**3GPP TSG-RAN WG4 Meeting #99-e *R4-200xxxx***

**Electronic Meeting, May. 19th – 27th, 2021**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **36.101** | **CR** | **5779** | **rev** | **-** | **Current version:** | **13.20.0** |  |
|  | | | | | | | | |
| *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: cleanup of the square brackets in the specificaiton | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Huawei, HiSilicon | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | TEI13 | | | | |  | ***Date:*** | | | 2021-5-11 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **F** |  | | | | | ***Release:*** | | | Rel-13 |
|  | *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-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | Still some square brackets exist in the specificaiton. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Removed the remaining square brackets in the specifications | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Square brackets will still exist and bring some confusions. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | Table 8.3.1.1-2, Table 8.3.2.1A-2, Table 8.11.2.2-2, Table 8.11.2.2.1-1, Table 8.11.2.2.2-1, Table 9.2.1.1-2, Table 9.2.3.1A-1, Table 9.2.3.2A-1, Table 9.2.4.1A-1, Table 9.2.4.2A-1, Table 9.9.1.4.1-1 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **x** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | | **x** |  | Test specifications | | | | TS 36.521-1 | | |
| ***(show related CRs)*** | |  | **x** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

<Start of the Change>

Table 8.3.1.1-2: Minimum performance for CDM-multiplexed DM RS without simultaneous transmission (FRC) with multiple CSI-RS configurations

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Test number | Bandwidth and MCS | Reference Channel | OCNG Pattern | Propagation Condition | Correlation Matrix and Antenna Configuration | Reference value | | UE Category | UE DL Cat-egory |
| Fraction of Maximum  Throughput (%) | SNR (dB) |
| 1 | 10 MHz  QPSK 1/3 | R.43-1 FDD | OP.1 FDD | EVA5 | 2x2 Low | 70 | -1.2 | ≥1 | ≥6 |
| 1a | 10 MHz  QPSK 1/3 | R.43-2 FDD | OP.1 FDD | EVA5 | 2x2 Low | 70 | -1.3 | ≥1 | ≥6 |
| 3 | 10MHz  256QAM | R. 66 FDD | OP.1 FDD | EPA5 | 2x2 Low | 70 | 24.3 | 11-12 | ≥11 |
| Note 1: For UE that indicates support of *pdsch-CollisionHandling-r13*, test 1a will be run and test 1 will be skipped. Otherwise, test 1 will be run and test 1a will be skipped. | | | | | | | | | |

<End of the Change>

<Start of the Next Change>

Table 8.3.2.1A-2: Minimum performance for CDM-multiplexed DM RS without simultaneous transmission (FRC) with multiple CSI-RS configurations

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Test number | Bandwidth and MCS | Reference Channel | OCNG Pattern | Propagation Condition | Correlation Matrix and Antenna Configuration | Reference value | | UE Category | UE DL Cat-egory |
| Fraction of Maximum  Throughput (%) | SNR (dB) |
| 1 | 10 MHz  QPSK 1/3 | R.50-1 TDD | OP.1 TDD | EVA5 | 2x2 Low | 70 | -0.73 | ≥1 | ≥6 |
| 1a | 10 MHz  QPSK 1/3 | R.50-2 TDD | OP.1 TDD | EVA5 | 2x2 Low | 70 | -0.6 | ≥1 | ≥6 |
| 3 | 20MHz  256QAM | R. 66 TDD | OP.1 TDD | EPA5 | 2x2 Low | 70 | 24.3 | 11-12 | ≥11 |
| Note 1: For UE that indicates support of *pdsch-CollisionHandling-r13*, test 1a will be run and test 1 will be skipped. Otherwise, test 1 will be run and test 1a will be skipped. | | | | | | | | | |

<End of the Change>

<Start of the Next Change>

Table 8.11.2.2-2: Test Parameters for MPDCCH (Category ≥1)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | CE Mode A (Test 2) | CE Mode A  (Test 3) | CE Mode B  (Test 2) | CE Mode B  (Test 3) |
| OFDM starting symbol (startSymbolLC) | | symbols | 2 | 2 | 2 | 2 |
| Unused RE-s and PRB-s | |  | OCNG | OCNG | OCNG | OCNG |
| Cell ID | |  | 0 | 0 | 0 | 0 |
| Downlink power allocation |  | -3 | -3 | -3 | 0 | 0 |
|  | -3 | -3 | -3 | 0 | 0 |
| σ | 0 | 0 | 0 | -3 | -3 |
| δ | 3 | 3 | 3 | 0 | 0 |
| at antenna port | | dBm/15kHz | -98 | -98 | -98 | -98 |
| Cyclic prefix | |  | Normal | Normal | Normal | Normal |
| Subframe Configuration | |  | Non-MBSFN | Non-MBSFN | Non-MBSFN | Non-MBSFN |
| Precoder Update Granularity | | PRB | 1 | 1 | 1 | 1 |
| ms | 5 (Note 2) | 5 (Note 2) | 20 (Note 2) | 20 (Note 2) |
| Beamforming Pre-Coder | |  | Annex B.4.4 | Annex B.4.4 | Annex B.4.4 | Annex B.4.4 |
| Cell Specific Reference Signal | |  | Port 0 and 1 | Port 0 and 1 | Port 0 and 1 | Port 0 and 1 |
| Number of PRB per MPDCCH Set | |  | 4 | 4 | 2+4 | 2+4 |
| Transmission type | |  | Distributed | Distributed | Localized | Localized |
| Frequency hopping | |  | Disabled | Disabled | Enabled | Enabled |
| Number of frequency hopping narrowbands | |  | N/A | N/A | 4 | 4 |
| Frequency hopping offset | |  | N/A | N/A | 1 | 1 |
| Frequency hopping interval | | ms | N/A | N/A | 5 | 5 |
| Value of G in MPDCCH start subframe (*mpdcch-startSF-UESS*) Note 3 | |  | 5 | 5 | 5 | 5 |
| Maximum number of repetitions(*mPDCCH-NumRepetition*) | |  | 4 | 2 | 16 | 8 |
| MPDCCH repetition number | |  | 4 | 2 | 16 | 8 |
| MPDCCH narrowband (*mpdcch-Narrowband*) | |  | 1 | 1 | 7 | 7 |
| PDSCH TM | |  | TM2 | TM2 | TM2 | TM2 |
| DCI Format | |  | 6-1A | 6-1A | 6-1B | 6-1B |
| fdd-DownlinkOrTddSubframeBitmapBR | |  | 1000010000 | 1000010000 | 1000010000 | 1000010000 |
| Note 1: For each test, DC subcarrier puncturing shall be considered.  Note 2: Same precoding matrix is used for a PRB across subframes during the frequency hopping interval.  Note 3: For MPDCCH UE-specific search space the formula for the start subframe k0 is given in TS 36.213 [6] clause 9.1.5.  Note 4: If not otherwise stated, the values in this table refer to parameters in TS 36.211 [4] or/and TS 36.213 [6] as appropriate. | | | | | | |

##### 8.11.2.2.1 CE Mode A

For the parameters specified in Table 8.11.2.2-1 and 8.11.2.2-2 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.11.2.2.1-1. The downlink physical setup is in accordance with Annex C.3.2.

Table 8.11.2.2.1-1: Minimum performance CE Mode A MPDCCH

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Test number | Bandwidth | Aggregation level | Reference Channel | OCNG Pattern | Propagation Condition | Antenna configuration and correlation Matrix | Reference value | | UE  Category |
| Pm-dsg (%) | SNR (dB) |
| 1 | 10 MHz | 16 ECCE | R.82 TDD | OP.2 TDD | EPA5 | 2 x 1 Low | 1 | -5.3 | M1 |
| 2 | 10 MHz | 16 ECCE | R.82 TDD | OP.2 TDD | EPA5 | 2 x 2 Low | 1 | -5.3 | ≥1 |
| 3 | 10 MHz | 16 ECCE | R.82 TDD | OP.2 TDD | EPA5 | 2 x 4 Low | 1 | -6.8 | ≥1 |

##### 8.11.2.2.2 CE Mode B

For the parameters specified in Table 8.11.2.2-1 and 8.11.2.2-2 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.11.2.2.2-1. The downlink physical setup is in accordance with Annex C.3.2.

Table 8.11.2.2.2-1: Minimum performance CE Mode B MPDCCH

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Test number | Bandwidth | Aggregation level | Reference Channel | OCNG Pattern | Propagation Condition | Antenna configuration and correlation Matrix | Reference value | | UE  Category |
| Pm-dsg (%) | SNR (dB) |
| 1 | 10 MHz | 24 ECCE | R.83 TDD | OP.2 TDD | ETU1 | 2 x 1 Low | 1 | -10.1 | M1 |
| 2 | 10 MHz | 24 ECCE | R.83 TDD | OP.2 TDD | ETU1 | 2 x 2 Low | 1 | -12.3 | ≥1 |
| 3 | 10 MHz | 24 ECCE | R.83 TDD | OP.2 TDD | ETU1 | 2 x 4 Low | 1 | -12.8 | ≥1 |

<End of the Change>

<Start of the Next Change>

### 9.2.1 Minimum requirement PUCCH 1-0 (Cell-Specific Reference Symbols)

#### 9.2.1.1 FDD

The following requirements apply to UE Category ≥1. For the parameters specified in Table 9.2.1.1-1 and Table 9.2.1.1-2, and using the downlink physical channels specified in tables C.3.2-1 and C.3.2-2, the reported CQI value according to RC.1 FDD / RC.14 FDD in Table A.4-1 shall be in the range of ±1 of the reported median more than 90% of the time. If the PDSCH BLER using the transport format indicated by median CQI is less than or equal to 0.1, 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, the BLER using transport format indicated by (median CQI – 1) shall be less than or equal to 0.1.

The applicability of the requirement with 5MHz bandwidth as specificed in Table 9.2.1.1-2 is defined in 9.1.1.1.

Table 9.2.1.1-1: PUCCH 1-0 static test (FDD)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | Test 2 | |
| Bandwidth | | MHz | 10 | | | |
| PDSCH transmission mode | |  | 1 | | | |
| Downlink power allocation |  | dB | 0 | | | |
|  | dB | 0 | | | |
| σ | dB | 0 | | | |
| Propagation condition and antenna configuration | |  | AWGN (1 x 2) | | | |
| SNR (Note 2) | | dB | 0 | 1 | 6 | 7 |
|  | | dB[mW/15kHz] | -98 | -97 | -92 | -91 |
|  | | dB[mW/15kHz] | -98 | | -98 | |
| Max number of HARQ transmissions | |  | 1 | | | |
| Physical channel for CQI reporting | |  | PUCCH Format 2 | | | |
| PUCCH Report Type | |  | 4 | | | |
| Reporting periodicity | | ms | *N*pd = 5 | | | |
| *cqi-pmi-ConfigurationIndex* | |  | 6 | | | |
| Note 1: Reference measurement channel RC.1 FDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1, except for category 1 UE use RC.4 FDD with two sided dynamic OCNG Pattern OP.2 FDD as described in Annex A.5.1.2.  Note 2: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level. | | | | | | |

Table 9.2.1.1-2: PUCCH 1-0 static test (FDD 5MHz)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | Test 2 | |
| Bandwidth | | MHz | 5 | | | |
| PDSCH transmission mode | |  | 1 | | | |
| Downlink power allocation |  | dB | 0 | | | |
|  | dB | 0 | | | |
| σ | dB | 0 | | | |
| Propagation condition and antenna configuration | |  | AWGN (1 x 2) | | | |
| SNR (Note 2) | | dB | 0 | 1 | 6 | 7 |
|  | | dB[mW/15kHz] | -98 | -97 | -92 | -91 |
|  | | dB[mW/15kHz] | -98 | | -98 | |
| Max number of HARQ transmissions | |  | 1 | | | |
| Physical channel for CQI reporting | |  | PUCCH Format 2 | | | |
| PUCCH Report Type | |  | 4 | | | |
| Reporting periodicity | | ms | *N*pd = 5 | | | |
| *cqi-pmi-ConfigurationIndex* | |  | 6 | | | |
| Note 1: Reference measurement channel RC.14 FDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1, except for category 1 UE use RC.15 FDD with two sided dynamic OCNG Pattern OP.2 FDD as described in Annex A.5.1.2.  Note 2: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level. | | | | | | |

<End of the Change>

<Start of the Next Change>

#### 9.2.3.1A FDD (With *channelMeasRestriction* configured)

The following requirements apply to UE Category ≥2. For the parameters specified in table 9.2.3.1A-1, and using the downlink physical channels specified in tables C.3.2-1 and C.3.2-2, the reported offset level of the wideband spatial differential CQI for codeword #1 (Table 7.2-2 in TS 36.213 [6]) shall be used to determine the wideband CQI index for codeword #1 as

wideband CQI1 = wideband CQI0 – Codeword 1 offset level

The wideband CQI1 shall be within the set {median CQI1 -1, median CQI1, median CQI1 +1} for more than 90% of the time, where the resulting wideband values CQI1 shall be used to determine the median CQI values for codeword #1. For both codewords #0 and #1, the PDSCH BLER using the transport format indicated by the respective median CQI0 – 1 and median CQI1 – 1 shall be less than or equal to 0.1. Furthermore, for both codewords #0 and #1, the PDSCH BLER using the transport format indicated by the respective median CQI0 + 1 and median CQI1 + 1 shall be greater than or equal to 0.1.

Table 9.2.3.1A-1: PUCCH 1-1 static test (FDD)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | Test 2 | |
| Bandwidth | | MHz | 10 | | | |
| PDSCH transmission mode | |  | 9 | | | |
| Downlink power allocation |  | dB | 0 | | | |
|  | dB | 0 | | | |
|  | dB | -3 | | | |
| σ | dB | -3 | | | |
| Cell-specific reference signals | |  | Antenna ports 0, 1 | | | |
| e-MIMO Type | |  | Class B | | | |
| Number of CSI-RS resource (K) | |  | 1 | | | |
| *channelMeasRestriction* | |  | Enable | | | |
| CSI reference signals | |  | Antenna ports 15,…,18 | | | |
| CSI-RS periodicity and subframe offset  *T*CSI-RS / *∆*CSI-RS | |  | 5/1 | | | |
| CSI reference signal configuration | |  | 0 | | | |
| Propagation condition and antenna configuration | |  | Clause B.1 (4 x 2) | | | |
| Beamforming Model | |  | As specified in Section B.4.3 | | | |
| CodeBookSubsetRestriction bitmap | |  | 0x0000 0000 0100 0000 | | | |
| SNR (Note 2) | | dB | 7 | 8 | 13 | 14 |
|  | | dB[mW/15kHz] | -91 | -90 | -85 | -84 |
|  | | dB[mW/15kHz] | -98 | | -98 | |
| Max number of HARQ transmissions | |  | 1 | | | |
| Physical channel for CQI/PMI reporting | |  | PUSCH (Note3) | | | |
| PUCCH Report Type for CQI/PMI | |  | 2 | | | |
| Physical channel for RI reporting | |  | PUCCH Format 2 | | | |
| PUCCH Report Type for RI | |  | 3 | | | |
| Reporting periodicity | | ms | *N*pd = 10 | | | |
| CQI delay | | ms | 8 | | | |
| *cqi-pmi-ConfigurationIndex* | |  | 12 | | | |
| *ri-ConfigIndex* | |  | 1 | | | |
| PDSCH scheduled sub-frames | |  | 1,2,3,4,7,8,9 | | | |
| Note 1: Reference measurement channel RC.7 FDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1.  Note 2: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.  Note 3: To avoid collisions between CQI/PMI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#1 to allow periodic CQI/PMI to multiplex with the HARQ-ACK on PUSCH in uplink #5.  Note 4: In sub-frame 6, transmission power of CSI-RS REs is 9dB lower than CRS REs, in sub-frame 1, there is no power offset between CSI-RS REs and CRS REs. | | | | | | |

<End of the Change>

<Start of the Next Change>

#### 9.2.3.2A TDD (With *channelMeasRestriction* configured)

The following requirements apply to UE Category ≥2. For the parameters specified in table 9.2.3.2A-1, and using the downlink physical channels specified in tables C.3.2-1 and C.3.2-2, the reported offset level of the wideband spatial differential CQI for codeword #1 (Table 7.2-2 in TS 36.213 [6]) shall be used to determine the wideband CQI index for codeword #1 as

wideband CQI1 = wideband CQI0 – Codeword 1 offset level

The wideband CQI1 shall be within the set {median CQI1 -1, median CQI1, median CQI1 +1} for more than 90% of the time, where the resulting wideband values CQI1 shall be used to determine the median CQI values for codeword #1. For both codewords #0 and #1, the PDSCH BLER using the transport format indicated by the respective median CQI0 – 1 and median CQI1 – 1 shall be less than or equal to 0.1. Furthermore, for both codewords #0 and #1, the PDSCH BLER using the transport format indicated by the respective median CQI0 + 1 and median CQI1 + 1 shall be greater than or equal to 0.1.

Table 9.2.3.2A-1: PUCCH 1-1 submode 1 static test (TDD)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | Test 2 | |
| Bandwidth | | MHz | 10 | | | |
| PDSCH transmission mode | |  | 9 | | | |
| Uplink downlink configuration | |  | 2 | | | |
| Special subframe configuration | |  | 4 | | | |
| Downlink power allocation |  | dB | 0 | | | |
|  | dB | 0 | | | |
|  | dB | -6 | | | |
| σ | dB | -3 | | | |
| CRS reference signals | |  | Antenna ports 0, 1 | | | |
| e-MIMO Type | |  | Class B | | | |
| Number of CSI-RS resource (K) | |  | 1 | | | |
| *channelMeasRestriction* | |  | Enable | | | |
| CSI reference signals | |  | Antenna ports 15,…,22 | | | |
| CSI-RS periodicity and subframe offset  *T*CSI-RS / *∆*CSI-RS | |  | 5/ 3 | | | |
| CSI reference signal configuration | |  | 0 | | | |
| Propagation condition and antenna configuration | |  | Clause B.1 (8 x 2) | | | |
| Beamforming Model | |  | As specified in Section B.4.3 | | | |
| CodeBookSubsetRestriction bitmap | |  | 0x0000 0000 0020 0000 0000 0001 0000 | | | |
| SNR (Note 2) | | dB | 4 | 5 | 10 | 11 |
|  | | dB[mW/15kHz] | -94 | -93 | -88 | -87 |
|  | | dB[mW/15kHz] | -98 | | -98 | |
| Max number of HARQ transmissions | |  | 1 | | | |
| Physical channel for CQI/PMI reporting | |  | PUSCH (Note 3) | | | |
| PUCCH Report Type for CQI/second PMI | |  | 2b | | | |
| Physical channel for RI reporting | |  | PUSCH | | | |
| PUCCH Report Type for RI/ first PMI | |  | 5 | | | |
| Reporting periodicity | | ms | *N*pd = 10 | | | |
| CQI delay | | ms | 10 or 11 | | | |
| *cqi-pmi-ConfigurationIndex* | |  | 13 | | | |
| *ri-ConfigIndex* | |  | 805 (Note 4) | | | |
| ACK/NACK feedback mode | |  | Multiplexing | | | |
| PDSCH scheduled sub-frames | |  | 3,4,9 | | | |
| Note 1: Reference measurement channel RC.7 TDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 TDD as described in Annex A.5.2.1.  Note 2: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.  Note 3: To avoid collisions between CQI/PMI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#3 to allow periodic CQI/PMI to multiplex with the HARQ-ACK on PUSCH in uplink SF#7.  Note 4: RI reporting interval is set to the maximum allowable length of 160ms to minimise collisions between RI, CQI/PMI and HARQ-ACK reports. In the case when all three reports collide, it is expected that CQI/PMI reports will be dropped, while RI and HARQ-ACK will be multiplexed. At eNB, CQI report collection shall be skipped every 160ms during performance verification.  Note 5: In sub-frame 8, transmission power of CSI-RS REs is 9dB lower than CRS REs, in sub-frame 3, there is no power offset between CSI-RS REs and CRS REs. | | | | | | |

<End of the Change>

<Start of the Next Change>

#### 9.2.4.1A FDD (With *interferenceMeasRestriction* configured)

The following requirements apply to UE Category ≥2. For the parameters specified in table 9.2.4.1A-1, and using the downlink physical channels specified in Tables C.3.4-1 and C.3.4-2, the reported offset level of the wideband spatial differential CQI for codeword #1 (Table 7.2-2 in TS 36.213 [6]) shall be used to determine the wideband CQI index for codeword #1 as

wideband CQI1 = wideband CQI0 – Codeword 1 offset level

The wideband CQI1 shall be within the set {median CQI1 -1, median CQI1, median CQI1 +1} for more than 90% of the time, where the resulting wideband values CQI1 shall be used to determine the median CQI values for codeword #1. For both codewords #0 and #1, the PDSCH BLER using the transport format indicated by the respective median CQI0 – 1 and median CQI1 – 1 shall be less than or equal to 0.1. Furthermore, for both codewords #0 and #1, the PDSCH BLER using the transport format indicated by the respective median CQI0 + 1 and median CQI1 + 1 shall be greater than or equal to 0.1.

Table 9.2.4.1A-1: PUCCH 1-1 static test (FDD)

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Test 1 | | | Test 2 | | |
| TP1 | TP2 | | TP1 | TP2 | |
| Bandwidth | | | MHz | 10 | | | | | |
| PDSCH transmission mode | | |  | 10 | | | | | |
| Downlink power allocation (Note 1) | |  | dB | 0 | 0 | | 0 | 0 | |
|  | dB | 0 | 0 | | 0 | 0 | |
| Pc | dB | -3 | -3 | | -3 | -3 | |
| σ | dB | -3 | N/A | | -3 | N/A | |
| Cell ID | | |  | 0 | | | 0 | | |
| Cell-specific reference signals | | |  | Antenna ports 0, 1 | (Note 2) | | Antenna ports 0, 1 | (Note 2) | |
| e-MIMO Type | | |  | Class B | | | | | |
| Number of CSI-RS resource (K) | | |  | 1 | | | | | |
| *interferenceMeasRestriction* | | |  | Enable | | | | | |
| CSI reference signals | | |  | Antenna ports 15,…,18 | N/A | | Antenna ports 15,…,18 | N/A | |
| CSI-RS periodicity and subframe offset *T*CSI-RS / *∆*CSI-RS | | |  | 5/1 | N/A | | 5/1 | N/A | |
| CSI-RS configuration | | |  | 0 | N/A | | 0 | N/A | |
| Zero-Power CSI-RS configuration  *I*CSI-RS / *ZeroPowerCSI-RS* bitmap | | |  | 1 /  0010000000000000 | 1 / 1000000000000000 | | 1 /  0010000000000000 | 1 / 1000000000000000 | |
| CSI-IM configuration  *I*CSI-RS / *ZeroPowerCSI-RS* bitmap | | |  | 1 /  0010000000000000 | N/A | | 1 /  0010000000000000 | N/A | |
| CSI process configuration  Signal/Interference/Reporting mode | | |  | CSI-RS/CSI-IM/PUCCH 1-1 | | | CSI-RS/CSI-IM/PUCCH 1-1 | | |
| Propagation condition and antenna configuration | | |  | Clause B.1  (4 x 2) | Clause B.1  (2 x 2) | | Clause B.1  (4 x 2) | Clause B.1  (2 x 2) | |
| CodeBookSubsetRestriction bitmap | | |  | 0x0000 0000 0100 0000 | 100000 | | 0x0000 0000 0100 0000 | 100000 | |
| SNR (Note 3) | Sub-frame 6 | | dB | 20 | 15 | 16 | 20 | 23 | 24 |
| Other sub-frames | | 20 | 6 | 7 | 20 | 14 | 15 |
|  | Sub-frame 6 | | dB[mW/15kHz] | -78 | -83 | -82 | -78 | -75 | -74 |
| Other sub-frames | | -78 | -92 | -91 | -78 | -84 | -83 |
|  | | | dB[mW/15kHz] | -98 | | | -98 | | |
| Modulation / Information bit payload | | |  | (Note4) | QPSK / 4392 | | (Note4) | QPSK / 4392 | |
| Max number of HARQ transmissions | | |  | 1 | N/A | | 1 | N/A | |
| Physical channel for CQI/PMI reporting | | |  | PUSCH (Note5) | N/A | | PUSCH (Note5) | N/A | |
| PUCCH Report Type for CQI/PMI | | |  | 2 | N/A | | 2 | N/A | |
| PUCCH Report Type for RI | | |  | 3 | N/A | | 3 | N/A | |
| Reporting periodicity | | | ms | *N*pd = 10 | N/A | | *N*pd = 10 | N/A | |
| CQI Delay | | | ms | 8 | N/A | | 8 | N/A | |
| *cqi-pmi-ConfigurationIndex* | | |  | 12 | N/A | | 12 | N/A | |
| *ri-ConfigIndex* | | |  | 1 | N/A | | 1 | N/A | |
| PDSCH scheduled sub-frames | | |  | 1,2,3,4,7,8,9 | 1,2,3,4,6,7,8,9 | | 1,2,3,4,7,8,9 | 1,2,3,4,6,7,8,9 | |
| Timing offset between TPs | | | us | 0 | | | 0 | | |
| Frequency offset between TPs | | | Hz | 0 | | | 0 | | |
| Note1: Reference measurement channel RC.10 FDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1.  Note 2: REs for antenna ports 0 and 1 CRS have zero transmission power.  Note 3: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.  Note 4: N/A.  Note 5: To avoid collisions between CQI/PMI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#1 to allow periodic CQI/PMI to multiplex with the HARQ-ACK on PUSCH in uplink #5. | | | | | | | | | |

<End of the Change>

<Start of the Next Change>

#### 9.2.4.2A TDD (With *interferenceMeasRestriction* configured)

The following requirements apply to UE Category ≥2. For the parameters specified in table 9.2.4.2A-1, and using the downlink physical channels specified in Tables C.3.4-1 and C.3.4-2, the reported offset level of the wideband spatial differential CQI for codeword #1 (Table 7.2-2 in TS 36.213 [6]) shall be used to determine the wideband CQI index for codeword #1 as

wideband CQI1 = wideband CQI0 – Codeword 1 offset level

The wideband CQI1 shall be within the set {median CQI1 -1, median CQI1, median CQI1 +1} for more than 90% of the time, where the resulting wideband values CQI1 shall be used to determine the median CQI values for codeword #1. For both codewords #0 and #1, the PDSCH BLER using the transport format indicated by the respective median CQI0 – 1 and median CQI1 – 1 shall be less than or equal to 0.1. Furthermore, for both codewords #0 and #1, the PDSCH BLER using the transport format indicated by the respective median CQI0 + 1 and median CQI1 + 1 shall be greater than or equal to 0.1.

Table 9.2.4.2A-1: PUCCH 1-1 static test (TDD)

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Test 1 | | | Test 2 | | |
| TP1 | TP2 | | TP1 | TP2 | |
| Bandwidth | | | MHz | 10 | | | | | |
| PDSCH transmission mode | | |  | 10 | | | | | |
| Uplink downlink configuration | | |  | 2 | | | | | |
| Special subframe configuration | | |  | 4 | | | | | |
| Downlink power allocation (Note 1) | |  | dB | 0 | 0 | | 0 | 0 | |
|  | dB | 0 | 0 | | 0 | 0 | |
| Pc | dB | -6 | -6 | | -6 | -6 | |
| σ | dB | -3 | N/A | | -3 | N/A | |
| Cell ID | | |  | 0 | | | 0 | | |
| Cell-specific reference signals | | |  | Antenna ports 0, 1 | (Note 2) | | Antenna ports 0, 1 | (Note 2) | |
| e-MIMO Type | | |  | Class B | | | | | |
| Number of CSI-RS resource (K) | | |  | 1 | | | | | |
| *interferenceMeasRestriction* | | |  | Enable | | | | | |
| CSI reference signals | | |  | Antenna ports 15,…,22 | N/A | | Antenna ports 15,…,22 | N/A | |
| CSI-RS periodicity and subframe offset *T*CSI-RS / *∆*CSI-RS | | |  | 5/3 | N/A | | 5/3 | N/A | |
| CSI-RS configuration | | |  | 0 | N/A | | 0 | N/A | |
| Zero-Power CSI-RS configuration  *I*CSI-RS / *ZeroPowerCSI-RS* bitmap | | |  | 3 /  0010000000000000 | 3 / 1000010000000000 | | 3 /  0010000000000000 | 3 / 1000010000000000 | |
| CSI-IM configuration  *I*CSI-RS / *ZeroPowerCSI-RS* bitmap | | |  | 3 /  0010000000000000 | N/A | | 3 /  0010000000000000 | N/A | |
| CSI process configuration  Signal/Interference/Reporting mode | | |  | CSI-RS/CSI-IM/PUCCH 1-1 | | | CSI-RS/CSI-IM/PUCCH 1-1 | | |
| Propagation condition and antenna configuration | | |  | Clause B.1  (8 x 2) | Clause B.1  (2 x 2) | | Clause B.1  (8 x 2) | Clause B.1  (2 x 2) | |
| CodeBookSubsetRestriction bitmap | | |  | 0x0000 0000 0020 0000 0000 0001 0000 | 100000 | | 0x0000 0000 0020 0000 0000 0001 0000 | 100000 | |
| SNR (Note 3) | Sub-frame 8 | | dB | 17 | 15 | 16 | 17 | 23 | 24 |
| Other sub-frames | | 17 | 6 | 7 | 17 | 14 | 15 |
|  | Sub-frame 8 | | dB[mW/15kHz] | -81 | -83 | -82 | -81 | -75 | -74 |
| Other sub-frames | | -81 | -92 | -91 | -81 | -84 | -83 |
|  | | | dB[mW/15kHz] | -98 | | | -98 | | |
| Modulation / Information bit payload | | |  | (Note4) | QPSK / 4392 | | (Note4) | QPSK / 4392 | |
| Max number of HARQ transmissions | | |  | 1 | N/A | | 1 | N/A | |
| Physical channel for CQI/PMI reporting | | |  | PUSCH (Note5) | N/A | | PUSCH (Note5) | N/A | |
| PUCCH Report Type for CQI/second PMI | | |  | 2b | N/A | | 2b | N/A | |
| Physical channel for RI reporting | | |  | PUSCH | N/A | | PUSCH | N/A | |
| PUCCH Report Type for RI/ first PMI | | |  | 5 | N/A | | 5 | N/A | |
| Reporting periodicity | | | ms | *N*pd = 10 | N/A | | *N*pd = 10 | N/A | |
| CQI Delay | | | ms | 10 or 11 | N/A | | 10 or 11 | N/A | |
| *cqi-pmi-ConfigurationIndex* | | |  | 13 | N/A | | 13 | N/A | |
| *ri-ConfigIndex* | | |  | 805 (Note 6) | N/A | | 805 (Note 6) | N/A | |
| *ACK/NACK feedback mode* | | |  | Multiplexing | N/A | | Multiplexing | N/A | |
| PDSCH scheduled sub-frames | | |  | 3,4,9 | 3,4,8,9 | | 3,4,9 | 3,4,8,9 | |
| Timing offset between TPs | | | us | 0 | | | 0 | | |
| Frequency offset between TPs | | | Hz | 0 | | | 0 | | |
| Note1: Reference measurement channel RC.10 TDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 TDD as described in Annex A.5.2.1.  Note 2: REs for antenna ports 0 and 1 CRS have zero transmission power.  Note 3: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.  Note 4: N/A.  Note 5: To avoid collisions between CQI/PMI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#3 to allow periodic CQI/PMI to multiplex with the HARQ-ACK on PUSCH in uplink SF#7.  Note 6: RI reporting interval is set to the maximum allowable length of 160ms to minimise collisions between RI, CQI/PMI and HARQ-ACK reports. In the case when all three reports collide, it is expected that CQI/PMI reports will be dropped, while RI and HARQ-ACK will be multiplexed. At eNB, CQI report collection shall be skipped every 160ms during performance verification. | | | | | | | | | |

<End of the Change>

<Start of the Next Change>

#### 9.9.1.4 Minimum requirement PUCCH 1-1 with Rank 3 (CSI Reference Symbols)

The minimum requirements for dual codeword transmission are defined in terms of a reporting spread of the wideband CQI value for codeword #1, and their BLER performance using the transport format indicated by the reported CQI median of codeword #0 and codeword #1. The precoding used at the transmitter is a fixed precoding matrix specified by the bitmap parameter *codebookSubsetRestriction*. The propagation condition assumed for the minimum performance requirement is defined in subclause B.1.

##### 9.9.1.4.1 FDD

The following requirements apply to UE Category ≥5. For the parameters specified in table 9.9.1.4.1-1, and using the downlink physical channels specified in tables C.3.2-1 and C.3.2-2, the reported offset level of the wideband spatial differential CQI for codeword #1 (Table 7.2-2 in TS 36.213 [6]) shall be used to determine the wideband CQI index for codeword #1 as

wideband CQI1 = wideband CQI0 – Codeword 1 offset level

The wideband CQI1 shall be within the set {median CQI1 -1, median CQI1, median CQI1 +1} for more than 90% of the time, where the resulting wideband values CQI1 shall be used to determine the median CQI values for codeword #1. For both codewords #0 and #1, the PDSCH BLER using the transport format indicated by the respective median CQI0 – 1 and median CQI1 – 1 shall be less than or equal to 0.1. Furthermore, for both codewords #0 and #1, the PDSCH BLER using the transport format indicated by the respective median CQI0 + 1 and median CQI1 + 1 shall be greater than or equal to 0.1.

Table 9.9.1.4.1-1: PUCCH 1-1 static test (FDD)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | | Unit | Test 1 | | Test 2 | |
| Bandwidth | | MHz | 10 | | | |
| PDSCH transmission mode | |  | 9 | | | |
| Downlink power allocation |  | dB | 0 | | | |
|  | dB | 0 | | | |
|  | dB | -3 | | | |
| σ | dB | -3 | | | |
| Cell-specific reference signals | |  | Antenna ports 0, 1 | | | |
| CSI reference signals | |  | Antenna ports 15,…,18 | | | |
| CSI-RS periodicity and subframe offset  *T*CSI-RS / *∆*CSI-RS | |  | 5/1 | | | |
| CSI reference signal configuration | |  | 0 | | | |
| Propagation condition and antenna configuration | |  | Clause B.1 (4 x 4) | | | |
| Beamforming Model | |  | As specified in Section B.4.3 | | | |
| CodeBookSubsetRestriction bitmap | |  | 0x0000 0020 0000 0000 | | | |
| SNR (Note 2) | | dB | 5 | 6 | 11 | 12 |
|  | | dB[mW/15kHz] | -93 | -92 | -87 | -86 |
|  | | dB[mW/15kHz] | -98 | | -98 | |
| Max number of HARQ transmissions | |  | 1 | | | |
| Physical channel for CQI/PMI reporting | |  | PUSCH (Note3) | | | |
| PUCCH Report Type for CQI/PMI | |  | 2 | | | |
| Physical channel for RI reporting | |  | PUCCH Format 2 | | | |
| PUCCH Report Type for RI | |  | 3 | | | |
| Reporting periodicity | | ms | *N*pd = 5 | | | |
| CQI delay | | ms | 8 | | | |
| *cqi-pmi-ConfigurationIndex* | |  | 2 | | | |
| *ri-ConfigIndex* | |  | 1 | | | |
| Note 1: Reference measurement channel RC.22 FDD according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1.  Note 2: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.  Note 3: To avoid collisions between CQI/PMI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#1 and #6 to allow periodic CQI/PMI to multiplex with the HARQ-ACK on PUSCH in uplink SF#0 and #5. | | | | | | |

<End of the Change>