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

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

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CR-Form-v12.3* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.101-4** | **CR** | **drafCR** | **rev** | **-** | **Current version:** | **18.3.0** |  |
|  | | | | | | | | |
| *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 for 38.101-4: Introduction of eRedCap FDD PDSCH demodulation requirements | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Ericsson | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_redcap\_enh-Perf | | | | |  | ***Date:*** | | | 2024-05-20 |
|  |  | | | |  | |  | | |  |
| ***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:*** | | Introduction of eRedCap PDSCH demodulation requirements for FDD/HD-FDD | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Introduction of eRedCap PDSCH demodulation requirements for FDD/HD-FDD | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Cannot verify eRedCap PDSCH demodulation performance for FDD/HD-FDD | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 5.2.1.1.2 (New), 5.2.2.1.2x (New), A.3.2.1.1, A.3.2.3.1 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

----------------------------------------------------- Beginning of Change ------------------------------------------------------------

##### 5.2.1.1.2 Minimum requirements for eRedCap

The performance requirements are specified in Table 5.2.1.1.2-3 and Table 5.2.1.1.2-4, with the addition of test parameters in Table 5.2.1.1.2-2 and the downlink physical channel setup according to Annex C.3.1.

The test purposes are specified in Table 5.2.1.1.2-1.

Table 5.2.1.1.2-1: Tests purpose

|  |  |
| --- | --- |
| Purpose | Test index |
| Verify the PDSCH mapping Type A normal performance under 1 receive antenna conditions and with different channel models and MCSs for eRedCap UE with reduced baseband bandwidth in FR1. | 1-1, 1-2, 1-3 |
| Verify the PDSCH mapping Type A normal performance under 1 receive antenna conditions and with different channel models and MCSs for eRedCap without reduced baseband bandwidth in FR1. | 2-1, 2-2, 2-3 |

Table 5.2.1.1.2-2: Test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | | Unit | Value |
| Duplex mode | |  | FDD / HD-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 and Test 2-1  2 for other tests |
|  | 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 |  | 2 for Test 1-1 and Test 2-1, 1 for other tests |
|  | Maximum number of OFDM symbols for DL front loaded DMRS |  | 1 |
| CSI-RS for tracking | CSI-RS periodicity | Slots | Table 5.2-1 |
|  | CSI-RS offset | Slots | Table 5.2-1 |
| Number of HARQ Processes | |  | 4 |
| The number of slots between PDSCH and corresponding HARQ-ACK information | |  | 2 |

Table 5.2.1.1.2-3: Minimum performance for Rank 1 with reduced baseband bandwidth.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Test num. | Reference channel (Note 1) | 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.1-1.5 FDD  R.PDSCH.1-2.2 HD-FDD | 10 / 15 | QPSK, 0.30 | TDLB100-400 | 2x1 Low | 70 | TBD |
| 1-2 | R.PDSCH.1-12.2 FDD  R.PDSCH.1-2.3 HD-FDD | 10 / 15 | 16QAM, 0.48 | TDLC300-100 | 2x1 Low | 70 | TBD |
| 1-3 | R.PDSCH.1-12.4 FDD  R.PDSCH.1-3.1 HD-FDD | 10 / 15 | 64QAM, 0.50 | TDLA30-10 | 2x1 Low | 70 | TBD |
| Note 1: Applied reference channel depends on the supported operation mode: FDD or HD-FDD. | | | | | | | |

Table 5.2.1.1.2-4: Minimum performance for Rank 1 without reduced baseband bandwidth.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Test num. | Reference channel (Note 1) | 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) |
| 2-1 | R.PDSCH.1-1.1 FDD  R.PDSCH.1-1.1 HD-FDD | 10 / 15 | QPSK, 0.30 | TDLB100-400 | 2x1 Low | 70 | TBD |
| 2-2 | R.PDSCH.1-12.3 FDD  R.PDSCH.1-2.4 HD-FDD | 10 / 15 | 16QAM, 0.48 | TDLC300-100 | 2x1 Low | 70 | TBD |
| 2-3 | R.PDSCH.1-12.4 FDD  R.PDSCH.1-3.1 HD-FDD | 10 / 15 | 64QAM, 0.50 | TDLA30-10 | 2x1 Low | 70 | TBD |
| Note 1: Applied reference channel depends on the supported operation mode: FDD or HD-FDD. | | | | | | | |

------------------------------------------------------------- End of change ------------------------------------------------------------

----------------------------------------------------- Beginning of Change ------------------------------------------------------------

##### 5.2.2.1.2x Minimum requirements for eRedCap

The performance requirements are specified in Table 5.2.2.1.2x-3, Table 5.2.2.1.2x-4, Table 5.2.2.1.2x-5, and Table 5.2.2.1.2x-6, with the addition of test parameters in Table 5.2.2.1.2x-2 and the downlink physical channel setup according to Annex C.3.1.

The test purposes are specified in Table 5.2.2.1.2x-1.

Table 5.2.2.1.2x-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 for for eRedCap UE with reduced baseband bandwidth in FR1. | 1-1, 1-2, 2-1 |
| Verify the PDSCH mapping Type A normal performance under 2 receive antenna conditions and with different channel models, MCSs for for eRedCap UE without reduced baseband bandwidth in FR1. | 3-1, 3-2, 4-1 |

Table 5.2.2.1.2x-2: Test parameters

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter | | Unit | Value |
| Duplex mode | |  | FDD / HD-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 and Test 3-1  2 for other tests |
|  | 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 |  | 2 for Test 1-1 and Test 3-1  1 for other tests |
|  | Maximum number of OFDM symbols for DL front loaded DMRS |  | 1 |
| CSI-RS for tracking | CSI-RS periodicity | Slots | Table 5.2-1 |
|  | CSI-RS offset | Slots | Table 5.2-1 |
| Number of HARQ Processes | |  | 4 |
| The number of slots between PDSCH and corresponding HARQ-ACK information | |  | 2 |

Table 5.2.2.1.2x-3: Minimum performance for Rank 1 with reduced baseband bandwidth.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Test num. | Reference channel (Note 1) | 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.1-1.5 FDD  R.PDSCH.1-2.2 HD-FDD | 10 / 15 | QPSK, 0.30 | TDLB100-400 | 2x2, ULA Low | 70 | TBD |
| 1-2 | R.PDSCH.1-12.2 FDD  R.PDSCH.1-2.3 HD-FDD | 10 / 15 | 16QAM, 0.48 | TDLC300-100 | 2x2, ULA Low | 70 | TBD |
| Note 1: Applied reference channel depends on the supported operation mode: FDD or HD-FDD. | | | | | | | |

Table 5.2.2.1.2x-4: Minimum performance for Rank 2 with reduced baseband bandwidth.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Test num. | Reference channel (Note 1) | 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) |
| 2-1 | R.PDSCH.1-12.5 FDD  R.PDSCH.1-3.2 HD-FDD | 10 / 15 | 64QAM, 0.50 | TDLA30-10 | 2x2, ULA Low | 70 | TBD |
| Note 1: Applied reference channel depends on the supported operation mode: FDD or HD-FDD. | | | | | | | |

Table 5.2.2.1.2x-5: Minimum performance for Rank 1 without reduced baseband bandwidth.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Test num. | Reference channel (Note 1) | 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) |
| 3-1 | R.PDSCH.1-1.1 FDD  R.PDSCH.1-1.1 HD-FDD | 10 / 15 | QPSK, 0.30 | TDLB100-400 | 2x2, ULA Low | 70 | TBD |
| 3-2 | R.PDSCH.1-12.3 FDD  R.PDSCH.1-2.4 HD-FDD | 10 / 15 | 16QAM, 0.48 | TDLC300-100 | 2x2, ULA Low | 70 | TBD |
| Note 1: Applied reference channel depends on the supported operation mode: FDD or HD-FDD. | | | | | | | |

Table 5.2.2.1.2x-6: Minimum performance for Rank 2 without reduced baseband bandwidth.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Test num. | Reference channel (Note 1) | 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) |
| 4-1 | R.PDSCH.1-12.5 FDD  R.PDSCH.1-3.2 HD-FDD | 10 / 15 | 64QAM, 0.50 | TDLA30-10 | 2x2, ULA Low | 70 | TBD |
| Note 1: Applied reference channel depends on the supported operation mode: FDD or HD-FDD. | | | | | | | |

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----------------------------------------------------- Beginning of Change ------------------------------------------------------------

#### A.3.2.1.1 Reference measurement channels for SCS 15 kHz FR1

Table A.3.2.1.1-1: PDSCH Reference Channel for FDD (QPSK)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | | | | |
| Reference channel |  | R.PDSCH.1-1.1 FDD | R.PDSCH.1-1.2 FDD | R.PDSCH.1-1.3 FDD | R.PDSCH.1-1.4 FDD | R.PDSCH.1-1.5 FDD |
| Channel bandwidth | MHz | 10 | 10 | 10 | 10 | 10 |
| Subcarrier spacing | kHz | 15 | 15 | 15 | 15 | 15 |
| Number of allocated resource blocks | PRBs | 52 | 6 | 52 | 52 | 25 |
| Number of consecutive PDSCH symbols |  | 12 | 12 | 7 | 12 | 12 |
| Allocated slots per 2 frames | Slots | 19 | 19 | 19 | 19 | 19 |
| MCS table |  | 64QAM | 64QAM | 64QAM | 64QAMLowSE | 64QAM |
| MCS index |  | 4 | 4 | 4 | 14 | 4 |
| Modulation |  | QPSK | QPSK | QPSK | QPSK | QPSK |
| Target Coding Rate |  | 0.30 | 0.30 | 0.30 | 0.59 | 0.30 |
| Number of MIMO layers |  | 1 | 1 | 1 | 1 | 1 |
| Number of DMRS REs |  | 18 | 12 | 12 | 12 | 18 |
| Overhead for TBS determination |  | 0 | 0 | 0 | 0 | 0 |
| Information Bit Payload per Slot |  |  |  |  |  |  |
| For Slot i = 0 | Bits | N/A | N/A | N/A | N/A | N/A |
| For Slots i = 1,…, 19 | Bits | 3904 | 480 | 2280 | 8064 | 1928 |
| Transport block CRC per Slot |  |  |  |  |  |  |
| For Slot i = 0 | Bits | N/A | N/A | N/A | N/A | N/A |
| For Slots i = 1,…, 19 | Bits | 24 | 16 | 16 | 24 | 16 |
| Number of Code Blocks per Slot |  |  |  |  |  |  |
| For Slot i = 0 | CBs | N/A | N/A | N/A | N/A | N/A |
| For Slots i = 1,…, 19 | CBs | 1 | 1 | 1 | 1 | 1 |
| Binary Channel Bits Per Slot |  |  |  |  |  |  |
| For Slot i = 0 | Bits | N/A | N/A | N/A | N/A | N/A |
| For Slots i = 10, 11 | Bits | 12480 | 1512 | 6864 | 13104 | 6000 |
| For Slots i =1,…, 9, 12, …, 19 | Bits | 13104 | 1584 | 7488 | 13728 | 6300 |
| Max. Throughput averaged over 2 frames | Mbps | 3.709 | 0.456 | 2.166 | 7.661 | 1.832 |
| Note 1: SS/PBCH block is transmitted in slot #0 with periodicity 20 ms  Note 2: Slot i is slot index per 2 frames | | | | | | |

------------------------------------------------------------- End of change ------------------------------------------------------------

----------------------------------------------------- Beginning of Change ------------------------------------------------------------

Table A.3.2.1.1-12: PDSCH Reference Channel for FDD

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Value | | | | |
| Reference channel |  | R.PDSCH.1-12.1 FDD | R.PDSCH.1-12.2 FDD | R.PDSCH.1-12.3 FDD | R.PDSCH.1-12.4 FDD | R.PDSCH.1-12.5 FDD |
| Channel bandwidth | MHz | 10 | 10 | 10 | 10 | 10 |
| Subcarrier spacing | kHz | 15 | 15 | 15 | 15 | 15 |
| Number of allocated resource blocks | PRBs | 52 | 25 | 40 | 25 | 12 |
| Number of consecutive PDSCH symbols |  | 2 | 12 | 12 | 12 | 12 |
| Allocated slots per 2 frames | Slots | 19 | 19 | 19 | 19 | 19 |
| MCS table |  | 64QAM | 64QAM | 64QAM | 64QAM | 64QAM |
| MCS index |  | 4 | 13 | 13 | 19 | 19 |
| Modulation |  | QPSK | 16QAM | 16QAM | 64QAM | 64QAM |
| Target Coding Rate |  | 0.3 | 0.48 | 0.48 | 0.51 | 0.51 |
| Number of MIMO layers |  | 1 | 1 | 1 | 1 | 2 |
| Number of DMRS REs |  | 6 | 12 | 12 | 12 | 12 |
| Overhead for TBS determination |  | 0 | 0 | 0 | 0 | 0 |
| Information Bit Payload per Slot |  |  |  |  |  |  |
| For Slot i = 0 | Bits | N/A | N/A | N/A | N/A | N/A |
| For Slots i = 1,…, 19 | Bits | 576 | 6272 | 9992 | 9992 | 9480 |
| Transport block CRC per Slot |  |  |  |  |  |  |
| For Slot i = 0 | Bits | N/A | N/A | N/A | N/A | N/A |
| For Slots i = 1,…, 19 | Bits | 16 | 24 | 24 | 24 | 24 |
| Number of Code Blocks per Slot |  |  |  |  |  |  |
| For Slot i = 0 | CBs | N/A | N/A | N/A | N/A | N/A |
| For Slots i = 1,…, 19 | CBs | 1 | 1 | 2 | 2 | 2 |
| Binary Channel Bits Per Slot |  |  |  |  |  |  |
| For Slot i = 0 | Bits | N/A | N/A | N/A | N/A | N/A |
| For Slots i = 10, 11 | Bits | 1872 | 12600 | 20160 | 18900 | 18144 |
| For Slots i =1,…, 9, 12, …, 19 | Bits | 1872 | 13200 | 21120 | 19800 | 19008 |
| Max. Throughput averaged over 2 frames | Mbps | 0.547 | 5.958 | 9.492 | 9.492 | 9.006 |
| Note 1: SS/PBCH block is transmitted in slot #0 with periodicity 20 ms  Note 2: Slot i is slot index per 2 frames | | | | | | |

------------------------------------------------------------- End of change ------------------------------------------------------------

----------------------------------------------------- Beginning of Change ------------------------------------------------------------

### A.3.2.3 HD-FDD

#### A.3.2.3.1 Reference measurement channels for SCS 15 kHz FR1

Table A.3.2.3.1-1: PDSCH Reference Channel for HD-FDD

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Value | | | | |
| Reference channel |  | R.PDSCH.1-1.1 HD-FDD | R.PDSCH.1-1.2 HD-FDD | R.PDSCH.1-1.3 HD-FDD | R.PDSCH.1-1.4 HD-FDD | R.PDSCH.1-1.5 HD-FDD |
| Channel bandwidth | MHz | 10 | 10 | 10 | 10 | 10 |
| Subcarrier spacing | kHz | 15 | 15 | 15 | 15 | 15 |
| Number of allocated resource blocks | PRBs | 52 | 52 | 52 | 52 | 52 |
| Number of consecutive PDSCH symbols |  |  |  |  |  |  |
| For Slot i, if mod(i, 5) = 3 for i from {0,…,19} |  | 8 | 8 | 8 | 8 | 8 |
| For Slot i, if mod(i, 5) = {0,1,2} for i from {1,…,19} |  | 12 | 12 | 12 | 12 | 12 |
| Allocated slots per 2 frames | Slots | 15 | 15 | 15 | 15 | 15 |
| MCS table |  | 64QAM | 64QAM | 64QAM | 256QAM | 256QAM |
| MCS index |  | 4 | 13 | 19 | 20 | 24 |
| Modulation |  | QPSK | 16QAM | 64QAM | 256QAM | 256QAM |
| Target Coding Rate |  | 0.30 | 0.48 | 0.51 | 0.67 | 0.82 |
| Number of MIMO layers |  | 1 | 1 | 1 | 1 | 1 |
| Number of DMRS REs |  |  |  |  |  |  |
| For Slot i, if mod(i, 5) = 3 for i from {0,…,19} |  | 18 | 12 | 12 | 12 | 12 |
| For Slot i, if mod(i, 5) = {0,1,2} for i from {1,…,19} |  | 18 | 12 | 12 | 12 | 12 |
| Overhead for TBS determination |  | 0 | 0 | 0 | 0 | 0 |
| Information Bit Payload per Slot |  |  |  |  |  |  |
| For Slot i = 0 | Bits | N/A | N/A | N/A | N/A | N/A |
| For Slot i, if mod(i, 5) = 3 for i from {0,…,19} | Bits | 2472 | 8456 | 13320 | 23040 | 28680 |
| For Slot i, if mod(i, 5) = {0,1,2} for i from {1,…,19} | Bits | 3904 | 13064 | 21000 | 36896 | 45096 |
| Transport block CRC per Slot |  |  |  |  |  |  |
| For Slot i = 0 | Bits | N/A | N/A | N/A | N/A | N/A |
| For Slot i, if mod(i, 5) = 3 for i from {0,…,19} | Bits | 24 | 24 | 24 | 24 | 24 |
| For Slot i, if mod(i, 5) = {0,1,2} for i from {1,…,19} | Bits | 24 | 24 | 24 | 24 | 24 |
| Number of Code Blocks per Slot |  |  |  |  |  |  |
| For Slot i = 0 | CBs | N/A | N/A | N/A | N/A | N/A |
| For Slot i, if mod(i, 5) = 3 for i from {0,…,19} | CBs | 1 | 2 | 2 | 3 | 4 |
| For Slot i, if mod(i, 5) = {0,1,2} for i from {1,…,19} | CBs | 1 | 2 | 3 | 5 | 6 |
| Binary Channel Bits Per Slot |  |  |  |  |  |  |
| For Slot i = 0 | Bits | N/A | N/A | N/A | N/A | N/A |
| For Slots i = 10, 11 | Bits | 12480 | 26208 | 39312 | 52416 | 52416 |
| For Slot i, if mod(i, 5) = 3 for i from {0,…,19} | Bits | 8112 | 17472 | 26208 | 34944 | 34944 |
| For Slot i, if mod(i, 5) = {0,1,2} for i from {1,…,9,12,…,19} | Bits | 13104 | 27456 | 41184 | 54912 | 54912 |
| Max. Throughput averaged over 2 frames | Mbps | 2.642 | 11.489 | 14.214 | 24.901 | 30.539 |
| Note 1: SS/PBCH block is transmitted in slot #0 with periodicity 20 ms  Note 2: Slot i is slot index per 2 frames | | | | | | |

Table A.3.2.3.1-2: PDSCH Reference Channel for HD-FDD

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Value | | | | |
| Reference channel |  | R.PDSCH.1-2.1 HD-FDD | R.PDSCH.1-2.2 HD-FDD | R.PDSCH.1-2.3 HD-FDD | R.PDSCH.1-2.4 HD-FDD |  |
| Channel bandwidth | MHz | 10 | 10 | 10 | 10 |  |
| Subcarrier spacing | kHz | 15 | 15 | 15 | 15 |  |
| Number of allocated resource blocks | PRBs | 52 | 25 | 25 | 40 |  |
| Number of consecutive PDSCH symbols |  |  |  |  |  |  |
| For Slot i, if mod(i, 5) = 3 for i from {0,…,19} |  | 8 | 8 | 8 | 8 |  |
| For Slot i, if mod(i, 5) = {0,1,2} for i from {1,…,19} |  | 12 | 12 | 12 | 12 |  |
| Allocated slots per 2 frames | Slots | 15 | 15 | 15 | 15 |  |
| MCS table |  | 64QAM | 64QAM | 64QAM | 64QAM |  |
| MCS index |  | 19 | 4 | 13 | 13 |  |
| Modulation |  | 64QAM | QPSK | 16QAM | 16QAM |  |
| Target Coding Rate |  | 0.51 | 0.30 | 0.48 | 0.48 |  |
| Number of MIMO layers |  | 2 | 1 | 1 | 1 |  |
| Number of DMRS REs |  |  |  |  |  |  |
| For Slot i, if mod(i, 5) = 3 for i from {0,…,19} |  | 12 | 18 | 12 | 12 |  |
| For Slot i, if mod(i, 5) = {0,1,2} for i from {1,…,19} |  | 12 | 18 | 12 | 12 |  |
| Overhead for TBS determination |  | 0 | 0 | 0 | 0 |  |
| Information Bit Payload per Slot |  |  |  |  |  |  |
| For Slot i = 0 | Bits | N/A | N/A | N/A | N/A |  |
| For Slot i, if mod(i, 5) = 3 for i from {0,…,19} | Bits | 26632 | 1192 | 3968 | 6400 |  |
| For Slot i, if mod(i, 5) = {0,1,2} for i from {1,…,19} | Bits | 42016 | 1928 | 6272 | 9992 |  |
| Transport block CRC per Slot |  |  |  |  |  |  |
| For Slot i = 0 | Bits | N/A | N/A | N/A | N/A |  |
| For Slot i, if mod(i, 5) = 3 for i from {0,…,19} | Bits | 24 | 16 | 24 | 24 |  |
| For Slot i, if mod(i, 5) = {0,1,2} for i from {1,…,19} | Bits | 24 | 16 | 24 | 24 |  |
| Number of Code Blocks per Slot |  |  |  |  |  |  |
| For Slot i = 0 | CBs | N/A | N/A | N/A | N/A |  |
| For Slot i, if mod(i, 5) = 3 for i from {0,…,19} | CBs | 4 | 1 | 1 | 1 |  |
| For Slot i, if mod(i, 5) = {0,1,2} for i from {1,…,19} | CBs | 5 | 1 | 1 | 2 |  |
| Binary Channel Bits Per Slot |  |  |  |  |  |  |
| For Slot i = 0 | Bits | N/A | N/A | N/A | N/A |  |
| For Slots i = 10, 11 | Bits | 78624 | 6000 | 12600 | 20160 |  |
| For Slot i, if mod(i, 5) = 3 for i from {0,…,19} | Bits | 52416 | 3900 | 8400 | 13440 |  |
| For Slot i, if mod(i, 5) = {0,1,2} for i from {1,…,9,12,…,19} | Bits | 82368 | 6300 | 13200 | 21120 |  |
| Max. Throughput averaged over 2 frames | Mbps | 28.435 | 1.684 | 5.498 | 8.774 |  |
| Note 1: SS/PBCH block is transmitted in slot #0 with periodicity 20 ms  Note 2: Slot i is slot index per 2 frames | | | | | | |

Table A.3.2.3.1-3: PDSCH Reference Channel for HD-FDD

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Unit | Value | | | | |
| Reference channel |  | R.PDSCH.1-3.1 HD-FDD | R.PDSCH.1-3.2 HD-FDD |  |  |  |
| Channel bandwidth | MHz | 10 | 10 |  |  |  |
| Subcarrier spacing | kHz | 15 | 15 |  |  |  |
| Number of allocated resource blocks | PRBs | 25 | 12 |  |  |  |
| Number of consecutive PDSCH symbols |  |  |  |  |  |  |
| For Slot i, if mod(i, 5) = 3 for i from {0,…,19} |  | 8 | 8 |  |  |  |
| For Slot i, if mod(i, 5) = {0,1,2} for i from {1,…,19} |  | 12 | 12 |  |  |  |
| Allocated slots per 2 frames | Slots | 15 | 15 |  |  |  |
| MCS table |  | 64QAM | 64QAM |  |  |  |
| MCS index |  | 19 | 19 |  |  |  |
| Modulation |  | 64QAM | 64QAM |  |  |  |
| Target Coding Rate |  | 0.51 | 0.51 |  |  |  |
| Number of MIMO layers |  | 1 | 2 |  |  |  |
| Number of DMRS REs |  |  |  |  |  |  |
| For Slot i, if mod(i, 5) = 3 for i from {0,…,19} |  | 12 | 12 |  |  |  |
| For Slot i, if mod(i, 5) = {0,1,2} for i from {1,…,19} |  | 12 | 12 |  |  |  |
| Overhead for TBS determination |  | 0 | 0 |  |  |  |
| Information Bit Payload per Slot |  |  |  |  |  |  |
| For Slot i = 0 | Bits | N/A | N/A |  |  |  |
| For Slot i, if mod(i, 5) = 3 for i from {0,…,19} | Bits | 6400 | 6144 |  |  |  |
| For Slot i, if mod(i, 5) = {0,1,2} for i from {1,…,19} | Bits | 9992 | 9480 |  |  |  |
| Transport block CRC per Slot |  |  |  |  |  |  |
| For Slot i = 0 | Bits | N/A | N/A |  |  |  |
| For Slot i, if mod(i, 5) = 3 for i from {0,…,19} | Bits | 24 | 24 |  |  |  |
| For Slot i, if mod(i, 5) = {0,1,2} for i from {1,…,19} | Bits | 24 | 24 |  |  |  |
| Number of Code Blocks per Slot |  |  |  |  |  |  |
| For Slot i = 0 | CBs | N/A | N/A |  |  |  |
| For Slot i, if mod(i, 5) = 3 for i from {0,…,19} | CBs | 1 | 1 |  |  |  |
| For Slot i, if mod(i, 5) = {0,1,2} for i from {1,…,19} | CBs | 2 | 2 |  |  |  |
| Binary Channel Bits Per Slot |  |  |  |  |  |  |
| For Slot i = 0 | Bits | N/A | N/A |  |  |  |
| For Slots i = 10, 11 | Bits | 18900 | 18144 |  |  |  |
| For Slot i, if mod(i, 5) = 3 for i from {0,…,19} | Bits | 12600 | 12096 |  |  |  |
| For Slot i, if mod(i, 5) = {0,1,2} for i from {1,…,9,12,…,19} | Bits | 19800 | 19008 |  |  |  |
| Max. Throughput averaged over 2 frames | Mbps | 8.774 | 8.339 |  |  |  |
| Note 1: SS/PBCH block is transmitted in slot #0 with periodicity 20 ms  Note 2: Slot i is slot index per 2 frames | | | | | | |

------------------------------------------------------------- End of change ------------------------------------------------------------