**3GPP TSG-RAN WG4 Meeting #109 R4-2320218**

**Chicago, 13th - 17th Nov, 2023**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.101-4** | **CR** | **Draft** | **rev** | **-** | **Current version:** | **18.1.0** |  |
|  | | | | | | | | |
| *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:*** | [NR\_ATG-Perf] Draft CR on ATG PDSCH demodulation performance requirements (TS38.101-4, Rel-18) | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Huawei, HiSilicon | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_ATG-Perf | | | | |  | ***Date:*** | | | 2023-11-03 |
|  |  | | | |  | |  | | |  |
| ***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-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | Introduce ATG PDSCH demodulation performance requirements. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | For introducing ATG PDSCH demodulation performance requirements, add new clause 5.2.2.1.22, 5.2.2.2.23, 5.2.3.1.21, 5.2.3.2.22. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | There will be inconsist between specification and RAN4 agreements. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 5.2.2.1.22 (new clause), 5.2.2.2.23 (new clause), 5.2.3.1.21 (new clause), 5.2.3.2.22 (new clause) | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **x** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | | **X** |  | Test specifications | | | | TS 38.521-4 | | |
| ***(show related CRs)*** | |  | **x** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | | New clause: 5.2.2.1.22, 5.2.2.2.23, 5.2.3.1.21, 5.2.3.2.22 | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

*<START OF THE CHANGE 1>*

5.2.2.1.22 Minimum requirements for ATG

The performance requirements are specified in Table 5.2.2.1.22-3, with the addition of test parameters in Table 5.2.2.1.22-2 and the downlink physical channel setup according to Annex C.3.1.

The test purposes are specified in Table 5.2.2.1.22-1.

**Table 5.2.2.1.22-1: Tests purpose**

|  |  |
| --- | --- |
| **Purpose** | **Test index** |
| Verify UE PDSCH performance under the ATG scenario | 1-1, 1-2, 1-3 |

**Table 5.2.2.1.22-2: Test parameters**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** |
| Duplex mode | |  | FDD |
| Active DL BWP index | |  | 1 |
| PDSCH configuration | Mapping type |  | Type A |
| k0 |  | 0 |
| Starting symbol (S) |  | 2 |
| Length (L) |  | 12 |
| PDSCH aggregation factor |  | 1 |
| PRB bundling type |  | Static |
| PRB bundling size |  | 2 |
| Resource allocation type |  | Type 0 |
| RBG size |  | Config2 |
| VRB-to-PRB mapping type |  | Non-interleaved |
| VRB-to-PRB mapping interleaver bundle size |  | N/A |
| PDSCH DMRS configuration | DMRS Type |  | Type 1 |
| Number of additional DMRS |  | 1 |
| Maximum number of OFDM symbols for DL front loaded DMRS |  | 1 |
| Number of HARQ Processes | |  | 4 |
| The number of slots between PDSCH and corresponding HARQ-ACK information | |  | 2 |

**Table 5.2.2.1.22-3: Minimum performance for ATG**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Test num.** | **Reference channel** | **Bandwidth (MHz) / Subcarrier spacing (kHz)** | **Modulation format and code rate** | **Propagation condition** | **Frequency offset** | **Correlation matrix and antenna configuration** | **Reference value** | |
| **Fraction of maximum throughput (%)** | **SNR (dB)** |
| 1-1 | R.PDSCH.1-2.1 FDD | 10 / 15 | 16QAM, 0.48 | AWGN | 220Hz | 2x2 | 70 | [TBD] |
| 1-2 | [TBD] | 10 / 15 | 64QAM, 0.65 | AWGN | 220Hz | 2x2 | 70 | [TBD] |
| 1-3 | R.PDSCH.1-4.1 FDD | 10 / 15 | 256QAM, 0.82 | AWGN | 220Hz | 2x2 | 70 | [TBD] |

*<END OF THE CHANGE 1>*

*<START OF THE CHANGE 2>*

5.2.2.2.23 Minimum requirements for ATG

The performance requirements are specified in Table 5.2.2.2.23-3, with the addition of test parameters in Table 5.2.2.2.23-2 and the downlink physical channel setup according to Annex C.3.1.

The test purposes are specified in Table 5.2.2.2.23-1.

**Table 5.2.2.2.23-1: Tests purpose**

|  |  |
| --- | --- |
| **Purpose** | **Test index** |
| Verify UE PDSCH performance under the ATG scenario | 1-1, 1-2, 1-3 |

**Table 5.2.2.2.23-2: Test parameters**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** |
| Duplex mode | |  | TDD |
| Active DL BWP index | |  | 1 |
| PDSCH configuration | Mapping type |  | Type A |
| k0 |  | 0 |
| Starting symbol (S) |  | 2 |
| Length (L) |  | Specific to each Reference channel |
| PDSCH aggregation factor |  | 1 |
| PRB bundling type |  | Static |
| PRB bundling size |  | 2 |
| Resource allocation type |  | Type 0 |
| RBG size |  | Config2 |
| VRB-to-PRB mapping type |  | Non-interleaved |
| VRB-to-PRB mapping interleaver bundle size |  | N/A |
| PDSCH DMRS configuration | DMRS Type |  | Type 1 |
| Number of additional DMRS |  | 1 |
| Maximum number of OFDM symbols for DL front loaded DMRS |  | 1 |
| Number of HARQ Processes | |  | Test 1-1, 1-2, 1-3: 8  Test 1-4, 1-5, 1-6: 32 |
| The number of slots between PDSCH and corresponding HARQ-ACK information | |  | Specific to each TDD UL-DL pattern and as defined in Annex A.1.2 |

**Table 5.2.2.2.23-3: Minimum performance for ATG**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Test num.** | **Reference channel** | **Bandwidth (MHz) / Subcarrier spacing (kHz)** | **Modulation format and code rate** | **TDD UL-DL pattern** | **Propagation condition** | **Frequency offset** | **Correlation matrix and antenna configuration** | **Reference value** | |
| **Fraction of maximum throughput (%)** | **SNR (dB)** |
| 1-1 | [TBD] | 40 / 30 | 16QAM, 0.48 | FR1.30-1 | AWGN | 500Hz | 2x2 | 70 | [TBD] |
| 1-2 | [TBD] | 40 / 30 | 64QAM, 0.65 | FR1.30-1 | AWGN | 500Hz | 2x2 | 70 | [TBD] |
| 1-3 | [TBD] | 40 / 30 | 256QAM, 0.82 | FR1.30-1 | AWGN | 500Hz | 2x2 | 70 | [TBD] |
| 1-4 | [TBD] | 40 / 30 | 16QAM, 0.48 | [TBD] | AWGN | 500Hz | 2x2 | 70 | [TBD] |
| 1-5 | [TBD] | 40 / 30 | 64QAM, 0.65 | [TBD] | AWGN | 500Hz | 2x2 | 70 | [TBD] |
| 1-6 | [TBD] | 40 / 30 | 256QAM, 0.82 | [TBD] | AWGN | 500Hz | 2x2 | 70 | [TBD] |

*<END OF THE CHANGE 2>*

*<START OF THE CHANGE 3>*

5.2.3.1.21 Minimum requirements for ATG

The performance requirements are specified in Table 5.2.3.1.21-3, with the addition of test parameters in Table 5.2.3.1.21-2 and the downlink physical channel setup according to Annex C.3.1.

The test purposes are specified in Table 5.2.3.1.21-1.

**Table 5.2.3.1.21-1: Tests purpose**

|  |  |
| --- | --- |
| **Purpose** | **Test index** |
| Verify UE PDSCH performance under the ATG scenario | 1-1, 1-2, 1-3 |

**Table 5.2.3.1.21-2: Test parameters**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** |
| Duplex mode | |  | FDD |
| Active DL BWP index | |  | 1 |
| PDSCH configuration | Mapping type |  | Type A |
| k0 |  | 0 |
| Starting symbol (S) |  | 2 |
| Length (L) |  | 12 |
| PDSCH aggregation factor |  | 1 |
| PRB bundling type |  | Static |
| PRB bundling size |  | 2 |
| Resource allocation type |  | Type 0 |
| RBG size |  | Config2 |
| VRB-to-PRB mapping type |  | Non-interleaved |
| VRB-to-PRB mapping interleaver bundle size |  | N/A |
| PDSCH DMRS configuration | DMRS Type |  | Type 1 |
| Number of additional DMRS |  | 1 |
| Maximum number of OFDM symbols for DL front loaded DMRS |  | 1 |
| Number of HARQ Processes | |  | 4 |
| The number of slots between PDSCH and corresponding HARQ-ACK information | |  | 2 |

**Table 5.2.3.1.21-3: Minimum performance for ATG**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Test num.** | **Reference channel** | **Bandwidth (MHz) / Subcarrier spacing (kHz)** | **Modulation format and code rate** | **Propagation condition** | **Frequency offset** | **Correlation matrix and antenna configuration** | **Reference value** | |
| **Fraction of maximum throughput (%)** | **SNR (dB)** |
| 1-1 | R.PDSCH.1-2.1 FDD | 10 / 15 | 16QAM, 0.48 | AWGN | 220Hz | 2x4 | 70 | [TBD] |
| 1-2 | [TBD] | 10 / 15 | 64QAM, 0.65 | AWGN | 220Hz | 2x4 | 70 | [TBD] |
| 1-3 | R.PDSCH.1-4.1 FDD | 10 / 15 | 256QAM, 0.82 | AWGN | 220Hz | 2x4 | 70 | [TBD] |

*<END OF THE CHANGE 3>*

*<START OF THE CHANGE 4>*

5.2.3.2.22 Minimum requirements for ATG

The performance requirements are specified in Table 5.2.3.2.22-3, with the addition of test parameters in Table 5.2.3.2.22-2 and the downlink physical channel setup according to Annex C.3.1.

The test purposes are specified in Table 5.2.3.2.22-1.

**Table 5.2.3.2.22-1: Tests purpose**

|  |  |
| --- | --- |
| **Purpose** | **Test index** |
| Verify UE PDSCH performance under the ATG scenario | 1-1, 1-2, 1-3 |

**Table 5.2.3.2.22-2: Test parameters**

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** |
| Duplex mode | |  | TDD |
| Active DL BWP index | |  | 1 |
| PDSCH configuration | Mapping type |  | Type A |
| k0 |  | 0 |
| Starting symbol (S) |  | 2 |
| Length (L) |  | Specific to each Reference channel |
| PDSCH aggregation factor |  | 1 |
| PRB bundling type |  | Static |
| PRB bundling size |  | 2 |
| Resource allocation type |  | Type 0 |
| RBG size |  | Config2 |
| VRB-to-PRB mapping type |  | Non-interleaved |
| VRB-to-PRB mapping interleaver bundle size |  | N/A |
| PDSCH DMRS configuration | DMRS Type |  | Type 1 |
| Number of additional DMRS |  | 1 |
| Maximum number of OFDM symbols for DL front loaded DMRS |  | 1 |
| Number of HARQ Processes | |  | Test 1-1, 1-2, 1-3: 8  Test 1-4, 1-5, 1-6: 32 |
| The number of slots between PDSCH and corresponding HARQ-ACK information | |  | Specific to each TDD UL-DL pattern and as defined in Annex A.1.2 |

**Table 5.2.3.2.22-3: Minimum performance for ATG**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Test num.** | **Reference channel** | **Bandwidth (MHz) / Subcarrier spacing (kHz)** | **Modulation format and code rate** | **TDD UL-DL pattern** | **Propagation condition** | **Frequency offset** | **Correlation matrix and antenna configuration** | **Reference value** | |
| **Fraction of maximum throughput (%)** | **SNR (dB)** |
| 1-1 | [TBD] | 40 / 30 | 16QAM, 0.48 | FR1.30-1 | AWGN | 500Hz | 2x4 | 70 | [TBD] |
| 1-2 | [TBD] | 40 / 30 | 64QAM, 0.65 | FR1.30-1 | AWGN | 500Hz | 2x4 | 70 | [TBD] |
| 1-3 | [TBD] | 40 / 30 | 256QAM, 0.82 | FR1.30-1 | AWGN | 500Hz | 2x4 | 70 | [TBD] |
| 1-4 | [TBD] | 40 / 30 | 16QAM, 0.48 | [TBD] | AWGN | 500Hz | 2x4 | 70 | [TBD] |
| 1-5 | [TBD] | 40 / 30 | 64QAM, 0.65 | [TBD] | AWGN | 500Hz | 2x4 | 70 | [TBD] |
| 1-6 | [TBD] | 40 / 30 | 256QAM, 0.82 | [TBD] | AWGN | 500Hz | 2x4 | 70 | [TBD] |

*<END OF THE CHANGE 4>*