**3GPP TSG- Meeting #-e**

**, –**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CR-Form-v12.0* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  |  | **CR** |  | **rev** | 1 | **Current version:** |  |  |
|  | | | | | | | | |
| *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)*.* | | | | | | | | |
|  | | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Proposed change affects:*** | UICC apps |  | ME | **x** | Radio Access Network |  | Core Network |  |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | | | | | | | | |
| ***Title:*** | Introduction of DL channel quality report for eMTC | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** |  | | | | | | | | | |
| ***Source to TSG:*** |  | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** |  | | | | |  | ***Date:*** | | |  |
|  |  | | | |  | |  | | |  |
| ***Category:*** |  |  | | | | | ***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-12 (Release 12)* *Rel-13 (Release 13) Rel-14 (Release 14) Rel-15 (Release 15) Rel-16 (Release 16)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | Requirements of DL channel quality reporing for eMTC are missing. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Introdution of measurement reporting table  Introdution of accuracy requirements for DL channel quality report. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | eMTC DL channel quality reporting functionality is not verified. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 9.1.21.22 (new) , 9.1.21.23 (new) , 9.1.21.24 (new) | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **x** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | | **x** |  | Test specifications | | | | TS36.521-3 | | |
| ***(show related CRs)*** | |  | **x** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

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

#### 9.1.21.22 Downlink Channel Report Mapping for UE Category M1

Table 9.1.21.22-1: Downlink channel quality measurement report mapping when the DL channel quality reporting is supported [7]

|  |  |  |  |
| --- | --- | --- | --- |
| Reported value | MPDCCH repetition level | MPDCCH aggregation level | Applicable CE Mode |
| [0] | No measurement reporting | No measurement reporting | A, B |
| [1] | 1 | 1 | A |
| [2] | 1 | 2 | A |
| [3] | 1 | 4 | A |
| [4] | 1 | 8 | A |
| [5] | 1 | 16 | A |
| [6] | 1 | 24 | A, B |
| [7] | 2 | 24 | A, B |
| [8] | 4 | 24 | A, B |
| [9] | 8 | 24 | A, B |
| [10] | 16 | 24 | A, B |
| [11] | 32 | 24 | A, B |
| [12] | 64 | 24 | A, B |
| [13] | 128 | 24 | A, B |
| [14] | 256 | 24 | A, B |

The MPDCCH repetition level for Short Downlink Channel Quality Report MAC Control Element is chosen with regard to the signalled parameter Rmax, the maximum number of repetitions for MPDCCH common search space for random access response (mpdcch-NumRepetition-RA) in SystemInformationBlockType2. The report mapping is defined in Table 9.1.21.22-2.

Table 9.1.21.22-2: Downlink channel quality measurement report mapping when Short Downlink Channel Quality Report MAC Control Element is supported [7]

|  |  |
| --- | --- |
| Reported value | MPDCCH repetition level |
| No short DCQR | No measurement reporting |
| Short DCQR 1 | Rmax/8 (Note 1) |
| Short DCQR 2 | Rmax (Note 3) |
| Short DCQR 3 | 4xRmax (Note 2) |
| Note 1: When Rmax is less than 8, set Short DCCQ 1 to 1.  Note 2: When Rmax is more than 32, set Short DCQR 3 to 256.  Note 3: When Rmax is 1, set Short DCQR 2 to 2.  Note 4: Aggregation level (ECCE) is assumed to be L’max = 24. | |

#### 9.1.21.23 Downlink Channel Quality Measurement Accuracy for UE Category M1 with CE Mode A

The requirements for accuracy of downlink channel quality reporting in this clause apply only to the serving cell on the anchor carrier for UE Category M1.

The accuracy requirements in Table 9.1.21.23-1, Table 9.1.21.23-2, Table 9.1.21.23-3, and Table 9.1.21.23-4 are valid under the following conditions:

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

RSRP|dBm according to Annex B.3.1 for a corresponding Band

At least 1 DL subframe per radio frame of measured cell is available at the UE for RSRP measurement assuming measured cell is identified cell.

Table 9.1.21.23-1: Downlink channel quality reporting accuracy for UE Category M1 with CE Mode A for FDD and TDD

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| MPDCCH Repetition | Pm-Dsg (%) | Ês/Iot | Io Note 1 range | | | |
| E-UTRA operating band groups Note 3 | Minimum Io | | Maximum Io |
|  |  | dB |  | dBm/15kHz | dBm/BWChannel | dBm/BWChannel |
| R NOTE 1 | ≤1 | -6 dB ≤ Ês/Iot ≤ -3 dB | FDD-M1\_A, TDD-M1\_A | -121 | N/A | -70 |
| FDD-M1\_B | -120.5 | N/A | -70 |
| FDD-M1\_D | -119.5 | N/A | -70 |
| FDD-M1\_E, TDD-M1\_E | -119 | N/A | -70 |
| FDD-M1\_F | -118.5 | N/A | -70 |
| FDD-M1\_G | -118 | N/A | -70 |
| FDD-M1\_N | -114.5 | N/A | -70 |
| [R/4] NOTE 1 | >1 | -6 dB ≤ Ês/Iot ≤ -3 dB | FDD-M1\_A, TDD-M1\_A | -121 | N/A | -70 |
| FDD-M1\_B | -120.5 | N/A | -70 |
| FDD-M1\_D | -119.5 | N/A | -70 |
| FDD-M1\_E, TDD-M1\_E | -119 | N/A | -70 |
| FDD-M1\_F | -118.5 | N/A | -70 |
| FDD-M1\_G | -118 | N/A | -70 |
| FDD-M1\_N | -114.5 | N/A | -70 |
| NOTE 1: R is the reported MPDCCH repetition level that UE has reported in [CQI-NPDCCH-NB] or Short Downlink Channel Quality Report MAC Control Element.  NOTE 2: Io is assumed to have constant EPRE across the bandwidth.  NOTE 3: E-UTRA operating band groups are as defined in Section 3.5. | | | | | | |

Table 9.1.21.23-2: Downlink channel quality reporting accuracy for UE Category M1 with CE Mode A for HD-FDD

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| MPDCCH Repetition | Pm-Dsg (%) | Ês/Iot | Io Note 1 range | | | |
| E-UTRA operating band groups Note 3 | Minimum Io | | Maximum Io |
|  |  | dB |  | dBm/15kHz | dBm/BWChannel | dBm/BWChannel |
| R NOTE 1 | ≤1 | -6 dB ≤ Ês/Iot ≤ -3 dB | FDD-M1\_A | -121 | N/A | -70 |
| FDD-M1\_B | -120.5 | N/A | -70 |
| FDD-M1\_D | -119.5 | N/A | -70 |
| FDD-M1\_E | -119 | N/A | -70 |
| FDD-M1\_F | -118.5 | N/A | -70 |
| FDD-M1\_G | -118 | N/A | -70 |
| FDD-M1\_N | -114.5 | N/A | -70 |
| [R/4] NOTE 1 | >1 | -6 dB ≤ Ês/Iot ≤ -3 dB | FDD-M1\_A | -121 | N/A | -70 |
| FDD-M1\_B | -120.5 | N/A | -70 |
| FDD-M1\_D | -119.5 | N/A | -70 |
| FDD-M1\_E | -119 | N/A | -70 |
| FDD-M1\_F | -118.5 | N/A | -70 |
| FDD-M1\_G | -118 | N/A | -70 |
| FDD-M1\_N | -114.5 | N/A | -70 |
| NOTE 1: R is the reported MPDCCH repetition level that UE has reported in [CQI-NPDCCH-NB] or Short Downlink Channel Quality Report MAC Control Element.  NOTE 2: Io is assumed to have constant EPRE across the bandwidth.  NOTE 3: E-UTRA operating band groups are as defined in Section 3.5. | | | | | | |

Table 9.1.21.23-3: Downlink channel quality reporting accuracy for UE Category M1 with CE Mode A for FDD and TDD

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| MPDCCH Aggregation level | Pm-Dsg (%) | Ês/Iot | Io Note 1 range | | | |
| E-UTRA operating band groups Note 3 | Minimum Io | | Maximum Io |
|  |  | dB |  | dBm/15kHz | dBm/BWChannel | dBm/BWChannel |
| Lk NOTE 1 | ≤1 | ≥ -3 dB | FDD-M1\_A, TDD-M1\_A | -121 | N/A | -70 |
| FDD-M1\_B | -120.5 | N/A | -70 |
| FDD-M1\_D | -119.5 | N/A | -70 |
| FDD-M1\_E, TDD-M1\_E | -119 | N/A | -70 |
| FDD-M1\_F | -118.5 | N/A | -70 |
| FDD-M1\_G | -118 | N/A | -70 |
| FDD-M1\_N | -114.5 | N/A | -70 |
| Lk-[2] NOTE 1 | >1 | ≥ -3 dB | FDD-M1\_A, TDD-M1\_A | -121 | N/A | -70 |
| FDD-M1\_B | -120.5 | N/A | -70 |
| FDD-M1\_D | -119.5 | N/A | -70 |
| FDD-M1\_E, TDD-M1\_E | -119 | N/A | -70 |
| FDD-M1\_F | -118.5 | N/A | -70 |
| FDD-M1\_G | -118 | N/A | -70 |
| FDD-M1\_N | -114.5 | N/A | -70 |
| NOTE 1: is the reported MPDCCH aggregation level that UE has reported in [CQI-NPDCCH-NB] where k is the index to the aggregation level set and 1 ≤ k ≤ 6.  NOTE 2: Io is assumed to have constant EPRE across the bandwidth.  NOTE 3: E-UTRA operating band groups are as defined in Section 3.5. | | | | | | |

Table 9.1.21.23-4: Downlink channel quality reporting accuracy for UE Category M1 with CE Mode A for HD-FDD

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| MPDCCH Aggregation level | Pm-Dsg (%) | Ês/Iot | Io Note 1 range | | | |
| E-UTRA operating band groups Note 3 | Minimum Io | | Maximum Io |
|  |  | dB |  | dBm/15kHz | dBm/BWChannel | dBm/BWChannel |
| Lk NOTE 1 | ≤1 | ≥ -3 dB | FDD-M1\_A | -121 | N/A | -70 |
| FDD-M1\_B | -120.5 | N/A | -70 |
| FDD-M1\_D | -119.5 | N/A | -70 |
| FDD-M1\_E | -119 | N/A | -70 |
| FDD-M1\_F | -118.5 | N/A | -70 |
| FDD-M1\_G | -118 | N/A | -70 |
| FDD-M1\_N | -114.5 | N/A | -70 |
| Lk-[2] NOTE 1 | >1 | ≥ -3 dB | FDD-M1\_A | -121 | N/A | -70 |
| FDD-M1\_B | -120.5 | N/A | -70 |
| FDD-M1\_D | -119.5 | N/A | -70 |
| FDD-M1\_E | -119 | N/A | -70 |
| FDD-M1\_F | -118.5 | N/A | -70 |
| FDD-M1\_G | -118 | N/A | -70 |
| FDD-M1\_N | -114.5 | N/A | -70 |
| NOTE 1: is the reported MPDCCH aggregation level that UE has reported in [CQI-NPDCCH-NB] where k is the index to the aggregation level set and 1 ≤ k ≤ 6.  NOTE 2: Io is assumed to have constant EPRE across the bandwidth.  NOTE 3: E-UTRA operating band groups are as defined in Section 3.5. | | | | | | |

#### 9.1.21.24 Downlink Channel Quality Measurement Accuracy for UE Category M1 with CE Mode B

The requirements for accuracy of downlink channel quality reporting in this clause apply only to the serving cell on the anchor carrier for UE Category M1.

The accuracy requirements in Table 9.1.21.24-1 and Table 9.1.21.24-2 are valid under the following conditions:

Cell specific reference signals are transmitted either from one, two or four antenna ports.

Conditions defined in 36.101 Clause 7.3 for reference sensitivity are fulfilled.

RSRP|dBm according to Annex B.3.1 for a corresponding Band

At least 1 DL subframe per radio frame of measured cell is available at the UE for RSRP measurement assuming measured cell is identified cell.

Table 9.1.21.24-1: Downlink channel quality reporting accuracy for UE Category M1 with CE Mode B for FDD and TDD

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| MPDCCH Repetition | Pm-Dsg (%) | Ês/Iot | Io Note 1 range | | | |
| E-UTRA operating band groups Note 3 | Minimum Io | | Maximum Io |
|  |  | dB |  | dBm/15kHz | dBm/BWChannel | dBm/BWChannel |
| R NOTE 1 | ≤1 | -15 ≤ Ês/Iot ≤ -6 dB | FDD-M1\_A, TDD-M1\_A | -121 | N/A | -70 |
| FDD-M1\_B | -120.5 | N/A | -70 |
| FDD-M1\_D | -119.5 | N/A | -70 |
| FDD-M1\_E, TDD-M1\_E | -119 | N/A | -70 |
| FDD-M1\_F | -118.5 | N/A | -70 |
| FDD-M1\_G | -118 | N/A | -70 |
| FDD-M1\_N | -114.5 | N/A | -70 |
| [R/8] NOTE 1 | >1 | -15 ≤ Ês/Iot ≤ -6 dB | FDD-M1\_A, TDD-M1\_A | -121 | N/A | -70 |
| FDD-M1\_B | -120.5 | N/A | -70 |
| FDD-M1\_D | -119.5 | N/A | -70 |
| FDD-M1\_E, TDD-M1\_E | -119 | N/A | -70 |
| FDD-M1\_F | -118.5 | N/A | -70 |
| FDD-M1\_G | -118 | N/A | -70 |
| FDD-M1\_N | -114.5 | N/A | -70 |
| NOTE 1: R is the reported MPDCCH repetition level that UE has reported in [CQI-NPDCCH-NB] or Short Downlink Channel Quality Report MAC Control Element.  NOTE 2: Io is assumed to have constant EPRE across the bandwidth.  NOTE 3: E-UTRA operating band groups are as defined in Section 3.5. | | | | | | |

Table 9.1.21.24-2: Downlink channel quality reporting accuracy for UE Category M1 with CE Mode B for HD-FDD

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| MPDCCH Repetition | Pm-Dsg (%) | Ês/Iot | Io Note 1 range | | | |
| E-UTRA operating band groups Note 3 | Minimum Io | | Maximum Io |
|  |  | dB |  | dBm/15kHz | dBm/BWChannel | dBm/BWChannel |
| R NOTE 1 | ≤1 | -15 ≤ Ês/Iot ≤ -6 dB | FDD-M1\_A | -121 | N/A | -70 |
| FDD-M1\_B | -120.5 | N/A | -70 |
| FDD-M1\_D | -119.5 | N/A | -70 |
| FDD-M1\_E | -119 | N/A | -70 |
| FDD-M1\_F | -118.5 | N/A | -70 |
| FDD-M1\_G | -118 | N/A | -70 |
| FDD-M1\_N | -114.5 | N/A | -70 |
| [R/8] NOTE 1 | >1 | -15 ≤ Ês/Iot ≤ -6 dB | FDD-M1\_A | -121 | N/A | -70 |
| FDD-M1\_B | -120.5 | N/A | -70 |
| FDD-M1\_D | -119.5 | N/A | -70 |
| FDD-M1\_E | -119 | N/A | -70 |
| FDD-M1\_F | -118.5 | N/A | -70 |
| FDD-M1\_G | -118 | N/A | -70 |
| FDD-M1\_N | -114.5 | N/A | -70 |
| NOTE 1: R is the reported MPDCCH repetition level that UE has reported in [CQI-NPDCCH-NB] or Short Downlink Channel Quality Report MAC Control Element.  NOTE 2: Io is assumed to have constant EPRE across the bandwidth.  NOTE 3: E-UTRA operating band groups are as defined in Section 3.5. | | | | | | |

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