**3GPP TSG-RAN4 Meeting #97-e *R4-2016500***

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| *CR-Form-v12.0* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.101-4** | **CR** | 0120 | **rev** | **-** | **Current version:** | **16.2.0** |  |
|  | | | | | | | | |
| *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)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network |  | Core Network |  |

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|  | | | | | | | | | | |
| ***Title:*** | CR on FDD HST Single-Tap and Multipath Fading Requirements | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Qualcomm Incorporated | | | | | | | | | |
| ***Source to TSG:*** |  | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_HST-Perf | | | | |  | ***Date:*** | | |  |
|  |  | | | |  | |  | | |  |
| ***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-12 (Release 12)* *Rel-13 (Release 13) Rel-14 (Release 14) Rel-15 (Release 15) Rel-16 (Release 16)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | Draft CR R4-2012673 was endorsed in last meeting with this change: FDD HST Single-Tap and Multipath Fading requirements are not defined. | | | | | | | | |
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| ***Summary of change:*** | | FDD HST Single-Tap and Multipath Fading requirements are specified. | | | | | | | | |
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| ***Consequences if not approved:*** | | FDD HST Single-Tap and Multipath Fading requriements will not be tested. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 5.2.2, 5.2.3 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | |  | | |
| ***affected:*** | | **X** |  | Test specifications | | | | TS 38.521-4 | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | |  | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

<< Start of change 1 >>

Table 5.2.2.1.1-1: Tests purpose

|  |  |
| --- | --- |
| **Purpose** | **Test index** |
| Verify the PDSCH mapping Type A normal performance under 2 receive antenna conditions and with different channel models, MCSs and number of MIMO layers | 1-1, 1-2, 1-3, 1-5, 1-6, 1-7, 2-1, 2-2 |
| Verify the PDSCH mapping Type A HARQ soft combining performance under 2 receive antenna conditions. | 1-4 |
| Verify the PDSCH mapping Type A performance requirements for Enhanced Receiver Type 1 under 2 receive antenna conditions. | 3-1 |

Table 5.2.2.1.1-2: 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 |  | 4 for Test 1-1  2 for other tests |
| Resource allocation type |  | Test 1-2: Type 1 with start RB = 23, LRBs = 6  Other tests: Type 0 |
| RBG size |  | Test 1-2: N/A  Other tests: 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 |  | 2 for Tests 1-1, 1-5, 1-6, 1-7 1 for other tests |
| Maximum number of OFDM symbols for DL front loaded DMRS |  | 1 |
| CSI-RS for tracking | CSI-RS periodicity | Slots | Test 1-5, 1-6, 1-7: 10 for CSI-RS resource 1,2,3,4.  Other tests: Table 5.2-1. |
| CSI-RS offset | Slots | Test 1-5, 1-6, 1-7: 1 for CSI-RS resource 1 and 2 2 for CSI-RS resource 3 and 4.  Other tests: Table 5.2-1. |
| Number of HARQ Processes | |  | 8 for Test 1-4  4 for other tests |
| The number of slots between PDSCH and corresponding HARQ-ACK information | |  | 2 |

**Table 5.2.2.1.1-3: Minimum performance for Rank 1**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Test num.** | **Reference channel** | **Bandwidth (MHz) / Subcarrier spacing (kHz)** | **Modulation format and code rate** | **Propagation condition** | **Correlation matrix and antenna configuration** | **Reference value** | |
| **Fraction of maximum throughput (%)** | **SNR (dB)** |
| 1-1 | R.PDSCH.1-1.1 FDD | 10 / 15 | QPSK, 0.30 | TDLB100-400 | 2x2, ULA Low | 70 | -0.8 |
| 1-2 | R.PDSCH.1-1.2 FDD | 10 / 15 | QPSK, 0.30 | TDLC300-100 | 2x2, ULA Low | 70 | 0.2 |
| 1-3 | R.PDSCH.1-4.1 FDD | 10 / 15 | 256QAM, 0.82 | TDLA30-10 | 2x2, ULA Low | 70 | 24.6 |
| 1-4 | R.PDSCH.1-2.1 FDD | 10 / 15 | 16QAM, 0.48 | TDLC300-100 | 2x2, ULA Low | 30 | 1.1 |
| 1-5 | R.PDSCH.1-8.1 FDD | 10 / 15 | 16QAM, 0.48 | HST-750 | 1x2 | 70 | 6.2 |
| 1-6 | R.PDSCH.1-8.2 FDD | 10 / 15 | 64QAM, 0.43 | HST-972 | 1x2 | 70 | [9.6] |
| 1-7 | R.PDSCH.1-8.1 FDD | 10 / 15 | 16QAM, 0.48 | TDLC300-600 | 2x2 | 70 | [8.6] |

<< End of change 1 >>

<< Start of change 2 >>

Table 5.2.3.1.1-1: Tests purpose

|  |  |
| --- | --- |
| **Purpose** | **Test index** |
| Verify the PDSCH mapping Type A normal performance under 4 receive antenna conditions and with different channel models, MCSs and number of MIMO layers | 1-1, 1-2, 1-3, 1-5, 1-6, 1-7, 2-1, 2-2, 3-1, 4-1 |
| Verify the PDSCH mapping Type A HARQ soft combining performance under 4 receive antenna conditions. | 1-4 |
| Verify the PDSCH mapping Type A performance requirements for Enhanced Receiver Type 1 under 4 receive antenna conditions. | 5-1 |

**Table 5.2.3.1.1-2: 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 |  | 4 for Test 1-1 WB for Test 3-1  2 for other tests |
| Resource allocation type |  | Test 1-2: Type 1 with start RB = 23, LRBs = 6  Other test: Type 0 |
| RBG size |  | Test 1-2: N/A  Other tests: 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 |  | 2 for Test 1-1, 1-5, 1-6, 1-7  1 for other tests |
| Maximum number of OFDM symbols for DL front loaded DMRS |  | 1 |
| CSI-RS for tracking | CSI-RS periodicity | Slots | Test 1-5, 1-6, 1-7: 10 for CSI-RS resource 1,2,3,4.  Other tests: Table 5.2-1. |
| CSI-RS offset | Slots | Test 1-5, 1-6, 1-7: 1 for CSI-RS resource 1 and 2 2 for CSI-RS resource 3 and 4.  Other tests: Table 5.2-1. |
| Number of HARQ Processes | |  | 8 for Test 1-4, 2-1  4 for other tests |
| The number of slots between PDSCH and corresponding HARQ-ACK information | |  | 2 |

**Table 5.2.3.1.1-3: Minimum performance for Rank 1**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Test num.** | **Reference channel** | **Bandwidth (MHz) / Subcarrier spacing (kHz)** | **Modulation format and code rate** | **Propagation condition** | **Correlation matrix and antenna configuration** | **Reference value** | |
| **Fraction of maximum throughput (%)** | **SNR (dB)** |
| 1-1 | R.PDSCH.1-1.1 FDD | 10 / 15 | QPSK, 0.30 | TDLB100-400 | 2x4, ULA Low | 70 | -3.5 |
| 1-2 | R.PDSCH.1-1.2 FDD | 10 / 15 | QPSK, 0.30 | TDLC300-100 | 2x4, ULA Low | 70 | -2.9 |
| 1-3 | R.PDSCH.1-4.1 FDD | 10 / 15 | 256QAM, 0.82 | TDLA30-10 | 2x4, ULA Low | 70 | 21.0 |
| 1-4 | R.PDSCH.1-2.1 FDD | 10 / 15 | 16QAM, 0.48 | TDLC300-100 | 2x4, ULA Low | 30 | -1.5 |
| 1-5 | R.PDSCH.1-8.1 FDD | 10 / 15 | 16QAM, 0.48 | HST-750 | 1x4 | 70 | 3.3 |
| 1-6 | R.PDSCH.1-8.2 FDD | 10 / 15 | 64QAM, 0.43 | HST-972 | 1x4 | 70 | [6.8] |
| 1-7 | R.PDSCH.1-8.1 FDD | 10 / 15 | 16QAM, 0.48 | TDLC300-600 | 2x4 | 70 | [5.8] |

<< End of change 2 >>