**3GPP TSG- Meeting # *R4-221xxxx***

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

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *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:*** | Rank Indicator reporting for RedCap | | | | | | | | | |
|  |  | | | | | | | | | |
| ***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 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:*** | | Rank Indicator reporting definition and test cases are missing for 2 Rx RedCap UEs. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Rank Indicator reporting definition and test cases are introduced for 2 Rx RedCap UEs. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | No performance requirements for RI reporting for 2 Rx RedCap UEs. Performance cannot be tested. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 6.4.2.1, 6.4.2.1.1 (new), 6.4.2.2, 6.4.2.2.1 (new) | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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 R4-2213074. | | | | | | | | |

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

### 6.4.2 2RX requirements

#### 6.4.2.1 FDD

The minimum performance requirement and related test parameters for RedCap are defined in clause 6.4.2.1.1.

Otherwise, the minimum performance requirement in Table 6.4.2.1-2 is defined as

a) The ratio of the throughput obtained when transmitting based on UE reported RI and that obtained when transmitting with fixed rank 1 shall be ≥ ;

b) The ratio of the throughput obtained when transmitting based on UE reported RI and that obtained when transmitting with fixed rank 2 shall be ≥ ;

For the parameters specified in Table 6.4.2.1-1, and using the downlink physical channels specified in Annex C.3.1, the minimum requirements are specified in Table 6.4.2.1-2.

Table 6.4.2.1-1: RI Test (FDD)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Test 1** | **Test 2** | **Test 3** |
| Bandwidth | | | MHz | 10 | 10 | 10 |
| Subcarrier spacing | | | kHz | 15 | 15 | 15 |
| Duplex Mode | | |  | FDD | FDD | FDD |
| SNR | | | dB | 0 | 20 | 20 |
| Propagation channel | | |  | TDLA30-5 | TDLA30-5 | TDLA30-5 |
| Antenna configuration | | |  | ULA Low 2x2 | ULA Low 2x2 | ULA High 2x2 |
| Beamforming Model | | |  | As defined in Annex B.4.1 | As defined in Annex B.4.1 | As defined in Annex B.4.1 |
| ZP CSI-RS configuration | CSI-RS resource Type | |  | Periodic | Periodic | Periodic |
| Number of CSI-RS ports (*X*) | |  | 4 | 4 | 4 |
| CDM Type | |  | FD-CDM2 | FD-CDM2 | FD-CDM2 |
| Density (ρ) | |  | 1 | 1 | 1 |
| First subcarrier index in the PRB used for CSI-RS (k0) | |  | Row 5,(4) | Row 5,(4) | Row 5,(4) |
| First OFDM symbol in the PRB used for CSI-RS (l0) | |  | (9) | (9) | (9) |
| CSI-RS  periodicity and offset | | slot | 5/1 | 5/1 | 5/1 |
| NZP CSI-RS for CSI acquisition | CSI-RS resource Type | |  | Periodic | Periodic | Periodic |
| Number of CSI-RS ports (*X*) | |  | 2 | 2 | 2 |
| CDM Type | |  | FD-CDM2 | FD-CDM2 | FD-CDM2 |
| Density (ρ) | |  | 1 | 1 | 1 |
| First subcarrier index in the PRB used for CSI-RS (k0) | |  | Row 3 (6) | Row 3 (6) | Row 3 (6) |
| First OFDM symbol in the PRB used for CSI-RS (l0) | |  | (13) | (13) | (13) |
| NZP CSI-RS-timeConfig  periodicity and offset | | slot | 5/1 | 5/1 | 5/1 |
| CSI-IM configuration | CSI-IM resource Type | |  | Periodic | Periodic | Periodic |
| CSI-IM RE pattern | |  | Pattern 0 | Pattern 0 | Pattern 0 |
| CSI-IM Resource Mapping  (kCSI-IM,lCSI-IM) | |  | (4,9) | (4,9) | (4,9) |
| CSI-IM timeConfig  periodicity and offset | | slot | 5/1 | 5/1 | 5/1 |
| ReportConfigType | | |  | Periodic | Periodic | Periodic |
| CQI-table | | |  | Table 2 | Table 2 | Table 2 |
| reportQuantity | | |  | cri-RI-PMI-CQI | cri-RI-PMI-CQI | cri-RI-PMI-CQI |
| timeRestrictionForChannelMeasurements | | |  | not configured | not configured | not configured |
| timeRestrictionForInterferenceMeasurements | | |  | not configured | not configured | not configured |
| cqi-FormatIndicator | | |  | Wideband | Wideband | Wideband |
| pmi-FormatIndicator | | |  | Wideband | Wideband | Wideband |
| Sub-band Size | | | RB | 8 | 8 | 8 |
| csi-ReportingBand | | |  | 1111111 | 1111111 | 1111111 |
| CSI-Report periodicity and offset | | | slot | 5/0 | 5/0 | 5/0 |
| Codebook configuration | | Codebook Type |  | typeI-SinglePanel | typeI-SinglePanel | typeI-SinglePanel |
| Codebook Mode |  | 1 | 1 | 1 |
| (CodebookConfig-N1,CodebookConfig-N2) |  | N/A | N/A | N/A |
| CodebookSubsetRestriction |  | 010000 for fixed rank 2,  010011 for following rank | 000011 for fixed rank 1,  010011 for following rank | 000011 for fixed rank 1,  010011 for following rank |
| RI Restriction |  | N/A | N/A | N/A |
| Physical channel for CSI report | | |  | PUCCH | PUCCH | PUCCH |
| CQI/RI/PMI delay | | | ms | 8 | 8 | 8 |
| Maximum number of HARQ transmission | | |  | 1 | 1 | 1 |
| RI Configuration | | |  | Fixed RI = 2 and follow RI | Fixed RI = 1 and follow RI | Fixed RI = 1 and follow RI |
| Note 1: Measurements channels are specified in Table A.4-2. TBS.2-1 is used for Rank 1 case. TBS.2-2 is used for Rank 2 case. | | | | | | |

Table 6.4.2.1-2: Minimum requirement (FDD)

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Test 1** | **Test 2** | **Test 3** |
| **1 | N/A | 1.05 | 0.9 |
| **2 | 1.0 | N/A | N/A |

##### 6.4.2.1.1 Minimum requirements for RedCap

The minimum performance requirement in Table 6.4.2.1.1-2 is defined as the ratio of the throughput obtained when transmitting based on UE reported RI and that obtained when transmitting with fixed rank 1 shall be ≥ .

For the parameters specified in Table 6.4.2.1.1-1, and using the downlink physical channels specified in Annex C.3.1, the minimum requirements are specified in Table 6.4.2.1.1-2.

Table 6.4.2.1.1-1: RI Test (FDD)

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Test 1** |
| Bandwidth | | MHz | 10 |
| Subcarrier spacing | | kHz | 15 |
| Duplex Mode | |  | FDD |
| SNR | | dB | [20] |
| Propagation channel | |  | TDLA30-5 |
| Antenna configuration | |  | ULA Low 2x2 |
| Beamforming Model | |  | As defined 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-RS  periodicity 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-timeConfig  periodicity 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 timeConfig  periodicity 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] |
| Codebook configuration | Codebook Type |  | typeI-SinglePanel |
| Codebook Mode |  | 1 |
| (CodebookConfig-N1,CodebookConfig-N2) |  | N/A |
| CodebookSubsetRestriction |  | 000011 for fixed rank 1, 010011 for following rank |
| RI Restriction |  | N/A |
| Physical channel for CSI report | |  | PUCCH |
| CQI/RI/PMI delay | | ms | [10 or 14] |
| Maximum number of HARQ transmission | |  | 1 |
| RI Configuration | |  | Fixed RI = 1 and follow RI |
| Note 1: Measurement channels are specified in Table A.4-1.  [TBS.1-X1] is used for Rank 1 case. [TBS.1-X2] is used for Rank 2 case. | | | |

Table 6.4.2.1.1-2: Minimum requirement (FDD)

|  |  |
| --- | --- |
|  | **Test 1** |
| **1 | 1.05 |

#### 6.4.2.2 TDD

The minimum performance requirement and related test parameters for RedCap are defined in clause 6.4.2.2.1.

Otherwise, the minimum performance requirement in Table 6.4.2.2-2 is defined as

a) The ratio of the throughput obtained when transmitting based on UE reported RI and that obtained when transmitting with fixed rank 1 shall be ≥ ;

b) The ratio of the throughput obtained when transmitting based on UE reported RI and that obtained when transmitting with fixed rank 2 shall be ≥ ;

For the parameters specified in Table 6.4.2.2-1, and using the downlink physical channels specified in Annex C.3.1, the minimum requirements are specified in Table 6.4.2.2-2.

Table 6.4.2.2-1: RI Test (TDD)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Test 1** | **Test 2** | **Test 3** |
| Bandwidth | | | MHz | 40 | 40 | 40 |
| Subcarrier spacing | | | kHz | 30 | 30 | 30 |
| Duplex Mode | | |  | TDD | TDD | TDD |
| TDD Slot Configuration | | |  | FR1.30-1 | FR1.30-1 | FR1.30-1 |
| SNR | | | dB | 0 | 20 | 20 |
| Propagation channel | | |  | TDLA30-5 | TDLA30-5 | TDLA30-5 |
| Antenna configuration | | |  | ULA Low 2x2 | ULA Low 2x2 | ULA High 2x2 |
| Beamforming Model | | |  | As defined in Annex B.4.1 | As defined in Annex B.4.1 | As defined in Annex B.4.1 |
| ZP CSI-RS configuration | CSI-RS resource Type | |  | Periodic | Periodic | Periodic |
| Number of CSI-RS ports (*X*) | |  | 4 | 4 | 4 |
| CDM Type | |  | FD-CDM2 | FD-CDM2 | FD-CDM2 |
| Density (ρ) | |  | 1 | 1 | 1 |
| First subcarrier index in the PRB used for CSI-RS (k0) | |  | Row 5,(4) | Row 5,(4) | Row 5,(4) |
| First OFDM symbol in the PRB used for CSI-RS (l0) | |  | (9) | (9) | (9) |
| CSI-RS  periodicity and offset | | slot | 10/1 | 10/1 | 10/1 |
| NZP CSI-RS for CSI acquisition | CSI-RS resource Type | |  | Periodic | Periodic | Periodic |
| Number of CSI-RS ports (*X*) | |  | 2 | 2 | 2 |
| CDM Type | |  | FD-CDM2 | FD-CDM2 | FD-CDM2 |
| Density (ρ) | |  | 1 | 1 | 1 |
| First subcarrier index in the PRB used for CSI-RS (k0) | |  | Row 3 (6) | Row 3 (6) | Row 3 (6) |
| First OFDM symbol in the PRB used for CSI-RS (l0) | |  | (13) | (13) | (13) |
| NZP CSI-RS-timeConfig  periodicity and offset | | slot | 10/1 | 10/1 | 10/1 |
| CSI-IM configuration | CSI-IM resource Type | |  | Periodic | Periodic | Periodic |
| CSI-IM RE pattern | |  | Pattern 0 | Pattern 0 | Pattern 0 |
| CSI-IM Resource Mapping  (kCSI-IM,lCSI-IM) | |  | (4,9) | (4,9) | (4,9) |
| CSI-IM timeConfig  periodicity and offset | | slot | 10/1 | 10/1 | 10/1 |
| ReportConfigType | | |  | Periodic | Periodic | Periodic |
| CQI-table | | |  | Table 2 | Table 2 | Table 2 |
| reportQuantity | | |  | cri-RI-PMI-CQI | cri-RI-PMI-CQI | cri-RI-PMI-CQI |
| timeRestrictionForChannelMeasurements | | |  | not configured | not configured | not configured |
| timeRestrictionForInterferenceMeasurements | | |  | not configured | not configured | not configured |
| cqi-FormatIndicator | | |  | Wideband | Wideband | Wideband |
| pmi-FormatIndicator | | |  | Wideband | Wideband | Wideband |
| Sub-band Size | | | RB | 16 | 16 | 16 |
| csi-ReportingBand | | |  | 1111111 | 1111111 | 1111111 |
| CSI-Report periodicity and offset | | | slot | 10/9 | 10/9 | 10/9 |
| Codebook configuration | | Codebook Type |  | typeI-SinglePanel | typeI-SinglePanel | typeI-SinglePanel |
| Codebook Mode |  | 1 | 1 | 1 |
| (CodebookConfig-N1,CodebookConfig-N2) |  | N/A | N/A | N/A |
| CodebookSubsetRestriction |  | 010000 for fixed rank 2,  010011 for following rank | 000011 for fixed rank 1,  010011 for following rank | 000011 for fixed rank 1,  010011 for following rank |
| RI Restriction |  | N/A | N/A | N/A |
| Physical channel for CSI report | | |  | PUCCH | PUCCH | PUCCH |
| CQI/RI/PMI delay | | | ms | 9.5 | 9.5 | 9.5 |
| Maximum number of HARQ transmission | | |  | 1 | 1 | 1 |
| RI Configuration | | |  | Fixed RI = 2 and follow RI | Fixed RI = 1 and follow RI | Fixed RI = 1 and follow RI |
| Note 1: Measurements channels are specified in Table A.4-2. TBS.2-3 is used for Rank 1 case. TBS.2-4 is used for Rank 2 case. | | | | | | |

Table 6.4.2.2-2: Minimum requirement (TDD)

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Test 1** | **Test 2** | **Test 3** |
| **1 | N/A | 1.05 | 0.9 |
| **2 | 1.0 | N/A | N/A |

##### 6.4.2.2.1 Minimum requirements for RedCap

The minimum performance requirement in Table 6.4.2.2.1-2 is defined as the ratio of the throughput obtained when transmitting based on UE reported RI and that obtained when transmitting with fixed rank 1 shall be ≥ .

For the parameters specified in Table 6.4.2.2.1-1, and using the downlink physical channels specified in Annex C.3.1, the minimum requirements are specified in Table 6.4.2.2.1-2.

Table 6.4.2.2.1-1: RI Test (TDD)

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Test 1** |
| Bandwidth | | MHz | [20] |
| Subcarrier spacing | | kHz | 30 |
| Duplex Mode | |  | TDD |
| TDD Slot Configuration | |  | FR1.30-1 |
| SNR | | dB | [20] |
| Propagation channel | |  | TDLA30-5 |
| Antenna configuration | |  | ULA Low 2x2 |
| Beamforming Model | |  | As defined 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-RS  periodicity 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-timeConfig  periodicity 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 timeConfig  periodicity 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] |
| Codebook configuration | Codebook Type |  | typeI-SinglePanel |
| Codebook Mode |  | 1 |
| (CodebookConfig-N1,CodebookConfig-N2) |  | N/A |
| CodebookSubsetRestriction |  | 000011 for fixed rank 1, 010011 for following rank |
| RI Restriction |  | N/A |
| Physical channel for CSI report | |  | PUCCH |
| CQI/RI/PMI delay | | ms | [10 or 14] |
| Maximum number of HARQ transmission | |  | 1 |
| RI Configuration | |  | Fixed RI = 1 and follow RI |
| Note 1: Measurement channels are specified in Table A.4-1.  [TBS.1-X3] is used for Rank 1 case. [TBS.1-X4] is used for Rank 2 case. | | | |

Table 6.4.2.2.1-2: Minimum requirement (TDD)

|  |  |
| --- | --- |
|  | **Test 1** |
| **1 | 1.05 |

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

**--- For information only ---**

**(Change is included in R4-2213072)**

# 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 data  Note 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 DL  Note 3: PDSCH is not scheduled on slots containing PBCH, i.e. slot#0 per 20ms periodicity  Note 4: Spectral efficiency is based on MCS Table defined in Table 5.1.3.1-1 of TS 38.214 [12] | | | | | | | | | |