong alignment of the number of TX antennas and the number of RX antennas for IAB-DU PUSCH requirements | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Clarification of Applicability rules for IAB-DU  Update structres of the tables with PUSCH requirements | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Performance for IAB node cannot be guaranteed | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 8.1.1.2, 8.1.2.1.5 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **x** | Other core specifications | | | |  | | |
| ***affected:*** | | **x** |  | Test specifications | | | | TS 38.174 | | |
| ***(show related CRs)*** | |  | **x** | O&M Specifications | | | |  | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | | R4-2114031 | | | | | | | | |

**START OF 1st CHANGE**

#### 8.1.1.2 Applicability rule

##### 8.1.1.2.1 General

Unless otherwise stated, for a IAB-DU supporting more than 8 *TAB connectors* (see D.37 in table 4.6-1), the performance requirement tests for 8 RX antennas shall apply, and the specific connectors used for testing are based on manufacturer declaration.

Unless otherwise stated, for a IAB-DU supporting different numbers of *TAB connectors* (see D.37 in table 4.6-1), the tests with low MIMO correlation level shall apply only for the highest numbers of supported connectors, and the specific connectors used for testing are based on manufacturer declaration.

##### 8.1.1.2.2 Applicability of PUSCH performance requirements

8.1.1.2.2.1 Applicability of requirements for different subcarrier spacings

Unless otherwise stated, PUSCH requirement tests shall apply only for each subcarrier spacing declared to be supported (see D.14 in table 4.6-1).

Unless otherwise stated, if IAB-DU supports more than one SCS then PUSCH requirement tests with highest modulation order shall apply only with lowest supported SCS and PUSCH requirement tests with other modulation orders shall apply only with highest supported SCS. Otherwise, all modulation orders are tested on supported SCS.

8.1.1.2.2.2 Applicability of requirements for different channel bandwidths

For each subcarrier spacing declared to be supported, the test requirements for a specific channel bandwidth shall apply only if the IAB-DU supports it (see D.14 in table 4.6-1).

Unless otherwise stated, for each subcarrier spacing declared to be supported, the tests shall be done only for the widest supported channel bandwidth. If performance requirement is not specified for this widest supported channel bandwidth, the tests shall be done by using performance requirement for the closest channel bandwidth lower than this widest supported bandwidth; the tested PRBs shall then be centred in this widest supported channel bandwidth.

8.1.1.2.2.3 Applicability of requirements for different configurations

Unless otherwise stated, PUSCH requirement tests shall apply only for the mapping type declared to be supported (see D.100 in table 4.6-1). If both mapping type A and type B are declared to be supported, the tests shall be done for either type A or type B; the same chosen mapping type shall then be used for all tests except the requirement for PUSCH mapping Type B with 2 symbol length allocated.

8.1.1.2.2.4 Applicability of requirements for uplink carrier aggregation

The tests for uplink carrier aggregation shall be carried out according to the declaration (see D.107 in table 4.6-1).

Unless otherwise stated, the tests for uplink carrier aggregation shall apply only for PUSCH with transform precoding disabled and shall be conducted on per component carrier basis.

8.1.1.2.2.5 Applicability of requirements for TDD with different UL-DL patterns

Unless otherwise stated, for each subcarrier spacing declared to be supported, if IAB-DU supports multiple TDD UL-DL patterns, only one of the supported TDD UL-DL patterns shall be used for all tests.

8.1.1.2.2.6 Applicability of requirements for transform precoding

Unless otherwise stated, the tests with transform precoding enabled shall apply only, if the IAB-DU supports it (see D.109 in table 4.6-1).

##### 8.1.1.2.3 Applicability of PUCCH performance requirements

8.1.1.2.3.1 Applicability of requirements for different formats

Unless otherwise stated, PUCCH requirement tests shall apply only for each PUCCH format declared to be supported (see D.102 in table 4.6-1).

8.1.1.2.3.2 Applicability of requirements for different subcarrier spacings

Unless otherwise stated, PUCCH requirement tests shall apply only for each subcarrier spacing declared to be supported (see D.14 in table 4.6-1). If multiple subcarrier spacings are declared to be supported, each supported PUCCH format can be tested on one subcarrier spacing.

8.1.1.2.3.3 Applicability of requirements for different channel bandwidths

For each subcarrier spacing declared to be supported by the IAB-DU, the test requirements for a specific channel bandwidth shall apply only if the IAB-DU supports it (see D.14 in table 4.6-1).

Unless otherwise stated, for each subcarrier spacing declared to be supported, the tests shall be done only for the widest supported channel bandwidth. If performance requirement is not specified for this widest supported channel bandwidth, the tests shall be done by using performance requirement for the closest channel bandwidth lower than this widest supported bandwidth; the tested PRIAB-DU shall then be centred in this widest supported channel bandwidth.

8.1.1.2.3.4 Applicability of requirements for different configurations

Unless otherwise stated, PUCCH format 3 requirement tests shall apply only for the additional DM-RS configuration declared to be supported (see D.104 in table 4.6-1). If both options (without and with additional DM-RS) are declared to be supported, the tests shall be done for either without or with additional DM-RS; the same chosen option shall then be used for all tests.

Unless otherwise stated, PUCCH format 4 requirement tests shall apply only for the additional DM-RS configuration declared to be supported (see D.105 in table 4.6-1). If both options (without and with additional DM-RS) are declared to be supported, the tests shall be done for either without or with additional DM-RS; the same chosen option shall then be used for all tests.

8.1.1.2.3.5 Applicability of requirements for multi-slot PUCCH

Unless otherwise stated, multi-slot PUCCH requirement tests shall apply only if the IAB-DU supports it (see D.106 in table 4.6-1).

##### 8.1.1.2.4 Applicability of PRACH performance requirements

8.1.1.2.4.1 Applicability of requirements for different formats

Unless otherwise stated, PRACH requirement tests shall apply only for PRACH formats declared to be supported (see D.103 in table 4.6-1).

For IAB-DU declares to support more than one PRACH formats, limit the number of tests to any two cases chosen by the manufacturer. If IAB-DU declares to support more than one PRACH formats where formats for both long and short PRACH sequences are presented, require choosing formats with different sequences (see TBA in table 4.61)

**END OF 1st CHANGE**

**START OF 2nd CHANGE**

##### 8.1.2.1.5 Test requirement

The throughput measured according to clause 8.1.2.1.4.2 shall not be below the limits for the SNR levels specified in table 8.1.2.1.5-1 to 8.1.2.1.5-14.

Table 8.1.2.1.5-1: Test 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 | Propagation conditions and correlation matrix (annex F) | FRC (annex A) | Additional DM-RS position | SNR  (dB) |
| 1 | 2 | TDLB100-400 Low | D-FR1-A.2.1-1 | pos1 | -1.7 |
| TDLC300-100 Low | D-FR1-A.2.3-1 | pos1 | 10.7 |
| TDLA30-10 Low | D-FR1-A.2.4-1 | pos1 | 12.9 |
| 4 | TDLB100-400 Low | D-FR1-A.2.1-1 | pos1 | -5.2 |
| TDLC300-100 Low | D-FR1-A.2.3-1 | pos1 | 6.8 |
| TDLA30-10 Low | D-FR1-A.2.4-1 | pos1 | 9.4 |
| 8 | TDLB100-400 Low | D-FR1-A.2.1-1 | pos1 | -8.1 |
| TDLC300-100 Low | D-FR1-A.2.3-1 | pos1 | 3.6 |
| TDLA30-10 Low | D-FR1-A.2.4-1 | pos1 | 6.2 |
| 2 | 2 | TDLB100-400 Low | D-FR1-A.2.1-8 | pos1 | 1.8 |
| TDLC300-100 Low | D-FR1-A.2.3-8 | pos1 | 19.0 |
| 4 | TDLB100-400 Low | D-FR1-A.2.1-8 | pos1 | -1.5 |
| TDLC300-100 Low | D-FR1-A.2.3-8 | pos1 | 11.8 |
| 8 | TDLB100-400 Low | D-FR1-A.2.1-8 | pos1 | -4.5 |
| TDLC300-100 Low | D-FR1-A.2.3-8 | pos1 | 7.6 |

Table 8.1.2.1.5-2: Test requirements for PUSCH with 70% of maximum throughput, Type A, 10 MHz channel bandwidth, 15 kHz SCS

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Number of TX antennas | Number of RX antennas | Propagation conditions and correlation matrix (annex F) | FRC (annex A) | Additional DM-RS position | SNR  (dB) |
| 1 | 2 | TDLB100-400 Low | D-FR1-A.2.1-2 | pos1 | -1.9 |
| TDLC300-100 Low | D-FR1-A.2.3-2 | pos1 | 10.8 |
| TDLA30-10 Low | D-FR1-A.2.4-2 | pos1 | 12.8 |
| 4 | TDLB100-400 Low | D-FR1-A.2.1-2 | pos1 | -5.4 |
| TDLC300-100 Low | D-FR1-A.2.3-2 | pos1 | 6.9 |
| TDLA30-10 Low | D-FR1-A.2.4-2 | pos1 | 9.2 |
| 8 | TDLB100-400 Low | D-FR1-A.2.1-2 | pos1 | -8.1 |
| TDLC300-100 Low | D-FR1-A.2.3-2 | pos1 | 3.7 |
| TDLA30-10 Low | D-FR1-A.2.4-2 | pos1 | 6.1 |
| 2 | 2 | TDLB100-400 Low | D-FR1-A.2.1-9 | pos1 | 2.5 |
| TDLC300-100 Low | D-FR1-A.2.3-9 | pos1 | 19.1 |
| 4 | TDLB100-400 Low | D-FR1-A.2.1-9 | pos1 | -1.2 |
| TDLC300-100 Low | D-FR1-A.2.3-9 | pos1 | 12.0 |
| 8 | TDLB100-400 Low | D-FR1-A.2.1-9 | pos1 | -4.7 |
| TDLC300-100 Low | D-FR1-A.2.3-9 | pos1 | 7.6 |

Table 8.1.2.1.5-3: Test requirements for PUSCH with 70% of maximum throughput, Type A, 20 MHz channel bandwidth, 15 kHz SCS

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Number of TX antennas | Number of RX antennas | Propagation conditions and correlation matrix (annex F) | FRC (annex A) | Additional DM-RS position | SNR  (dB) |
| 1 | 2 | TDLB100-400 Low | D-FR1-A.2.1-3 | pos1 | -1.5 |
| TDLC300-100 Low | D-FR1-A.2.3-3 | pos1 | 10.6 |
| TDLA30-10 Low | D-FR1-A.2.4-3 | pos1 | 13.0 |
| 4 | TDLB100-400 Low | D-FR1-A.2.1-3 | pos1 | -4.9 |
| TDLC300-100 Low | D-FR1-A.2.3-3 | pos1 | 6.8 |
| TDLA30-10 Low | D-FR1-A.2.4-3 | pos1 | 9.2 |
| 8 | TDLB100-400 Low | D-FR1-A.2.1-3 | pos1 | -7.9 |
| TDLC300-100 Low | D-FR1-A.2.3-3 | pos1 | 3.6 |
| TDLA30-10 Low | D-FR1-A.2.4-3 | pos1 | 6.1 |
| 2 | 2 | TDLB100-400 Low | D-FR1-A.2.1-10 | pos1 | 2.9 |
| TDLC300-100 Low | D-FR1-A.2.3-10 | pos1 | 19.1 |
| 4 | TDLB100-400 Low | D-FR1-A.2.1-10 | pos1 | -1.0 |
| TDLC300-100 Low | D-FR1-A.2.3-10 | pos1 | 11.9 |
| 8 | TDLB100-400 Low | D-FR1-A.2.1-10 | pos1 | -4.5 |
| TDLC300-100 Low | D-FR1-A.2.3-10 | pos1 | 7.7 |

Table 8.1.2.1.5-4: Test 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 | Propagation conditions and correlation matrix (annex F) | FRC (annex A) | Additional DM-RS position | SNR  (dB) |
| 1 | 2 | TDLB100-400 Low | D-FR1-A.2.1-4 | pos1 | -1.7 |
| TDLC300-100 Low | D-FR1-A.2.3-4 | pos1 | 10.8 |
| TDLA30-10 Low | D-FR1-A.2.4-4 | pos1 | 13.4 |
| 4 | TDLB100-400 Low | D-FR1-A.2.1-4 | pos1 | -5.0 |
| TDLC300-100 Low | D-FR1-A.2.3-4 | pos1 | 7.0 |
| TDLA30-10 Low | D-FR1-A.2.4-4 | pos1 | 9.2 |
| 8 | TDLB100-400 Low | D-FR1-A.2.1-4 | pos1 | -8.0 |
| TDLC300-100 Low | D-FR1-A.2.3-4 | pos1 | 3.9 |
| TDLA30-10 Low | D-FR1-A.2.4-4 | pos1 | 6.1 |
| 2 | 2 | TDLB100-400 Low | D-FR1-A.2.1-11 | pos1 | 2.1 |
| TDLC300-100 Low | D-FR1-A.2.3-11 | pos1 | 19.2 |
| 4 | TDLB100-400 Low | D-FR1-A.2.1-11 | pos1 | -1.4 |
| TDLC300-100 Low | D-FR1-A.2.3-11 | pos1 | 12.0 |
| 8 | TDLB100-400 Low | D-FR1-A.2.1-11 | pos1 | -4.4 |
| TDLC300-100 Low | D-FR1-A.2.3-11 | pos1 | 7.8 |

Table 8.1.2.1.5-5: Test requirements for PUSCH with 70% of maximum throughput, Type A, 20 MHz channel bandwidth, 30 kHz SCS

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Number of TX antennas | Number of RX antennas | Propagation conditions and correlation matrix (annex F) | FRC (annex A) | Additional DM-RS position | SNR  (dB) |
| 1 | 2 | TDLB100-400 Low | D-FR1-A.2.1-5 | pos1 | -2.3 |
| TDLC300-100 Low | D-FR1-A.2.3-5 | pos1 | 10.8 |
| TDLA30-10 Low | D-FR1-A.2.4-5 | pos1 | 13.1 |
| 4 | TDLB100-400 Low | D-FR1-A.2.1-5 | pos1 | -5.4 |
| TDLC300-100 Low | D-FR1-A.2.3-5 | pos1 | 7.0 |
| TDLA30-10 Low | D-FR1-A.2.4-5 | pos1 | 9.2 |
| 8 | TDLB100-400 Low | D-FR1-A.2.1-5 | pos1 | -8.2 |
| TDLC300-100 Low | D-FR1-A.2.3-5 | pos1 | 3.8 |
| TDLA30-10 Low | D-FR1-A.2.4-5 | pos1 | 6.1 |
| 2 | 2 | TDLB100-400 Low | D-FR1-A.2.1-12 | pos1 | 2.1 |
| TDLC300-100 Low | D-FR1-A.2.3-12 | pos1 | 18.9 |
| 4 | TDLB100-400 Low | D-FR1-A.2.1-12 | pos1 | -1.4 |
| TDLC300-100 Low | D-FR1-A.2.3-12 | pos1 | 12.1 |
| 8 | TDLB100-400 Low | D-FR1-A.2.1-12 | pos1 | -4.5 |
| TDLC300-100 Low | D-FR1-A.2.3-12 | pos1 | 7.7 |

Table 8.1.2.1.5-6: Test requirements for PUSCH with 70% of maximum throughput, Type A, 40 MHz channel bandwidth, 30 kHz SCS

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Number of TX antennas | Number of RX antennas | Propagation conditions and correlation matrix (annex F) | FRC (annex A) | Additional DM-RS position | SNR  (dB) |
| 1 | 2 | TDLB100-400 Low | D-FR1-A.2.1-6 | pos1 | -1.9 |
| TDLC300-100 Low | D-FR1-A.2.3-6 | pos1 | 10.6 |
| TDLA30-10 Low | D-FR1-A.2.4-6 | pos1 | 13.0 |
| 4 | TDLB100-400 Low | D-FR1-A.2.1-6 | pos1 | -5.2 |
| TDLC300-100 Low | D-FR1-A.2.3-6 | pos1 | 6.9 |
| TDLA30-10 Low | D-FR1-A.2.4-6 | pos1 | 9.1 |
| 8 | TDLB100-400 Low | D-FR1-A.2.1-6 | pos1 | -8.1 |
| TDLC300-100 Low | D-FR1-A.2.3-6 | pos1 | 3.7 |
| TDLA30-10 Low | D-FR1-A.2.4-6 | pos1 | 6.0 |
| 2 | 2 | TDLB100-400 Low | D-FR1-A.2.1-13 | pos1 | 2.1 |
| TDLC300-100 Low | D-FR1-A.2.3-13 | pos1 | 20.3 |
| 4 | TDLB100-400 Low | D-FR1-A.2.1-13 | pos1 | -1.5 |
| TDLC300-100 Low | D-FR1-A.2.3-13 | pos1 | 12.1 |
| 8 | TDLB100-400 Low | D-FR1-A.2.1-13 | pos1 | -4.4 |
| TDLC300-100 Low | D-FR1-A.2.3-13 | pos1 | 7.7 |

Table 8.1.2.1.5-7: Test requirements for PUSCH with 70% of maximum throughput, Type A, 100 MHz channel bandwidth, 30 kHz SCS

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Number of TX antennas | Number of RX antennas | Propagation conditions and correlation matrix (annex F) | FRC (annex A) | Additional DM-RS position | SNR  (dB) |
| 1 | 2 | TDLB100-400 Low | D-FR1-A.2.1-7 | pos1 | -2.2 |
| TDLC300-100 Low | D-FR1-A.2.3-7 | pos1 | 10.8 |
| TDLA30-10 Low | D-FR1-A.2.4-7 | pos1 | 13.6 |
| 4 | TDLB100-400 Low | D-FR1-A.2.1-7 | pos1 | -5.2 |
| TDLC300-100 Low | D-FR1-A.2.3-7 | pos1 | 7.1 |
| TDLA30-10 Low | D-FR1-A.2.4-7 | pos1 | 9.6 |
| 8 | TDLB100-400 Low | D-FR1-A.2.1-7 | pos1 | -8.1 |
| TDLC300-100 Low | D-FR1-A.2.3-7 | pos1 | 3.8 |
| TDLA30-10 Low | D-FR1-A.2.4-7 | pos1 | 6.4 |
| 2 | 2 | TDLB100-400 Low | D-FR1-A.2.1-14 | pos1 | 2.2 |
| TDLC300-100 Low | D-FR1-A.2.3-14 | pos1 | 20.0 |
| 4 | TDLB100-400 Low | D-FR1-A.2.1-14 | pos1 | -1.4 |
| TDLC300-100 Low | D-FR1-A.2.3-14 | pos1 | 12.4 |
| 8 | TDLB100-400 Low | D-FR1-A.2.1-14 | pos1 | -4.4 |
| TDLC300-100 Low | D-FR1-A.2.3-14 | pos1 | 7.9 |

Table 8.1.2.1.5-8: Test 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 | Propagation conditions and correlation matrix (annex F) | FRC (annex A) | Additional DM-RS position | SNR  (dB) |
| 1 | 2 | TDLB100-400 Low | D-FR1-A.2.1-1 | pos1 | -1.7 |
| TDLC300-100 Low | D-FR1-A.2.3-1 | pos1 | 10.8 |
| TDLA30-10 Low | D-FR1-A.2.4-1 | pos1 | 13.1 |
| 4 | TDLB100-400 Low | D-FR1-A.2.1-1 | pos1 | -5.1 |
| TDLC300-100 Low | D-FR1-A.2.3-1 | pos1 | 6.9 |
| TDLA30-10 Low | D-FR1-A.2.4-1 | pos1 | 9.5 |
| 8 | TDLB100-400 Low | D-FR1-A.2.1-1 | pos1 | -8.1 |
| TDLC300-100 Low | D-FR1-A.2.3-1 | pos1 | 3.6 |
| TDLA30-10 Low | D-FR1-A.2.4-1 | pos1 | 6.3 |
| 2 | 2 | TDLB100-400 Low | D-FR1-A.2.1-8 | pos1 | 2.3 |
| TDLC300-100 Low | D-FR1-A.2.3-8 | pos1 | 19.1 |
| 4 | TDLB100-400 Low | D-FR1-A.2.1-8 | pos1 | -1.5 |
| TDLC300-100 Low | D-FR1-A.2.3-8 | pos1 | 11.9 |
| 8 | TDLB100-400 Low | D-FR1-A.2.1-8 | pos1 | -4.6 |
| TDLC300-100 Low | D-FR1-A.2.3-8 | pos1 | 7.6 |

Table 8.1.2.1.5-9: Test requirements for PUSCH with 70% of maximum throughput, Type B, 10 MHz channel bandwidth, 15 kHz SCS

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Number of TX antennas | Number of RX antennas | Propagation conditions and correlation matrix (annex F) | FRC (annex A) | Additional DM-RS position | SNR  (dB) |
| 1 | 2 | TDLB100-400 Low | D-FR1-A.2.1-2 | pos1 | -1.7 |
| TDLC300-100 Low | D-FR1-A.2.3-2 | pos1 | 11.1 |
| TDLA30-10 Low | D-FR1-A.2.4-2 | pos1 | 13.2 |
| 4 | TDLB100-400 Low | D-FR1-A.2.1-2 | pos1 | -5.1 |
| TDLC300-100 Low | D-FR1-A.2.3-2 | pos1 | 7.1 |
| TDLA30-10 Low | D-FR1-A.2.4-2 | pos1 | 9.5 |
| 8 | TDLB100-400 Low | D-FR1-A.2.1-2 | pos1 | -8.4 |
| TDLC300-100 Low | D-FR1-A.2.3-2 | pos1 | 3.8 |
| TDLA30-10 Low | D-FR1-A.2.4-2 | pos1 | 6.4 |
| 2 | 2 | TDLB100-400 Low | D-FR1-A.2.1-9 | pos1 | 2.8 |
| TDLC300-100 Low | D-FR1-A.2.3-9 | pos1 | 19.5 |
| 4 | TDLB100-400 Low | D-FR1-A.2.1-9 | pos1 | -1.5 |
| TDLC300-100 Low | D-FR1-A.2.3-9 | pos1 | 12.1 |
| 8 | TDLB100-400 Low | D-FR1-A.2.1-9 | pos1 | -4.4 |
| TDLC300-100 Low | D-FR1-A.2.3-9 | pos1 | 7.8 |

Table 8.1.2.1.5-10: Test requirements for PUSCH with 70% of maximum throughput, Type B, 20 MHz channel bandwidth, 15 kHz SCS

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Number of TX antennas | Number of RX antennas | Propagation conditions and correlation matrix (annex F) | FRC (annex A) | Additional DM-RS position | SNR  (dB) |
| 1 | 2 | TDLB100-400 Low | D-FR1-A.2.1-3 | pos1 | -1.5 |
| TDLC300-100 Low | D-FR1-A.2.3-3 | pos1 | 11.0 |
| TDLA30-10 Low | D-FR1-A.2.4-3 | pos1 | 12.9 |
| 4 | TDLB100-400 Low | D-FR1-A.2.1-3 | pos1 | -5.1 |
| TDLC300-100 Low | D-FR1-A.2.3-3 | pos1 | 6.9 |
| TDLA30-10 Low | D-FR1-A.2.4-3 | pos1 | 9.4 |
| 8 | TDLB100-400 Low | D-FR1-A.2.1-3 | pos1 | -7.9 |
| TDLC300-100 Low | D-FR1-A.2.3-3 | pos1 | 3.7 |
| TDLA30-10 Low | D-FR1-A.2.4-3 | pos1 | 6.3 |
| 2 | 2 | TDLB100-400 Low | D-FR1-A.2.1-10 | pos1 | 2.4 |
| TDLC300-100 Low | D-FR1-A.2.3-10 | pos1 | 18.9 |
| 4 | TDLB100-400 Low | D-FR1-A.2.1-10 | pos1 | -1.2 |
| TDLC300-100 Low | D-FR1-A.2.3-10 | pos1 | 12.0 |
| 8 | TDLB100-400 Low | D-FR1-A.2.1-10 | pos1 | -4.5 |
| TDLC300-100 Low | D-FR1-A.2.3-10 | pos1 | 7.7 |

Table 8.1.2.1.5-11: Test 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 | Propagation conditions and correlation matrix (annex F) | FRC (annex A) | Additional DM-RS position | SNR  (dB) |
| 1 | 2 | TDLB100-400 Low | D-FR1-A.2.1-4 | pos1 | -1.8 |
| TDLC300-100 Low | D-FR1-A.2.3-4 | pos1 | 10.7 |
| TDLA30-10 Low | D-FR1-A.2.4-4 | pos1 | 13.1 |
| 4 | TDLB100-400 Low | D-FR1-A.2.1-4 | pos1 | -5.1 |
| TDLC300-100 Low | D-FR1-A.2.3-4 | pos1 | 7.0 |
| TDLA30-10 Low | D-FR1-A.2.4-4 | pos1 | 9.2 |
| 8 | TDLB100-400 Low | D-FR1-A.2.1-4 | pos1 | -8.2 |
| TDLC300-100 Low | D-FR1-A.2.3-4 | pos1 | 3.8 |
| TDLA30-10 Low | D-FR1-A.2.4-4 | pos1 | 6.2 |
| 2 | 2 | TDLB100-400 Low | D-FR1-A.2.1-11 | pos1 | 1.9 |
| TDLC300-100 Low | D-FR1-A.2.3-11 | pos1 | 19.3 |
| 4 | TDLB100-400 Low | D-FR1-A.2.1-11 | pos1 | -1.7 |
| TDLC300-100 Low | D-FR1-A.2.3-11 | pos1 | 12.1 |
| 8 | TDLB100-400 Low | D-FR1-A.2.1-11 | pos1 | -4.8 |
| TDLC300-100 Low | D-FR1-A.2.3-11 | pos1 | 7.8 |

Table 8.1.2.1.5-12: Test requirements for PUSCH with 70% of maximum throughput, Type B, 20 MHz channel bandwidth, 30 kHz SCS

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Number of TX antennas | Number of RX antennas | Propagation conditions and correlation matrix (annex F) | FRC (annex A) | Additional DM-RS position | SNR  (dB) |
| 1 | 2 | TDLB100-400 Low | D-FR1-A.2.1-5 | pos1 | -2.3 |
| TDLC300-100 Low | D-FR1-A.2.3-5 | pos1 | 10.7 |
| TDLA30-10 Low | D-FR1-A.2.4-5 | pos1 | 13.1 |
| 4 | TDLB100-400 Low | D-FR1-A.2.1-5 | pos1 | -5.4 |
| TDLC300-100 Low | D-FR1-A.2.3-5 | pos1 | 6.9 |
| TDLA30-10 Low | D-FR1-A.2.4-5 | pos1 | 9.2 |
| 8 | TDLB100-400 Low | D-FR1-A.2.1-5 | pos1 | -8.4 |
| TDLC300-100 Low | D-FR1-A.2.3-5 | pos1 | 3.7 |
| TDLA30-10 Low | D-FR1-A.2.4-5 | pos1 | 6.2 |
| 2 | 2 | TDLB100-400 Low | D-FR1-A.2.1-12 | pos1 | 2.1 |
| TDLC300-100 Low | D-FR1-A.2.3-12 | pos1 | 19.0 |
| 4 | TDLB100-400 Low | D-FR1-A.2-1-12 | pos1 | -1.5 |
| TDLC300-100 Low | D-FR1-A.2.3-12 | pos1 | 12.0 |
| 8 | TDLB100-400 Low | D-FR1-A.2.1-12 | pos1 | -4.6 |
| TDLC300-100 Low | D-FR1-A.2.2-12 | pos1 | 7.8 |

Table 8.1.2.1.5-13: Test requirements for PUSCH with 70% of maximum throughput, Type B, 40 MHz channel bandwidth, 30 kHz SCS

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Number of TX antennas | Number of RX antennas | Propagation conditions and correlation matrix (annex F) | FRC (annex A) | Additional DM-RS position | SNR  (dB) |
| 1 | 2 | TDLB100-400 Low | D-FR1-A.2.1-6 | pos1 | -1.9 |
| TDLC300-100 Low | D-FR1-A.2.3-6 | pos1 | 10.6 |
| TDLA30-10 Low | D-FR1-A.2.4-6 | pos1 | 13.1 |
| 4 | TDLB100-400 Low | D-FR1-A.2.1-6 | pos1 | -5.2 |
| TDLC300-100 Low | D-FR1-A.2.3-6 | pos1 | 6.8 |
| TDLA30-10 Low | D-FR1-A.2.4-6 | pos1 | 9.3 |
| 8 | TDLB100-400 Low | D-FR1-A.2.1-6 | pos1 | -8.2 |
| TDLC300-100 Low | D-FR1-A.2.3-6 | pos1 | 3.6 |
| TDLA30-10 Low | D-FR1-A.2.4-6 | pos1 | 6.1 |
| 2 | 2 | TDLB100-400 Low | D-FR1-A.2.1-13 | pos1 | 2.5 |
| TDLC300-100 Low | D-FR1-A.2.3-13 | pos1 | 19.5 |
| 4 | TDLB100-400 Low | D-FR1-A.2.1-13 | pos1 | -1.3 |
| TDLC300-100 Low | D-FR1-A.2.3-13 | pos1 | 12.0 |
| 8 | TDLB100-400 Low | D-FR1-A.2.1-13 | pos1 | -4.4 |
| TDLC300-100 Low | D-FR1-A.2.3-13 | pos1 | 7.7 |

Table 8.1.2.1.5-14: Test requirements for PUSCH with 70% of maximum throughput, Type B, 100 MHz channel bandwidth, 30 kHz SCS

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Number of TX antennas | Number of RX antennas | Propagation conditions and correlation matrix (annex F) | FRC (annex A) | Additional DM-RS position | SNR  (dB) |
| 1 | 2 | TDLB100-400 Low | D-FR1-A.2.1-7 | pos1 | -1.9 |
| TDLC300-100 Low | D-FR1-A.2.3-7 | pos1 | 10.7 |
| TDLA30-10 Low | D-FR1-A.2.4-7 | pos1 | 13.7 |
| 4 | TDLB100-400 Low | D-FR1-A.2.1-7 | pos1 | -5.2 |
| TDLC300-100 Low | D-FR1-A.2.3-7 | pos1 | 6.9 |
| TDLA30-10 Low | D-FR1-A.2.4-7 | pos1 | 9.8 |
| 8 | TDLB100-400 Low | D-FR1-A.2.1-7 | pos1 | -8.1 |
| TDLC300-100 Low | D-FR1-A.2.3-7 | pos1 | 3.7 |
| TDLA30-10 Low | D-FR1-A.2.4-7 | pos1 | 6.5 |
| 2 | 2 | TDLB100-400 Low | D-FR1-A.2.1-14 | pos1 | 2.4 |
| TDLC300-100 Low | D-FR1-A.2.3-14 | pos1 | 20.1 |
| 4 | TDLB100-400 Low | D-FR1-A.2.1-14 | pos1 | -1.4 |
| TDLC300-100 Low | D-FR1-A.2.3-14 | pos1 | 12.4 |
| 8 | TDLB100-400 Low | D-FR1-A.2.1-14 | pos1 | -4.5 |
| TDLC300-100 Low | D-FR1-A.2.3-14 | pos1 | 7.9 |

**END OF 2nd CHANGE**