**3GPP TSG- Meeting #**

 **Meeting, August 15 - 26, 2022**

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| *CR-Form-v12.2* |
| **CHANGE REQUEST** |
|  |
|  | **38.101-4** | **CR** | **DRAFT** | **rev** | **1** | **Current version:** | **17.5.0** |  |
|  |
| *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:***  | Channel quality reporting for RedCap under static condition  |
|  |  |
| ***Source to WG:*** |  |
| ***Source to TSG:*** |  |
|  |  |
| ***Work item code:*** | NR\_redcap-Perf |  | ***Date:*** | 23/08/2022 |
|  |  |  |  |  |
| ***Category:*** | **B** |  | ***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 canbe 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:*** | Channel quality reporting definition and test cases under static condition are missing for 1 Rx and 2 Rx RedCap UEs.  |
|  |  |
| ***Summary of change:*** | Channel quality reporting definition and test cases under static condition are introduced for 1 Rx and 2 Rx RedCap UEs. |
|  |  |
| ***Consequences if not approved:*** | No performance requirements for CQI reporting for 1 Rx and 2 Rx RedCap UEs. Performance cannot be tested. |
|  |  |
| ***Clauses affected:*** |  6.2.1.1 (new), 6.2.1.1.1 (new), 6.2.1.2 (new), 6.2.1.2.1 (new), 6.2.2.1.1.4 (new), 6.2.2.2.1.5 (new), A.4 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **x** |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** |  | **X** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** | Values in square brackets indicate changes according to agreed RedCap working assumptions in R4-2210672. |
|  |  |
| ***This CR's revision history:*** | Revision of R4-2213072. |

**--- Start of change 1 ---**

## 6.2 Reporting of Channel Quality Indicator (CQI)

This clause includes the requirements for the reporting of channel quality indicator (CQI).

### 6.2.1 1RX requirements

6.2.1.1 FDD

##### 6.2.1.1.1 CQI reporting definition under AWGN conditions

The reporting accuracy of the channel quality indicator (CQI) under frequency non-selective conditions is determined by the reporting variance and the BLER performance using the transport format indicated by the reported CQI median. The purpose is to verify that the reported CQI values are in accordance with the CQI definition given in TS 38.214 [12]. To account for sensitivity of the input SNR the reporting definition is considered to be verified if the reporting accuracy is met for at least one of two SNR levels separated by an offset of 1 dB.

###### 6.2.1.1.1.1 Minimum requirement for periodic CQI reporting for RedCap

For the parameters specified in Table 6.2.1.1.1.1-1, and using the downlink physical channels specified in Annex C.3.1, the minimum requirements are specified by the following:

a) The reported CQI value according to the reference channel shall be in the range of ±1 of the reported median more than 90% of the time.

b) If the PDSCH BLER using the transport format indicated by median CQI is less than or equal to 0.1, then the BLER using the transport format indicated by the (median CQI+1) shall be greater than 0.1. If the PDSCH BLER using the transport format indicated by the median CQI is greater than 0.1, then the BLER using transport format indicated by (median CQI-1) shall be less than or equal to 0.1.

Table 6.2.1.1.1.1-1: CQI reporting definition test

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test 1** | **Test 2** |
| Bandwidth | MHz | 10 |
| Subcarrier spacing | kHz | 15 |
| Duplex Mode |  | FDD |
| SNR | dB | [5] | [6] | [11] | [12] |
| Propagation channel |  | AWGN |
| Antenna configuration |  | [2×1 with static channel specified in Annex B.1] |
| Beamforming Model |  | As specified in Annex B.4.1 |
| ZP CSI-RS configuration | CSI-RS resource Type |  | Periodic |
| Number of CSI-RS ports (*X*) |  | 4 |
| CDM Type |  | FD-CDM2 |
| Density (ρ) |  | 1 |
| First subcarrier index in the PRB used for CSI-RS (k0) |  | Row 5,4 |
| First OFDM symbol in the PRB used for CSI-RS (l0) |  | 9 |
| CSI-RSperiodicity and offset | slot | [10/1] |
| NZP CSI-RS for CSI acquisition | CSI-RS resource Type |  | Periodic |
| Number of CSI-RS ports (*X*) |  | 2 |
| CDM Type |  | FD-CDM2 |
| Density (ρ) |  | 1 |
| First subcarrier index in the PRB used for CSI-RS (k0) |  | Row 3,(6) |
| First OFDM symbol in the PRB used for CSI-RS (l0) |  | 13 |
| NZP CSI-RS-timeConfigperiodicity and offset | slot | [10/1] |
| CSI-IM configuration | CSI-IM resource Type |  | Periodic |
| CSI-IM RE pattern |  | 0 |
| CSI-IM Resource Mapping(kCSI-IM,lCSI-IM) |  | (4, 9) |
| CSI-IM timeConfigperiodicity and offset | slot | [10/1] |
| ReportConfigType |  | Periodic |
| CQI-table |  | [Table 1] |
| reportQuantity |  | cri-RI-PMI-CQI |
| timeRestrictionForChannelMeasurements |  | Not configured |
| timeRestrictionForInterferenceMeasurements |  | Not configured |
| cqi-FormatIndicator |  | Wideband |
| pmi-FormatIndicator |  | Wideband |
| Sub-band Size | RB | 8 |
| Csi-ReportingBand |  | 1111111 |
| CSI-Report periodicity and offset | slot | [10/9] |
| aperiodicTriggeringOffset |  | Not configured |
| Codebook configuration | Codebook Type |  | typeI-SinglePanel |
| Codebook Mode |  | 1 |
| (CodebookConfig-N1,CodebookConfig-N2) |  | Not configured |
| CodebookSubsetRestriction |  | 000001 |
| RI Restriction |  | N/A |
| Physical channel for CSI report |  | PUCCH |
| CQI/RI/PMI delay  | ms | [10 or 14] |
| Maximum number of HARQ transmission |  | 1 |
| Measurement channel |  | As specified in [Table A.4-1, TBS.1-X1] |

**--- End of change 1 ---**

**--- Start of change 2 ---**

#### 6.2.1.2 TDD

##### 6.2.1.2.1 CQI reporting definition under AWGN conditions

###### 6.2.1.2.1.1 Minimum requirement for periodic CQI reporting for RedCap

The purpose of the requirements is to verify that the reported CQI values are in accordance with the CQI definition given in TS 38.214 [12]. The reporting accuracy of CQI under AWGN condition is determined by the reporting variance and BLER performance using the transport format indicated by the reported CQI median. To account for sensitivity of the input SNR the reporting definition is considered to be verified if the reporting accuracy is met for at least one of two SNR levels separated by an offset of 1 dB.

For the parameters specified in Table 6.2.1.2.1.1-1, and using the downlink physical channels specified in Annex C.3.1, the minimum requirements are specified by the following:

a) The reported CQI value according to the reference channel shall be in the range of ±1 of the reported median more than 90% of the time.

b) If the PDSCH BLER using the transport format indicated by median CQI is less than or equal to 0.1, then the BLER using the transport format indicated by the (median CQI+1) shall be greater than 0.1. If the PDSCH BLER using the transport format indicated by the median CQI is greater than 0.1, then the BLER using transport format indicated by (median CQI-1) shall be less than or equal to 0.1.

Table 6.2.1.2.1.1-1: CQI reporting definition test

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test 1** | **Test 2** |
| Bandwidth | MHz | [20] |
| Subcarrier spacing | kHz | 30 |
| Duplex Mode |  | TDD |
| TDD UL-DL pattern |  | FR1.30-1 |
| SNR |  dB | [5] | [6] | [11] | [12] |
| Propagation channel |  | AWGN |
| Antenna configuration |  | [2×1 with static channel specified in Annex B.1] |
| Beamforming Model |  | As specified in Annex B.4.1 |
| ZP CSI-RS configuration | CSI-RS resource Type |  | Periodic |
| Number of CSI-RS ports (*X*) |  | 4 |
| CDM Type |  | FD-CDM2 |
| Density (ρ) |  | 1 |
| First subcarrier index in the PRB used for CSI-RS (k0) |  | Row 5,4 |
| First OFDM symbol in the PRB used for CSI-RS (l0) |  | 9 |
| CSI-RSperiodicity and offset | slot | [10/1] |
| NZP CSI-RS for CSI acquisition | CSI-RS resource Type |  | Periodic |
| Number of CSI-RS ports (*X*) |  | 2 |
| CDM Type |  | FD-CDM2 |
| Density (ρ) |  | 1 |
| First subcarrier index in the PRB used for CSI-RS (k0) |  | Row 3,(6) |
| First OFDM symbol in the PRB used for CSI-RS (l0) |  | 13 |
| NZP CSI-RS-timeConfigperiodicity and offset | slot | [10/1] |
| CSI-IM configuration | CSI-IM resource Type |  | Periodic |
| CSI-IM RE pattern |  | 0 |
| CSI-IM Resource Mapping(kCSI-IM,lCSI-IM) |  | (4, 9) |
| CSI-IM timeConfigperiodicity and offset | slot | [10/1] |
| ReportConfigType |  | Periodic |
| CQI-table |  | [Table 1] |
| reportQuantity |  | cri-RI-PMI-CQI |
| timeRestrictionForChannelMeasurements |  | Not configured |
| timeRestrictionForInterferenceMeasurements |  | Not configured |
| cqi-FormatIndicator |  | Wideband |
| pmi-FormatIndicator |  | Wideband |
| Sub-band Size | RB | 16 |
| Csi-ReportingBand |  | 1111111 |
| CSI-Report periodicity and offset | slot | [10/9] |
| aperiodicTriggeringOffset |  | Not configured |
| Codebook configuration | Codebook Type |  | typeI-SinglePanel |
| Codebook Mode |  | 1 |
| (CodebookConfig-N1,CodebookConfig-N2) |  | Not configured |
| CodebookSubsetRestriction |  | 000001 |
| RI Restriction |  | N/A |
| Physical channel for CSI report |  | PUCCH |
| CQI/RI/PMI delay  | ms | [10 or 14] |
| Maximum number of HARQ transmission |  | 1 |
| Measurement channel |  | As specified in [Table A.4-1, TBS.1-X3] |

**--- End of change 2 ---**

### **--- Start of change 3 ---**6.2.2 2RX requirements

This sub-clause includes the requirements for reporting of CQI for UE equipped with 2 receiver antennas.

#### 6.2.2.1 FDD

##### 6.2.2.1.1 CQI reporting definition under AWGN conditions

**--- Unchanged sections omitted ---**

###### 6.2.2.1.1.4 Minimum requirement for periodic CQI reporting for RedCap

For the parameters specified in Table 6.2.2.1.1.4-1, and using the downlink physical channels specified in Annex C.3.1, the minimum requirements are specified by the following:

a) The reported CQI value according to the reference channel shall be in the range of ±1 of the reported median more than 90% of the time.

b) If the PDSCH BLER using the transport format indicated by median CQI is less than or equal to 0.1, then the BLER using the transport format indicated by the (median CQI+1) shall be greater than 0.1. If the PDSCH BLER using the transport format indicated by the median CQI is greater than 0.1, then the BLER using transport format indicated by (median CQI-1) shall be less than or equal to 0.1.

Table 6.2.2.1.1.4-1: CQI reporting definition test

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test 1** | **Test 2** |
| Bandwidth | MHz | 10 |
| Subcarrier spacing | kHz | 15 |
| Duplex Mode |  | FDD |
| SNR | dB | [8] | [9] | [14] | [15] |
| Propagation channel |  | AWGN |
| Antenna configuration |  | [2×2 with static channel specified in Annex B.1] |
| Beamforming Model |  | As specified in Annex B.4.1 |
| ZP CSI-RS configuration | CSI-RS resource Type |  | Periodic |
| Number of CSI-RS ports (*X*) |  | 4 |
| CDM Type |  | FD-CDM2 |
| Density (ρ) |  | 1 |
| First subcarrier index in the PRB used for CSI-RS (k0) |  | Row 5,4 |
| First OFDM symbol in the PRB used for CSI-RS (l0) |  | 9 |
| CSI-RSperiodicity and offset | slot | [10/1] |
| NZP CSI-RS for CSI acquisition | CSI-RS resource Type |  | Periodic |
| Number of CSI-RS ports (*X*) |  | 2 |
| CDM Type |  | FD-CDM2 |
| Density (ρ) |  | 1 |
| First subcarrier index in the PRB used for CSI-RS (k0) |  | Row 3,(6) |
| First OFDM symbol in the PRB used for CSI-RS (l0) |  | 13 |
| NZP CSI-RS-timeConfigperiodicity and offset | slot | [10/1] |
| CSI-IM configuration | CSI-IM resource Type |  | Periodic |
| CSI-IM RE pattern |  | 0 |
| CSI-IM Resource Mapping(kCSI-IM,lCSI-IM) |  | (4, 9) |
| CSI-IM timeConfigperiodicity and offset | slot | [10/1] |
| ReportConfigType |  | Periodic |
| CQI-table |  | [Table 1] |
| reportQuantity |  | cri-RI-PMI-CQI |
| timeRestrictionForChannelMeasurements |  | Not configured |
| timeRestrictionForInterferenceMeasurements |  | Not configured |
| cqi-FormatIndicator |  | Wideband |
| pmi-FormatIndicator |  | Wideband |
| Sub-band Size | RB | 8 |
| Csi-ReportingBand |  | 1111111 |
| CSI-Report periodicity and offset | slot | [10/9] |
| aperiodicTriggeringOffset |  | Not configured |
| Codebook configuration | Codebook Type |  | typeI-SinglePanel |
| Codebook Mode |  | 1 |
| (CodebookConfig-N1,CodebookConfig-N2) |  | Not configured |
| CodebookSubsetRestriction |  | 010000 |
| RI Restriction |  | N/A |
| Physical channel for CSI report |  | PUCCH |
| CQI/RI/PMI delay  | ms | [10 or 14] |
| Maximum number of HARQ transmission |  | 1 |
| Measurement channel |  | As specified in [Table A.4-1, TBS.1-X2] |

**--- End of change 3 ---**

**--- Start of change 4 ---**

#### 6.2.2.2 TDD

##### 6.2.2.2.1 CQI reporting definition under AWGN conditions

**--- Unchanged sections omitted ---**

###### 6.2.2.2.1.5 Minimum requirement for periodic CQI reporting for RedCap

The purpose of the requirements is to verify that the reported CQI values are in accordance with the CQI definition given in TS 38.214 [12]. The reporting accuracy of CQI under AWGN condition is determined by the reporting variance and BLER performance using the transport format indicated by the reported CQI median. To account for sensitivity of the input SNR the reporting definition is considered to be verified if the reporting accuracy is met for at least one of two SNR levels separated by an offset of 1 dB.

For the parameters specified in Table 6.2.2.2.1.5-1, and using the downlink physical channels specified in Annex C.3.1, the minimum requirements are specified by the following:

a) The reported CQI value according to the reference channel shall be in the range of ±1 of the reported median more than 90% of the time.

b) If the PDSCH BLER using the transport format indicated by median CQI is less than or equal to 0.1, then the BLER using the transport format indicated by the (median CQI+1) shall be greater than 0.1. If the PDSCH BLER using the transport format indicated by the median CQI is greater than 0.1, then the BLER using transport format indicated by (median CQI-1) shall be less than or equal to 0.1.

Table 6.2.2.2.1.5-1: CQI reporting definition test

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test 1** | **Test 2** |
| Bandwidth | MHz | [20] |
| Subcarrier spacing | kHz | 30 |
| Duplex Mode |  | TDD |
| TDD UL-DL pattern |  | [FR1.30-1] |
| SNR |  dB | [8] | [9] | [14] | [15] |
| Propagation channel |  | AWGN |
| Antenna configuration |  | [2×2 with static channel specified in Annex B.1] |
| Beamforming Model |  | As specified in Annex B.4.1 |
| ZP CSI-RS configuration | CSI-RS resource Type |  | Periodic |
| Number of CSI-RS ports (*X*) |  | 4 |
| CDM Type |  | FD-CDM2 |
| Density (ρ) |  | 1 |
| First subcarrier index in the PRB used for CSI-RS (k0) |  | Row 5,4 |
| First OFDM symbol in the PRB used for CSI-RS (l0) |  | 9 |
| CSI-RSperiodicity and offset | slot | [10/1] |
| NZP CSI-RS for CSI acquisition | CSI-RS resource Type |  | Periodic |
| Number of CSI-RS ports (*X*) |  | 2 |
| CDM Type |  | FD-CDM2 |
| Density (ρ) |  | 1 |
| First subcarrier index in the PRB used for CSI-RS (k0) |  | Row 3,(6) |
| First OFDM symbol in the PRB used for CSI-RS (l0) |  | 13 |
| NZP CSI-RS-timeConfigperiodicity and offset | slot | [10/1] |
| CSI-IM configuration | CSI-IM resource Type |  | Periodic |
| CSI-IM RE pattern |  | 0 |
| CSI-IM Resource Mapping(kCSI-IM,lCSI-IM) |  | (4, 9) |
| CSI-IM timeConfigperiodicity and offset | slot | [10/1] |
| ReportConfigType |  | Periodic |
| CQI-table |  | [Table 1] |
| reportQuantity |  | cri-RI-PMI-CQI |
| timeRestrictionForChannelMeasurements |  | Not configured |
| timeRestrictionForInterferenceMeasurements |  | Not configured |
| cqi-FormatIndicator |  | Wideband |
| pmi-FormatIndicator |  | Wideband |
| Sub-band Size | RB | 16 |
| Csi-ReportingBand |  | 1111111 |
| CSI-Report periodicity and offset | slot | [10/9] |
| aperiodicTriggeringOffset |  | Not configured |
| Codebook configuration | Codebook Type |  | typeI-SinglePanel |
| Codebook Mode |  | 1 |
| (CodebookConfig-N1,CodebookConfig-N2) |  | Not configured |
| CodebookSubsetRestriction |  | 010000 |
| RI Restriction |  | N/A |
| Physical channel for CSI report |  | PUCCH |
| CQI/RI/PMI delay  | ms | [10 or 14] |
| Maximum number of HARQ transmission |  | 1 |
| Measurement channel |  | As specified in [Table A.4-1, TBS.1-X4] |

**--- End of change 4 ---**

**--- Start of change 5 ---**

# A.4 CSI reference measurement channels

This clause defines the DL signal applicable to the reporting of channel state information (Clauses 6 and 8).

Tables in this clause specifies the mapping of CQI index to Information Bit payload, which complies with the CQI definition specified in clause 5.2.2.1 of TS 38.214 [12] and with MCS definition specified in clause 5.1.3 of TS 38.214 [12].

Table A.4-1: Mapping of CQI Index to Information Bit payload (CQI table 1)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| TBS Scheme | TBS.1-1 | TBS.1-2 | TBS.1-X1 | TBS.1-X2 | TBS.1-X3 | TBS.1-X4 |
| MCS table | 64QAM |
| Number of allocated PDSCH resource blocks | 66 | 66 | [52] | [52] | [51] | [51] |
| Number of consecutive PDSCH symbols | 12 | 12 | [12] | [12] | [12] | [12] |
| Number of PDSCH MIMO layers | 1 | 2 | [1] | [2] | [1] | [2] |
| Number of DMRS REs (Note 1) | 24 | 24 | [24] | [24] | [24] | [24] |
| Overhead for TBS determination | 6 | 6 | [0] | [0] | [0] | [0] |
| Available RE-s | 7590 | 7590 | [6240] | [6240] | [6120] | [6120] |
| CQI index | Spectral efficiency | MCS index | Modulation | Information Bit Payload per Slot |
| 0 | OOR | OOR | OOR | N/A | N/A | N/A | N/A | N/A | N/A |
| 1 | 0.2344 | 0 | QPSK | 1800 | 3624 | [1480] | [2976] | [1480] | [2856] |
| 2 | 0.2344 | 0 | 1800 | 3624 | [1480] | [2976] | [1480] | [2856] |
| 3 | 0.3770 | 2 | 2856 | 5640 | [2408] | [4744] | [2408] | [4616] |
| 4 | 0.6016 | 4 | 4480 | 8968 | [3752] | [7424] | [3752] | [7296] |
| 5 | 0.8770 | 6 | 6528 | 13064 | [5504] | [11016] | [5376] | [10760] |
| 6 | 1.1758 | 8 | 8712 | 17928 | [7296] | [14600] | [7168] | [14344] |
| 7 | 1.4766 | 11 | 16QAM | 11016 | 22032 | [9224] | [18432] | [8968] | [17928] |
| 8 | 1.9141 | 13 | 14344 | 28680 | [12040] | [24072] | [11784] | [23568] |
| 9 | 2.4063 | 15 | 17928 | 35856 | [15112] | [30216] | [14600] | [29192] |
| 10 | 2.7305 | 18 | 64QAM | 20496 | 40976 | [16896] | [33816] | [16896] | [33816] |
| 11 | 3.3223 | 20 | 25104 | 50184 | [20496] | [40976] | [20496] | [40976]  |
| 12 | 3.9023 | 22 | 29192 | 58384 | [24576] | [49176] | [24072] | [48168] |
| 13 | 4.5234 | 24 | 33816 | 67584 | [28168] | [56368] | [27656] | [55304] |
| 14 | 5.1152 | 26 | 38936 | 77896 | [31752] | [63528] | [31240] | [62504] |
| 15 | 5.5547 | 28 | 42016 | 83976 | [34816] | [69672] | [33816] | [67584] |
| Note 1: Number of DMRS REs includes the overhead of the DM-RS CDM groups without dataNote 2: PDSCH is not scheduled on slots containing CSI-RS for tracking, CSI-RS for CSI acquisition and CSI-RS for beam refinement or slots which are not full DLNote 3: PDSCH is not scheduled on slots containing PBCH, i.e. slot#0 per 20ms periodicityNote 4: Spectral efficiency is based on MCS Table defined in Table 5.1.3.1-1 of TS 38.214 [12] |

Table A.4-2: Mapping of CQI Index to Information Bit payload (CQI table 2, Rank 1 and Rank 2)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| TBS Scheme | TBS.2-1 | TBS.2-2 | TBS.2-3 | TBS.2-4 | TBS.2-5 | TBS.2-6 | TBS.2-7 | TBS.2-8 |
| MCS table | 256QAM |
| Number of allocated PDSCH resource blocks | 52 | 52 | 106 | 106 | 8 | 16 | 32 | 51 |
| Number of consecutive PDSCH symbols | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| Number of PDSCH MIMO layers | 1 | 2 | 1 | 2 | 1 | 1 | 1 | 2 |
| Number of DMRS REs (Note 1) | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| Overhead for TBS determination | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 0 |
| Available RE-s for PDSCH | 6240 | 6240 | 12720 | 12720 | 960 | 1920 | 3680 | 6120 |
| CQI index | Spectral efficiency | MCS index | Modulation | Information Bit Payload per Slot |
| 0 | OOR | OOR | OOR | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 1 | 0.2344 | 0 | QPSK | 1480 | 2976 | 2976 | 5896 | 224 | 456 | 848 | 1864 |
| 2 | 0.3770  | 1 | 2408 | 4744 | 4744 | 9480 | 368 | 736 | 1416 | 4616 |
| 3 | 0.8770  | 3 | 5504 | 11016 | 11016 | 22536 | 848 | 1736 | 3240 | 10760 |
| 4 | 1.4766  | 5 | 16QAM | 9224 | 18432 | 18960 | 37896 | 1416 | 2856 | 5376 | 17928 |
| 5 | 1.9141  | 7 | 12040 | 24072 | 24576 | 49176 | 1864 | 3752 | 6912 | 23568 |
| 6 | 2.4063  | 9 | 15112 | 30216 | 30728 | 61480 | 2408 | 4608 | 8712 | 29192 |
| 7 | 2.7305  | 11 | 64QAM | 16896 | 33816 | 34816 | 69672 | 2600 | 5248 | 9992 | 33816 |
| 8 | 3.3223  | 13 | 20496 | 40976 | 42016 | 83976 | 3240 | 6400 | 12040 | 40976  |
| 9 | 3.9023  | 15 | 24576 | 49176 | 49176 | 98376 | 3752 | 7424 | 14344 | 48168 |
| 10 | 4.5234  | 17 | 28168 | 56368 | 57376 | 114776 | 4352 | 8712 | 16392 | 55304 |
| 11 | 5.1152  | 19 | 31752 | 63528 | 65576 | 131176 | 4864 | 9736 | 18432 | 62504 |
| 12 | 5.5547  | 21 | 256QAM | 34816 | 69672 | 69672 | 139376 | 5248 | 10760 | 20496 | 67584 |
| 13 | 6.2266 | 23 | 38936 | 77896 | 79896 | 159880 | 6016 | 12040 | 22536 | 75792 |
| 14 | 6.9141 | 25 | 43032 | 86040 | 88064 | 176208 | 6656 | 13320 | 25104 | 83976 |
| 15 | 7.4063  | 27 | 46104 | 92200 | 94248 | 188576 | 7040 | 14088 | 27144 | 90176 |
| Note 1: Number of DMRS REs includes the overhead of the DM-RS CDM groups without dataNote 2: PDSCH is not scheduled on slots containing CSI-RS for tracking, CSI-RS for CSI acquisition and CSI-RS for beam refinement or slots which are not full DLNote 3: PDSCH is not scheduled on slots containing PBCH, i.e. slot#0 per 20ms periodicityNote 4: Spectral efficiency is based on MCS Table defined in Table 5.1.3.1-2 of TS 38.214 [12] |  |

**Table A.4-3: Mapping of CQI Index to Information Bit payload (CQI table 2, Rank 3 and Rank 4)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| TBS Scheme | TBS.3-1 | TBS.3-2 | TBS.3-3 | TBS.3-4 |  |  |
| MCS table | 256QAM |
| Number of allocated PDSCH resource blocks | 52 | 52 | 106 | 106 |  |  |
| Number of consecutive PDSCH symbols | 12 | 12 | 12 | 12 |  |  |
| Number of PDSCH MIMO layers | 3 | 4 | 3 | 4 |  |  |
| Number of DMRS REs (Note 1) | 24 | 24 | 24 | 24 |  |  |
| Overhead for TBS determination | 0 | 0 | 0 | 0 |  |  |
| Available RE-s for PDSCH | 6240 | 6240 | 12720 | 12720 |  |  |
| CQI index | Spectral efficiency | MCS index | Modulation | Information Bit Payload per Slot |
| 0 | OOR | OOR | OOR | N/A | N/A | N/A | N/A |  |  |
| 1 | 0.2344 | 0 | QPSK | 4360 | 5896 | 8976 | 11784 |  |  |
| 2 | 0.3770  | 1 | 7048 | 9480 | 14344 | 18976 |  |  |
| 3 | 0.8770  | 3 | 16392 | 22032 | 33816 | 45096 |  |  |
| 4 | 1.4766  | 5 | 16QAM | 27656 | 36896 | 56368 | 75792 |  |  |
| 5 | 1.9141  | 7 | 35856 | 48168 | 73776 | 98376 |  |  |
| 6 | 2.4063  | 9 | 45096 | 60456 | 92200 | 122976 |  |  |
| 7 | 2.7305  | 11 | 64QAM | 51216 | 67584 | 104496 | 139376 |  |  |
| 8 | 3.3223  | 13 | 62504 | 81976 | 127080 | 167976 |  |  |
| 9 | 3.9023  | 15 | 73776 | 98376 | 147576 | 196776 |  |  |
| 10 | 4.5234  | 17 | 83976 | 112648 | 172176 | 229576 |  |  |
| 11 | 5.1152  | 19 | 96264 | 127080 | 196776 | 262376 |  |  |
| 12 | 5.5547  | 21 | 256QAM | 104496 | 139376 | 213176 | 278776 |  |  |
| 13 | 6.2266 | 23 | 116792 | 155776 | 237776 | 319784 |  |  |
| 14 | 6.9141 | 25 | 129128 | 172176 | 262376 | 352440 |  |  |
| 15 | 7.4063  | 27 | 139376 | 184424 | 278776 | 376896 |  |  |
| Note 1: Number of DMRS REs includes the overhead of the DM-RS CDM groups without dataNote 2: PDSCH is not scheduled on slots containing CSI-RS for tracking, CSI-RS for CSI acquisition and CSI-RS for beam refinement or slots which are not full DLNote 3: PDSCH is not scheduled on slots containing PBCH, i.e. slot#0 per 20ms periodicityNote 4: Spectral efficiency is based on MCS Table defined in Table 5.1.3.1-2 of TS 38.214 [12] |

Table A.4-4: Mapping of CQI Index to Information Bit payload (CQI table 3)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| TBS Scheme | TBS.4-1 | TBS.4-2 |  |  |  |  |
| MCS table | 64QAMLowSE |
| Number of allocated PDSCH resource blocks | 52 | 106 |  |  |  |  |
| Number of consecutive PDSCH symbols | 12 | 12 |  |  |  |  |
| Number of PDSCH MIMO layers | 1 | 1 |  |  |  |  |
| Number of DMRS REs (Note 1) | 24 | 24 |  |  |  |  |
| Overhead for TBS determination | 0 | 0 |  |  |  |  |
| Available RE-s for PDSCH | 6240 | 12720 |  |  |  |  |
| CQI index | Spectral efficiency | MCS index | Modulation | Information Bit Payload per Slot |
| 0 | OOR | OOR | OOR | N/A | N/A |  |  |  |  |
| 1 | 0.0586 | 0 | QPSK | 368 | 768 |  |  |  |  |
| 2 | 0.0977 | 2 | 608 | 1256 |  |  |  |  |
| 3 | 0.1523 | 4 | 984 | 2024 |  |  |  |  |
| 4 | 0.2344 | 6 | 1480 | 2976 |  |  |  |  |
| 5 | 0.3770 | 8 | 2408 | 4744 |  |  |  |  |
| 6 | 0.6016 | 10 | 3752 | 7680 |  |  |  |  |
| 7 | 0.8770 | 12 | 5504 | 11016 |  |  |  |  |
| 8 | 1.1758 | 14 | 7296 | 14856 |  |  |  |  |
| 9 | 1.4766 | 16 | 16QAM | 9224 | 18960 |  |  |  |  |
| 10 | 1.9141 | 18 | 12040 | 24576 |  |  |  |  |
| 11 | 2.4063 | 20 | 15112 | 30728 |  |  |  |  |
| 12 | 2.7305 | 22 | 64QAM | 16896 | 34816 |  |  |  |  |
| 13 | 3.3223 | 24 | 20496 | 42016 |  |  |  |  |
| 14 | 3.9023 | 26 | 24576 | 49176 |  |  |  |  |
| 15 | 4.5234 | 28 | 28168 | 57376 |  |  |  |  |
| Note 1: Number of DMRS REs includes the overhead of the DM-RS CDM groups without dataNote 2: PDSCH is not scheduled on slots containing CSI-RS for tracking and CSI-RS for CSI acquisition or slots which are not full DLNote 3: PDSCH is not scheduled on slots containing PBCH, i.e. slot#0 per 20ms periodicity |

Table A.4-5: Mapping of CQI Index to Information Bit payload (CQI table 4)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| TBS Scheme | TBS.5-1 | TBS.5-2 |  |  |  |  |
| MCS table | 1024QAM |
| Number of allocated PDSCH resource blocks | 52 | 106 |  |  |  |  |
| Number of consecutive PDSCH symbols | 12 | 12 |  |  |  |  |
| Number of PDSCH MIMO layers | 1 | 1 |  |  |  |  |
| Number of DMRS REs (Note 1) | 24 | 24 |  |  |  |  |
| Overhead for TBS determination | 0 | 0 |  |  |  |  |
| Available RE-s | 6240 | 12720 |  |  |  |  |
| CQI index | Spectral efficiency | MCS index | Modulation | Information Bit Payload per Slot |
| 0 | OOR | OOR | OOR | N/A | N/A |  |  |  |  |
| 1 | 0.2344 | 0 | QPSK | 1480 | 2976 |  |  |  |  |
| 2 | 0.377 | 1 | 2408 | 4744 |  |  |  |  |
| 3 | 0.877 | 2 | 5504 | 11016 |  |  |  |  |
| 4 | 1.4766 | 3 | 16QAM | 9224 | 18960 |  |  |  |  |
| 5 | 2.4063 | 5 | 15112 | 30728 |  |  |  |  |
| 6 | 3.3223 | 8 | 64QAM | 20496 | 42016 |  |  |  |  |
| 7 | 3.9023 | 10 | 24576 | 49176 |  |  |  |  |
| 8 | 4.5234 | 12 | 28168 | 57376 |  |  |  |  |
| 9 | 5.1152 | 14 | 31752 | 65576 |  |  |  |  |
| 10 | 5.5547 | 16 | 256QAM | 34816 | 69672 |  |  |  |  |
| 11 | 6.2266 | 18 | 38936 | 79896 |  |  |  |  |
| 12 | 6.9141 | 20 | 43032 | 88064 |  |  |  |  |
| 13 | 7.4063 | 22 | 46104 | 94248 |  |  |  |  |
| 14 | 8.3301 | 24 | 1024QAM | 52224 | 106576 |  |  |  |  |
| 15 | 9.2578 | 26 | 57376 | 116792 |  |  |  |  |
| Note 1: Number of DMRS REs includes the overhead of the DM-RS CDM groups without dataNote 2: PDSCH is not scheduled on slots containing CSI-RS for tracking, CSI-RS for CSI acquisition and CSI-RS for beam refinement or slots which are not full DLNote 3: PDSCH is not scheduled on slots containing PBCH, i.e. slot#0 per 20ms periodicityNote 4: Spectral efficiency is based on MCS Table defined in Table 5.1.3.1-4 of TS 38.214 [12] |

**--- End of change 5 ---**