**3GPP TSG-RAN WG4 Meeting #** **109 R4-2321471**

**Chicago, US, 13 – 17 November 2023**

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| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **36.133** | **CR** | **7262** | **rev** | **1** | **Current version:** | **18.3.1** |  |
|  | | | | | | | | |
| *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:*** | Correction to IoT NTN eMTC test cases | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Ericsson | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | LTE\_NBIOT\_eMTC\_NTN\_req-Perf | | | | |  | ***Date:*** | | | 2023-11-13 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | F |  | | | | | ***Release:*** | | | Rel-18 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) … Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | Some of the RMCs used in the eMTC test cases use 10 MHz channel bandwidth which is not correct. For eMTC over NTN, the correct channel BW is 1.4 MHz. In this CR, change the RMCs from 10 MHz BW to 1.4 channel BW for PDSCH and MPDCCH RMCs.  Also RMCs with 2 transmitter antennas are used in the RLM test cases. This has been corrected to use 1 transmitter antenna which is aligned with demodulation and NR RRM test cases for satellite access.  Aligned the terminologies from GEO to GSO.  Removed all references to PCFICH/PHICH/PDCCH transmission parameters since these channels don’t apply for eMTC in standalone. Also corrected from PDCCH to MPDCCH.  Curren test cases contain references to TN bands whereas new frequency band groups were defined for IoT NTN. These references are updated based on bands in Table 3.5.1A-2 in TS 36.133. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | R.20 FDD --> R.48 FDD for PDSCH Reference Channel  R.22 FDD --> R.52 FDD for PDSCH Reference Channel R.16 FDD --> R.46 FDD for MPDCCH Reference Channel  R.18 FDD -> R.50 FDD for MPDCCH Reference Channel R.10 HD-FDD -->R.49 HD-FDD for PDSCH Reference Channel in HD-FDD test R.12 HD-FDD -> R.53 HD-FDD for PDSCH Reference Channel in HD-FDD test R.6 HD-FDD --> R.47 HD-FDD for MPDCCH Reference Channel in HD-FDD test R.8 HD-FDD --> R.51 HD-FDD for MPDCCH Reference Channel in HD-FDD test R.17 FDD --> R.46 FDD in MPDCCH parameters in RLM tests R.7 HD-FDD --> R.47 HD-FDD in MPDCCH parameters in RLM tests for HD-FDD R.9 HD-FDD --> R.51 HD-FDD in MPDCCH parameter in channel quality reporting test R.19 FDD --> R.50 FDD in HD-FDD in MPDCCH parameters in channel quality reporting test  Change 1: Corrected the use of RMCs in the handover tests  Change 2: Corrected the use of RMCs in the RA tests  Change 3: Corrected the use of RMCs in the timing advance tests  Change 4: Corrected the use of RMCs in the RLM tests  Change 5: Square brackets in RMCs are removed in measurement tests  Change 6: Corrected the use of RMCs in the channel quality reporting tests  Change #7: Updated the incorrect references from TN band groups to satellite band groups.  Chagne #8: Remove references to PCFICH/PHICH/PDCCH | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Incorrect channel bandwidth assumed in the tests and unreliable test results. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | A.14.2.1, A.14.3.2, A.14.4.2, A.14.4.3, A.15.5.1, A.14.6.1, A.14.6.2 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | | **X** |  | Test specifications | | | | TS 36.533 | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

<Start of Change 1>

### A.14.2.1 E-UTRAN handover for satellite access

#### A.14.2.1.1 E-UTRAN FDD-FDD Intra frequency handover for Cat-M1 UEs in CEModeA without SFN acquisition

##### A.14.2.1.1.1 Test Purpose and Environment

This test is to verify the requirement for the FDD-FDD intra frequency handover requirements without SFN acquisition for Satellite Access as specified in clause 5.5A.2.1.

The test configurations are given in Table A.14.2.1.1.1-1. The test scenario comprises of one E-UTRA FDD carrier and two cells as given in tables A.14.2.1.1.1-2 and A.14.2.1.1.1-3. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE may not have any timing information of Cell 2.

E-UTRAN shall send a RRC message implying handover to Cell 2. The RRC message implying handover shall be sent to the UE during period T2, after the UE has reported Event A3. The field sameSFN-Indication and mib-RepetitionStatus are included in the handover command. T3 is defined as the end of the last TTI containing the RRC message implying handover.

During the test, UE is configured with measurement gap for cell search, because the narrowband of the PDSCH Reference Measurement Channel does not overlap with the centre 6 PRBs of the carrier bandwidth.

Table A.14.2.1.1.1-1: Supported test configurations

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | GSO, FDD-FDD duplex mode |

**Table A.14.2.1.1.1-2: General test parameters for E-UTRAN FDD-FDD intra frequency handover for Cat-M1 UEs in CEModeA without SFN acquisition test case**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** | **Comment** |
| Initial conditions | Active cell |  | Cell 1 |  |
| Neighbouring cell |  | Cell 2 |  |
| Final condition | Active cell |  | Cell 2 |  |
| Satellite information | |  | SSC.1 | GSO |
| E-UTRA RF Channel Number | |  | 1 | Only one FDD carrier frequency is used. |
| A3-Offset | | dB | 0 |  |
| Hysteresis | | dB | 0 |  |
| Time To Trigger | | s | 0 |  |
| Filter coefficient | |  | 0 | L3 filtering is not used |
| DRX | |  |  | OFF |
| CP length | |  | Normal |  |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH configuration | |  | PRACH\_4CE | As specified in A.3.16 |
| PRACH initial CE level | |  | 0 | Specified in the handover message |
| T1 | | s | 5 |  |
| T2 | | s | ≤5 |  |
| T3 | | s | 1 |  |
| Gap pattern ID | |  | 1 |  |

Table A.14.2.1.1.1-3: Cell specific test parameters for E-UTRAN FDD-FDD intra frequency handover for Cat-M1 UEs in CEModeA without SFN acquisition test case

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Cell 1** | | | **Cell 2** | | | | | | |
| **T1** | **T2** | **T3** | **T1** | | **T2** | | | **T3** | |
| E-UTRA RF Channel Number |  | 1 | | | | | | | | | |
| BWchannel | MHz | 1.4 | | | | | | | | | |
| PDSCH Reference Channel in clause A.3.1.4.1 |  | R.48 FDD | R.48 FDD | - | - | - | | | R.48 FDD | | |
| MPDCCH Reference Channel in clause A.3.1.3.1 |  | R.46 FDD | | | R.46 FDD | | | | | | |
| OCNG Patterns in clause A.3.2.1 |  | OP.21 FDD | OP.21 FDD | OP.6 FDD | OP.6 FDD | OP.6 FDD | | | OP.21 FDD | | |
| PBCH\_RA | dB | -3 | | | -3 | | | | | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| MPDCCH\_RA | dB |
| MPDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
| Note 2 | dBm/15 KHz | -98 | | | | | | | | | |
|  | dB | 8 | 8 | 8 | -Infinity | | | 12 | | | 12 |
| Note 3 | dB | 8 | -4.27 | -4.27 | -Infinity | | 3.36 | | | 3.36 | |
| RSRP Note 3 | dBm/15 KHz | -90 | -90 | -90 | -Infinity | | -86 | | | -86 | |
| Propagation Condition |  | AWGN | | | AWGN | | | | | | |
| Antenna Configuration |  | 1x1 | | | 1x1 | | | | | | |
| Timing offset to Cell 1  Synchronous cells | us | - | | | 3 | | | | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: Es/Iot and RSRP level has been derived from other parameters for information purpose. They are not settable parameters themselves. | | | | | | | | | | | |

##### A.14.2.1.1.2 Test Requirements

The UE shall finish the transmission of all repetitions of the PRACH to Cell 2 less than 50 ms from the beginning of time period T3.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + Tinterrupt, where:

RRC procedure delay = 15 ms and is specified in clause 11.2 in TS 36.331 [2].

Tinterrupt = 35 ms in the test; Tinterrupt is defined in clause 5.5A.2.1.2.

This gives a total of 50 ms.

#### A.14.2.1.2 E-UTRAN HD-FDD Intra frequency handover for Cat-M1 UEs in CEModeA without SFN acquisition

##### A.14.2.1.2.1 Test Purpose and Environment

This test is to verify the requirement for the HD-FDD intra frequency handover requirements without SFN acquisition for Satellite Access specified in clause 5.5A.2.2.

The test configurations are given in Table A.14.2.1.1.2-1. The test scenario comprises of 1 E-UTRA FDD carrier and 2 cells as given in tables A.14.2.1.1.2-2 and A.14.2.1.1.2-3. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE may not have any timing information of Cell 2.

E-UTRAN shall send a RRC message implying handover to Cell 2. The RRC message implying handover shall be sent to the UE during period T2, after the UE has reported Event A3. The field sameSFN-Indication and mib-RepetitionStatus are included in the handover command. T3 is defined as the end of the last TTI containing the RRC message implying handover.

During the test, UE is configured with measurement gap for cell search, because the narrowband of the PDSCH Reference Measurement Channel does not overlap with the centre 6 PRBs of the carrier bandwidth.

Table A.14.2.1.1.2-1: Supported test configurations

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | GSO, HD-FDD duplex mode |

Table A. 14.2.1.1.2-2: General test parameters for E-UTRAN HD-FDD intra frequency handover for Cat-M1 UEs in CEModeA without SFN acquisition test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** | **Comment** |
| Initial conditions | Active cell |  | Cell 1 |  |
| Neighbouring cell |  | Cell 2 |  |
| Final condition | Active cell |  | Cell 2 |  |
| Satellite information | |  | SSC.1 | GSO |
| E-UTRA RF Channel Number | |  | 1 | Only one FDD carrier frequency is used. |
| A3-Offset | | dB | 0 |  |
| Hysteresis | | dB | 0 |  |
| Time To Trigger | | s | 0 |  |
| Filter coefficient | |  | 0 | L3 filtering is not used |
| DRX | |  |  | OFF |
| CP length | |  | Normal |  |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH configuration | |  | PRACH\_4CE | As specified in A.3.16 |
| PRACH initial CE level | |  | 0 | Specified in the handover message |
| T1 | | s | 5 |  |
| T2 | | s | ≤5 |  |
| T3 | | s | 1 |  |
| Gap pattern ID | |  | 1 |  |

Table A.14.2.1.1.1-3: Cell specific test parameters for E-UTRAN HD-FDD intra frequency handover for Cat-M1 UEs in CEModeA without SFN acquisition test case

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Cell 1** | | | **Cell 2** | | | | | | |
| **T1** | **T2** | **T3** | **T1** | | **T2** | | | **T3** | |
| E-UTRA RF Channel Number |  | 1 | | | | | | | | | |
| BWchannel | MHz | 1.4 | | | | | | | | | |
| PDSCH Reference Channel in clause A.3.1.4.2 |  | R.49 HD-FDD | R.49 HD-FDD | - | - | - | | | R.49 HD-FDD | | |
| MPDCCH Reference Channel in clause A.3.1.3.2 |  | R.47 HD-FDD | | | R.47 HD-FDD | | | | | | |
| OCNG Patterns in clause A.3.2.1 |  | OP.21 FDD | OP.21 FDD | OP.6 FDD | OP.6 FDD | OP.6 FDD | | | OP.21 FDD | | |
| PBCH\_RA | dB | -3 | | | -3 | | | | | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| MPDCCH\_RA | dB |
| MPDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
| Note 2 | dBm/15 KHz | -98 | | | | | | | | | |
| Note 3 | dB | 8 | 8 | 8 | -Infinity | | 12 | | | 12 | |
|  | dB | 8 | -4.27 | -4.27 | -Infinity | | | 3.36 | | | 3.36 |
| RSRP Note 3 | dBm/15 KHz | -90 | -90 | -90 | -Infinity | | -86 | | | -86 | |
| Propagation Condition |  | AWGN | | | AWGN | | | | | | |
| Antenna Configuration |  | 1x1 | | | 1x1 | | | | | | |
| Timing offset to Cell 1  Synchronous cells | us | - | | | 3 | | | | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: Es/Iot and RSRP level has been derived from other parameters for information purpose. They are not settable parameters themselves | | | | | | | | | | | |

##### A.14.2.1.2.2 Test Requirements

The UE shall finish the transmission of all the repetitions of the PRACH to Cell 2 less than 50 ms from the beginning of time period T3.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + Tinterrupt, where:

RRC procedure delay = 15 ms and is specified in clause 11.2 in TS 36.331 [2].

Tinterrupt = 35 ms in the test; Tinterrupt is defined in clause 5.5A.2.1.2.

This gives a total of 50 ms.

#### A.14.2.1.3 E-UTRAN FDD-FDD Intra frequency conditional handover for Cat-M1 UEs in CEModeA

##### A.14.2.1.3.1 Test Purpose and Environment

This test is to verify the requirement for the FDD-FDD intra frequency conditional handover requirements with SFN acquisition for Satellite Access as specified in clause 5.5.2.1.

The test configurations are given in Table A.14.2.1.3.1-1. The test scenario comprises of one E-UTRA FDD carrier and two cells as given in tables A.14.2.1.3.1-2 and A.14.2.1.3.1-3. The test consists of two successive time periods, with time durations of T1 and T2 respectively. At the start of time duration T1, the UE may not have any timing information of Cell 2.

E-UTRAN shall send a RRC message implying conditional handover to Cell 2. The RRC message implying conditional handover shall be sent to the UE during period T1, at a time earlier than TRRC before the beginning of T2. The field sameSFN-Indication and mib-RepetitionStatus are not included in the handover command. At the start of T2, cell 2 becomes detectable and meets the handover condition.

During the test, UE is configured with measurement gap for cell search, because the narrowband of the PDSCH Reference Measurement Channel does not overlap with the centre 6 PRBs of the carrier bandwidth.

Table A.14.2.1.3.1-2: General test parameters for E-UTRAN FDD-FDD intra frequency conditional handover for Cat-M1 UEs in CEModeA test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** | **Comment** |
| Initial conditions | Active cell |  | Cell 1 |  |
| Neighbouring cell |  | Cell 2 |  |
| Final condition | Active cell |  | Cell 2 |  |
| Satellite information | |  | SSC.1 | GSO |
| E-UTRA RF Channel Number | |  | 1 | Only one FDD carrier frequency is used. |
| A3-Offset | | dB | 0 |  |
| Hysteresis | | dB | 0 |  |
| Time To Trigger | | s | 0 |  |
| Filter coefficient | |  | 0 | L3 filtering is not used |
| DRX | |  |  | OFF |
| CP length | |  | Normal |  |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH configuration | |  | PRACH\_4CE | As specified in A.3.16 |
| PRACH initial CE level | |  | 0 | Specified in the handover message |
| Time offset between cells | |  | 3ms | Asynchronous cells |
| T1 | | s | 5 |  |
| T2 | | s | ≤2 |  |
| Gap pattern ID | |  | 1 |  |

Table A.14.2.1.3.1-3: Cell specific test parameters for E-UTRAN FDD-FDD intra frequency conditional handover for Cat-M1 UEs in CEModeA test case

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Cell 1** | | **Cell 2** | |
| **T1** | **T2** | **T1** | **T2** |
| E-UTRA RF Channel Number |  | 1 | | 1 | |
| BWchannel | MHz | 1.4 | | 1.4 | |
| PDSCH Reference Channel in clause A.3.1.4.1 |  | R.48 FDD | - | - | R.48 FDD |
| MPDCCH Reference Channel in clause A.3.1.3.1 |  | R.46 FDD | | R.46 FDD | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) |  | OP.21 FDD | OP.6 FDD | OP.6 FDD | OP.21 FDD |
| PBCH\_RA | dB | -3 | | -3 | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| MPDCCH\_RA | dB |
| MPDCCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
|  | dB | 8 | -4.27 | -Infinity | 3.36 |
| Note 2 | dBm/15 KHz | -98 | | | |
|  | dB | 8 | 8 | - Infinity | 12 |
| RSRP Note 3 | dBm/15 KHz | -90 | -90 | - Infinity | -86 |
| Propagation Condition |  | AWGN | | | |
| Antenna Configuration |  | 1x1 | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | |

##### A.14.2.1.3.2 Test Requirements

TRRC + TEvent\_DU occurs during T1 as the handover condition becomes satisfied at the start of T2. The test shall verify that there are no interruptions during T1.

The UE shall start to transmit the PRACH to Cell 2 less than Tmeasure + Tinterrupt + TCHO\_execution = 965 ms from the start of T2 and interruption during T2 shall not exceed 155ms.

The rate of correct conditional handovers observed during repeated tests shall be at least 90%.

NOTE: The conditional handover delay can be expressed as: TRRC + TDelayUncertainty + Tmeasure + TCHO\_execution + Tinterrupt, where:

TRRC = 15 ms and is specified in clause 11.2 in TS 36.331 [2].

Tmeasure = 800 ms in the test; Tmeasure is defined in clause 5.5A.2.3.2 without TDelayUncertainty.

TCHO\_execution = 10 ms in the test; TCHO\_execution is defined in clause 5.5A.2.3.3.

Tinterrupt = 155 ms in the test; Tinterrupt is defined in clause 5.5A.2.3.4.

#### A.14.2.1.4 E-UTRAN HD-FDD Intra frequency conditional handover for Cat-M1 UEs in CEModeA

##### A.14.2.1.4.1 Test Purpose and Environment

This test is to verify the requirement for the HD-FDD intra frequency conditional handover requirements with SFN acquisition for Satellite Access as specified in clause 5.5.2.2.

The test configurations are given in Table A.14.2.1.4.1-1. The test scenario comprises of 1 E-UTRA FDD carrier and 2 cells as given in tables A.14.2.1.4.1-2 and A.14.2.1.4.1-3. The The test consists of two successive time periods, with time durations of T1 and T2 respectively. At the start of time duration T1, the UE may not have any timing information of Cell 2.

E-UTRAN shall send a RRC message implying conditional handover to Cell 2. The RRC message implying conditional handover shall be sent to the UE during period T1, at a time earlier than TRRC before the beginning of T2. The field sameSFN-Indication and mib-RepetitionStatus are not included in the handover command. At the start of T2, cell 2 becomes detectable and meets the handover condition.

During the test, UE is configured with measurement gap for cell search, because the narrowband of the PDSCH Reference Measurement Channel does not overlap with the centre 6 PRBs of the carrier bandwidth.

Table A.14.2.1.4.1-2: General test parameters for E-UTRAN HD-FDD intra frequency conditional handover for Cat-M1 UEs in CEModeA test case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** | **Comment** |
| Initial conditions | Active cell |  | Cell 1 |  |
| Neighbouring cell |  | Cell 2 |  |
| Final condition | Active cell |  | Cell 2 |  |
| Satellite information | |  | SSC.1 | GSO |
| E-UTRA RF Channel Number | |  | 1 | Only one FDD carrier frequency is used. |
| A3-Offset | | dB | 0 |  |
| Hysteresis | | dB | 0 |  |
| Time To Trigger | | s | 0 |  |
| Filter coefficient | |  | 0 | L3 filtering is not used |
| DRX | |  |  | OFF |
| CP length | |  | Normal |  |
| Access Barring Information | | - | Not Sent | No additional delays in random access procedure. |
| PRACH configuration | |  | PRACH\_4CE | As specified in A.3.16 |
| PRACH initial CE level | |  | 0 | Specified in the handover message |
| Time offset between cells | |  | 3ms | Asynchronous cells |
| T1 | | s | 5 |  |
| T2 | | s | ≤2 |  |
| Gap pattern ID | |  | 1 |  |

Table A.14.2.1.4.1-3: Cell specific test parameters for E-UTRAN HD-FDD intra frequency handover for Cat-M1 UEs in CEModeA test case

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Cell 1** | | **Cell 2** | |
| **T1** | **T2** | **T1** | **T2** |
| E-UTRA RF Channel Number |  | 1 | | 1 | |
| BWchannel | MHz | 1.4 | | 1.4 | |
| PDSCH Reference Channel in clause A.3.1.4.1 |  | R.49 HD-FDD | - | - | R.49 HD-FDD |
| MPDCCH Reference Channel in clause A.3.1.3.1 |  | R.47 HD-FDD | | R.47 HD-FDD | |
| OCNG Patterns defined in A.3.2.1.1 (OP.1 FDD) and in A.3.2.1.2 (OP.2 FDD) |  | OP.21 FDD | OP.6 FDD | OP.6 FDD | OP.21 FDD |
| PBCH\_RA | dB | -3 | | -3 | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| MPDCCH\_RA | dB |
| MPDCCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
|  | dB | 8 | -4.27 | -Infinity | 3.36 |
| Note 2 | dBm/15 KHz | -98 | | | |
|  | dB | 8 | 8 | - Infinity | 12 |
| RSRP Note 3 | dBm/15 KHz | -90 | -90 | - Infinity | -86 |
| Propagation Condition |  | AWGN | | | |
| Antenna Configuration |  | 1x1 | | | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves. | | | | | |

##### A.14.2.1.4.2 Test Requirements

TRRC + TEvent\_DU occurs during T1 as the handover condition becomes satisfied at the start of T2. The test shall verify that there are no interruptions during T1.

The UE shall start to transmit the PRACH to Cell 2 less than Tmeasure + Tinterrupt + TCHO\_execution = 965 ms from the start of T2 and interruption during T2 shall not exceed 155ms.

The rate of correct conditional handovers observed during repeated tests shall be at least 90%.

NOTE: The conditional handover delay can be expressed as: TRRC + TDelayUncertainty + Tmeasure + TCHO\_execution + Tinterrupt, where:

TRRC = 15 ms and is specified in clause 11.2 in TS 36.331 [2].

Tmeasure = 800 ms in the test; Tmeasure is defined in clause 5.5A.2.3.2 without TDelayUncertainty.

TCHO\_execution = 10 ms in the test; TCHO\_execution is defined in clause 5.5A.2.3.3.

Tinterrupt = 155 ms in the test; Tinterrupt is defined in clause 5.5A.2.3.4.

<End of Change 1>

<Start of Change 2>

### A.14.3.2 Random access for satellite access

#### A.14.3.2.1 E-UTRAN FDD Contention Based Random Access Test for Cat-M1 UEs in Normal Coverage for satellite access

##### A.14.3.2.1.1 Test Purpose and Environment

The purpose of this test is to verify whether the behavior of the random access procedure of a Cat-M1 UE in Normal Coverage for satellite access is according to the requirements, whether the PRACH power settings and timing are within specified limits, and whether the UE determines properly the enhanced coverage level based on the RSRP measurement and the configured criterion in RSRP-ThresholdsPrach [2]. This test will verify the requirements in Clause 6.2.2, Clause 6.2.3A and Clause 7.24A.2 in an AWGN model.

During the test, the test system shall emulate and send the GNSS signal to the test UE by AT command. The UE shall be provided with the valid information about the SAN serving cells before the test.

For this test a single cell is used. The test parameters are given in tables A.14.3.2.1.1-1 to A.14.3.2.1.1-4.

Table A.14.3.2.1.1-1: Supported test configurations

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | GSO, HD-FDD duplex mode |
| 2 | NGSO, HD-FDD duplex mode |
| Note: If UE supports both NGSO and GSO, the test case Config 1 can be skipped if the UE passes test case Config 2. | |

Table A.14.3.2.1.1-2: General test parameters for FDD contention based random access test

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** | **Comments** |
| E-UTRA RF Channel Number | |  | 1 |  | |
| BWchannel | | MHz | 1.4 |  | |
| Satellite information | Config 1 |  | SSC.1 | GSO | |
| Config 2 |  | SSC.2 | NGSO | |
| OCNG Pattern Note 1 | |  | OP.21 FDD | As defined in A. A.3.2.1.21. | |
| PDSCH parameters Note 2 | |  | R.48 FDD | As defined in A.3.1.4.1 | |
| MPDCCH parameters Note 2 | |  | R.46 FDD | As defined in A.3.1.3.1 | |
| PBCH\_RA | | dB | 0 |  | |
| PBCH\_RB | | dB |  | |
| PSS\_RA | | dB |  | |
| SSS\_RA | | dB |  | |
| MPDCCH\_RA | | dB |  | |
| MPDCCH\_RB | | dB |  | |
| PDSCH\_RA | | dB |  | |
| PDSCH\_RB | | dB |  | |
| OCNG\_RA Note 1 | | dB |  | |
| OCNG\_RB Note 1 | | dB |  | |
|  | | dBm/15 KHz | -103 |  | |
|  | | dB | 3 |  | |
| Note 3 | | dB | 3 |  | |
| RSRP Note 3 | | dBm/15 KHz | -100 |  | |
| Io Note 3 | | dBm/9 MHz | -70.45 |  | |
| Propagation Condition | | - | AWGN |  | |
| Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.  Note 2: The PDSCH and MPDCCH reference measurement channels are used in the test only when a downlink transmission dedicated to the UE under test is required.  Note 3: Es/Iot, RSRP and Io level has been derived from other parameters for information purpose. They are not settable parameters themselves. | | | | |

Table A.14.3.2.1.1-3: RACH-Configuration parameters for FDD contention based random access test

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Field** | **Value** | | | | **Comment** |
| **Parameters not per CE Levels** | | | | | |
| powerRampingStep | dB2 | | | |  |
| preambleInitialReceivedTargetPower | dBm-120 | | | |  |
| preambleTransMax | n6 | | | |  |
| maxHARQ-Msg3Tx | 4 | | | |  |
| rar-HoppingConfig | Off | | | |  |
| **Parameters per CE Levels** | | | | | |
| ***CE Level*** | ***Level 0*** | ***Level 1*** | ***Level 2*** | ***Level 3*** |  |
| ra-ResponseWindowSize (per CE) | sf20 | sf80 | sf180 | sf320 |  |
| mac-ContentionResolutionTimer (per CE) | sf80 | sf120 | sf200 | sf480 |  |
| PreambleMappingInfo  {firstPreamble, lastPreamble} | {0, 9} | {10,19} | {20,29} | {30,39} |  |
| Note: For further information see Clause 6.3.2 in TS 36.331. | | | | | |

Table A.14.3.2.1.1-4: PRACH-Configuration parameters for FDD contention based random access test

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Field** | **Value** | | | | **Comment** |
| **Parameters not per CE Levels** | | | | | |
| rsrp-ThresholdsPrach | {24, 27, 33} | | | | Corresponding to {-116, -113, -107} dBm as defined in Section 9.1.21.5 |
| mpdcch-startSF-CSS-RA | v1 | | | |  |
| referenceSignalPower | -5 dBm/15 KHz | | | | As defined in clause 6.3.2 in TS 36.331. |
| maxHARQ-Msg3Tx | 4 | | | | As defined in table 5.7.1-2 in TS 36.211 |
| Backoff Parameter Index | 2 | | | | As defined in table 7.2-1 in TS 36.321 |
| Configured UE transmitted power () | Maximum value allowed by the applicable UE power class | | | | As defined in clause 6.2.5 in TS 36.102 |
| **Parameters per PRACH CE Levels** | | | | | |
| ***CE Level*** | ***Level 0*** | ***Level 1*** | ***Level 2*** | ***Level 3*** |  |
| prach-ConfigIndex | 4 | 4 | 4 | 4 | As defined in table 5.7.1-2 in TS 36.211 |
| prach-FreqOffset | 0 | 0 | 0 | 0 |  |
| prach-StartingSubframe | sf2 | sf4 | sf16 | sf64 |  |
| maxNumPreambleAttempt | n3 | n5 | n7 | n10 |  |
| numRepetitionPerPreambleAttempt | n1 | n4 | n16 | n64 |  |
| mpdcch-NarrowbandsToMonitor | 2 | 2 | 2 | 2 |  |
| mpdcch-NumRepetition-RA | r8 | r8 | r128 | r128 |  |
| prach-HoppingConfig | Off | Off | Off | Off |  |
| Note 1: See Clause 6.3.2 in TS 36.331 for further information on the parameters in this table. | | | | | |

##### A.14.3.2.1.2 Test Requirements

Contention based random access is triggered by *not* explicitly assigning a random access preamble via dedicated signalling in the downlink.

A.14.3.2.1.2.1 Random Access Response Reception

To test the UE behavior specified in Subclause 6.2.2, the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preamble transmission attempts (the preamble may be transmitted multiple times in each attempt) have been received by the System Simulator. In response to the first 4 preamble transmission attempts, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble.

The UE may stop monitoring for Random Access Response(s) and shall transmit the msg3 if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble.

The UE shall re-select a preamble and transmit with the calculated PRACH transmission power when the backoff time expires if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Subclause 6.2.2. The power of the first preamble shall be -25 dBm with an accuracy specified in clause 6.3.5.1.1 of TS 36.102 [60]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.102 [60].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Subclause 7.24A.2.

A.14.3.2.1.2.2 No Random Access Response Reception

To test the UE behavior specified in subclause 6.2.2.1.2, the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preamble transmission attempts have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preamble transmission attempts.

The UE shall re-select a preamble and transmit with the calculated PRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window.

In addition, the power applied to all preambles shall be in accordance with what is specified in Subclause 6.2.2. The power of the first preamble shall be -25 dBm with an accuracy specified in clause 6.3.5.1.1 of TS 36.102 [60]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.102 [60].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Subclause 7.24A.2.

A.14.3.2.1.2.3 Receiving a NACK on msg3

To test the UE behavior specified in subclause 6.2.2.1.3, the System Simulator shall NACK *all* UE msg3 following a successful Random Access Response.

The UE shall re-transmit the msg3 upon the reception of a NACK on msg3 until the maximum number of HARQ re-transmissions is reached.

A.14.3.2.1.2.4 Reception of an Incorrect Message over Temporary C-RNTI

To test the UE behavior specified in Subclause 6.2.2.1.5, the System Simulator shall send a message addressed to the temporary C-RNTI with a UE Contention Resolution Identity included in the MAC control element *not* matching the CCCH SDU transmitted in msg3 uplink message.

The UE shall re-select a preamble and transmit with the calculated PRACH transmission power when the backoff time expires unless the received message includes a UE Contention Resolution Identity MAC control element and the UE Contention Resolution Identity included in the MAC control element matches the CCCH SDU transmitted in the uplink message.

A.14.3.2.1.2.5 Reception of a Correct Message over Temporary C-RNTI

To test the UE behavior specified in Subclause 6.2.2.1.5, the System Simulator shall send a message addressed to the temporary C-RNTI with a UE Contention Resolution Identity included in the MAC control element matching the CCCH SDU transmitted in the msg3 uplink message.

The UE shall send ACK if the Contention Resolution is successful.

A.14.3.2.1.2.6 Contention Resolution Timer expiry

To test the UE behavior specified in Subclause 6.2.2.1.6, the System Simulator shall *not* send a response to a msg3.

The UE shall re-select a preamble and transmit with the calculated PRACH transmission power when the backoff time expires if the Contention Resolution Timer expires.

A.14.3.2.1.2.7 PRACH Resource Selection

The UE shall select PRACH resources and transmits or re- transmits PRACH preambles using the PRACH resources and PRACH configuration corresponding to the coverage enhancement level **0**.

Note: The PRACH Resource Selection requirement is already assumed for testing the other PRACH requirements.

#### A.14.3.2.2 E-UTRAN HD-FDD Contention Based Random Access Test for Cat-M1 UEs in Normal Coverage for satellite access

##### A.14.3.2.2.1 Test Purpose and Environment

The purpose of this test is to verify whether the behavior of the random access procedure of a Cat-M1 UE in Normal Coverage for satellite access is according to the requirements, whether the PRACH power settings and timing are within specified limits, and whether the UE determines properly the enhanced coverage level based on the RSRP measurement and the configured criterion in RSRP-ThresholdsPrach [2]. This test will verify the requirements in Clause 6.2.2, Clause 6.2.3A and Clause 7.24A.2 in an AWGN model.

During the test, the test system shall emulate and send the GNSS signal to the test UE by AT command. The UE shall be provided with the valid information about the SAN serving cells before the test.

For this test a single cell is used. The test parameters are given in tables A.14.3.2.2.1-1 to A.14.3.2.2.1-4.

Table A.14.3.2.2.1-1: Supported test configurations

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | GSO, HD-FDD duplex mode |
| 2 | NGSO, HD-FDD duplex mode |
| Note: If UE supports both NGSO and GSO, the test case Config 1 can be skipped if the UE passes test case Config 2. | |

Table A.14.3.2.2.1-2: General test parameters for HD-FDD contention based random access test

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comments** |
| E-UTRA RF Channel Number |  | 1 |  | |
| BWchannel | MHz | 1.4 |  | |
| OCNG Pattern Note 1 |  | OP.21 FDD | As defined in A.3.2.1.21. | |
| PDSCH parameters Note 2 |  | R.49 HD-FDD | As defined in A.3.1.4.2 | |
| MPDCCH parameters Note 2 |  | R.47 HD-FDD | As defined in A.3.1.3.2 | |
| PBCH\_RA | dB | 0 |  | |
| PBCH\_RB | dB |  | |
| PSS\_RA | dB |  | |
| SSS\_RA | dB |  | |
| MPDCCH\_RA | dB |  | |
| MPDCCH\_RB | dB |  | |
| PDSCH\_RA | dB |  | |
| PDSCH\_RB | dB |  | |
| OCNG\_RA Note 1 | dB |  | |
| OCNG\_RB Note 1 | dB |  | |
|  | dBm/15 KHz | -103 |  | |
|  | dB | 3 |  | |
| Note 3 | dB | 3 |  | |
| RSRP Note 3 | dBm/15 KHz | -100 |  | |
| Io Note 3 | dBm/9 MHz | -70.45 |  | |
| Propagation Condition | - | AWGN |  | |
| Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.  Note 2: The PDSCH and MPDCCH reference measurement channels are used in the test only when a downlink transmission dedicated to the UE under test is required.  Note 3: Es/Iot, RSRP and Io level has been derived from other parameters for information purpose. They are not settable parameters themselves. | | | |

Table A.14.3.2.2.1-3: RACH-Configuration parameters for HD-FDD contention based random access test

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Field** | **Value** | | | | **Comment** |
| **Parameters not per CE Levels** | | | | | |
| powerRampingStep | dB2 | | | |  |
| preambleInitialReceivedTargetPower | dBm-120 | | | |  |
| preambleTransMax | n6 | | | |  |
| maxHARQ-Msg3Tx | 4 | | | |  |
| rar-HoppingConfig | Off | | | |  |
| **Parameters per CE Levels** | | | | | |
| ***CE Level*** | ***Level 0*** | ***Level 1*** | ***Level 2*** | ***Level 3*** |  |
| ra-ResponseWindowSize (per CE) | sf20 | sf80 | sf180 | sf320 |  |
| mac-ContentionResolutionTimer (per CE) | sf80 | sf120 | sf200 | sf480 |  |
| PreambleMappingInfo  {firstPreamble, lastPreamble} | {0, 9} | {10,19} | {20,29} | {30,39} |  |
| Note: For further information see Clause 6.3.2 in TS 36.331. | | | | | |

Table A.14.3.2.2.1-4: PRACH-Configuration parameters for HD-FDD contention based random access test

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Field** | **Value** | | | | **Comment** |
| **Parameters not per CE Levels** | | | | | |
| rsrp-ThresholdsPrach | {24, 27, 33} | | | | Corresponding to {-116, -113, -107} dBm as defined in Section 9.1.21.5 |
| mpdcch-startSF-CSS-RA | v1 | | | |  |
| referenceSignalPower | -5 dBm/15 KHz | | | | As defined in clause 6.3.2 in TS 36.331. |
| maxHARQ-Msg3Tx | 4 | | | | As defined in table 5.7.1-2 in TS 36.211 |
| Backoff Parameter Index | 2 | | | | As defined in table 7.2-1 in TS 36.321 |
| Configured UE transmitted power () | Maximum value allowed by the applicable UE power class | | | | As defined in clause 6.2.5 in TS 36.102 |
| **Parameters per PRACH CE Levels** | | | | | |
| ***CE Level*** | ***Level 0*** | ***Level 1*** | ***Level 2*** | ***Level 3*** |  |
| prach-ConfigIndex | 4 | 4 | 4 | 4 | As defined in table 5.7.1-2 in TS 36.211 |
| prach-FreqOffset | 0 | 0 | 0 | 0 |  |
| prach-StartingSubframe | sf2 | sf4 | sf16 | sf64 |  |
| maxNumPreambleAttempt | n3 | n5 | n7 | n10 |  |
| numRepetitionPerPreambleAttempt | n1 | n4 | n16 | n64 |  |
| mpdcch-NarrowbandsToMonitor | 2 | 2 | 2 | 2 |  |
| mpdcch-NumRepetition-RA | r8 | r8 | r128 | r128 |  |
| prach-HoppingConfig | Off | Off | Off | Off |  |
| Note 1: See Clause 6.3.2 in TS 36.331 for further information on the parameters in this table. | | | | | |

##### A.14.3.2.2.2 Test Requirements

Contention based random access is triggered by *not* explicitly assigning a random access preamble via dedicated signalling in the downlink.

A.14.3.2.2.2.1 Random Access Response Reception

To test the UE behavior specified in Subclause 6.2.2, the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preamble transmission attempts (the preamble may be transmitted multiple times in each attempt) have been received by the System Simulator. In response to the first 4 preamble transmission attempts, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble.

The UE may stop monitoring for Random Access Response(s) and shall transmit the msg3 if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble.

The UE shall re-select a preamble and transmit with the calculated PRACH transmission power when the backoff time expires if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Subclause 6.2.2. The power of the first preamble shall be -25 dBm with an accuracy specified in clause 6.3.5.1.1 of TS 36.102 [60]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.102 [60].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Subclause 7.24A.2.

A.14.3.2.2.2.2 No Random Access Response Reception

To test the UE behavior specified in subclause 6.2.2.1.2, the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preamble transmission attempts have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preamble transmission attempts.

The UE shall re-select a preamble and transmit with the calculated PRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window.

In addition, the power applied to all preambles shall be in accordance with what is specified in Subclause 6.2.2. The power of the first preamble shall be -25 dBm with an accuracy specified in clause 6.3.5.1.1 of TS 36.102 [60]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.102 [60].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Subclause 7.24A.2.

A.14.3.2.2.2.3 Receiving a NACK on msg3

To test the UE behavior specified in subclause 6.2.2.1.3, the System Simulator shall NACK *all* UE msg3 following a successful Random Access Response.

The UE shall re-transmit the msg3 upon the reception of a NACK on msg3 until the maximum number of HARQ re-transmissions is reached.

A.14.3.2.2.2.4 Reception of an Incorrect Message over Temporary C-RNTI

To test the UE behavior specified in Subclause 6.2.2.1.5, the System Simulator shall send a message addressed to the temporary C-RNTI with a UE Contention Resolution Identity included in the MAC control element *not* matching the CCCH SDU transmitted in msg3 uplink message.

The UE shall re-select a preamble and transmit with the calculated PRACH transmission power when the backoff time expires unless the received message includes a UE Contention Resolution Identity MAC control element and the UE Contention Resolution Identity included in the MAC control element matches the CCCH SDU transmitted in the uplink message.

A.14.3.2.2.2.5 Reception of a Correct Message over Temporary C-RNTI

To test the UE behavior specified in Subclause 6.2.2.1.5, the System Simulator shall send a message addressed to the temporary C-RNTI with a UE Contention Resolution Identity included in the MAC control element matching the CCCH SDU transmitted in the msg3 uplink message.

The UE shall send ACK if the Contention Resolution is successful.

A.14.3.2.2.2.6 Contention Resolution Timer expiry

To test the UE behavior specified in Subclause 6.2.2.1.6, the System Simulator shall *not* send a response to a msg3.

The UE shall re-select a preamble and transmit with the calculated PRACH transmission power when the backoff time expires if the Contention Resolution Timer expires.

A.14.3.2.2.2.7 PRACH Resource Selection

The UE shall select PRACH resources and transmits or re- transmits PRACH preambles using the PRACH resources and PRACH configuration corresponding to the coverage enhancement level **0**.

Note: The PRACH Resource Selection requirement is already assumed for testing the other PRACH requirements.

#### A.14.3.2.3 E-UTRAN FDD Contention Based Random Access Test for Cat-M1 UEs in Enhanced Coverage for satellite access

##### A.14.3.2.3.1 Test Purpose and Environment

The purpose of this test is to verify whether the behavior of the random access procedure of a Cat-M1 UE in Enhanced Coverage for satellite access is according to the requirements, whether the PRACH power settings and timing are within specified limits, and whether the UE determines properly the enhanced coverage level based on the RSRP measurement and the configured criterion in RSRP-ThresholdsPrach [2]. This test will verify the requirements in Clause 7.24A.2, Clause 6.2.3A and Clause 7.1.2 in an AWGN model.

During the test, the test system shall emulate and send the GNSS signal to the test UE by AT command. The UE shall be provided with the valid information about the SAN serving cells before the test.

For this test a single cell is used. The test parameters are given in tables A.14.3.2.3.1-1 to A.14.3.2.3.1-4.

Table A.14.3.2.3-1: Supported test configurations

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | GSO, HD-FDD duplex mode |
| 2 | NGSO, HD-FDD duplex mode |
| Note: If UE supports both NGSO and GSO, the test case Config 1 can be skipped if the UE passes test case Config 2. | |

Table A.14.3.2.3.1-2: General test parameters for FDD contention based random access test

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comments** |
| E-UTRA RF Channel Number |  | 1 |  | |
| BWchannel | MHz | 1.4 |  | |
| OCNG Pattern Note 1 |  | OP.21 FDD | As defined in A.3.2.1.21. | |
| PDSCH parameters Note 2 |  | R.52 FDD | As defined in A.3.1.4.4 | |
| MPDCCH parameters Note 2 |  | R.50 FDD | As defined in A.3.1.3.4 | |
| PBCH\_RA | dB | 0 |  | |
| PBCH\_RB | dB |  | |
| PSS\_RA | dB |  | |
| SSS\_RA | dB |  | |
| MPDCCH\_RA | dB |  | |
| MPDCCH\_RB | dB |  | |
| PDSCH\_RA | dB |  | |
| PDSCH\_RB | dB |  | |
| OCNG\_RA Note 1 | dB |  | |
| OCNG\_RB Note 1 | dB |  | |
|  | dBm/15 KHz | -98 |  | |
|  | dB | -12 |  | |
| Note 3 | dB | -12 |  | |
| RSRP Note 3 | dBm/15 KHz | -110 |  | |
| Io Note 3 | dBm/9 MHz | -70 |  | |
| Propagation Condition | - | AWGN |  | |
| Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.  Note 2: The PDSCH and MPDCCH reference measurement channels are used in the test only when a downlink transmission dedicated to the UE under test is required.  Note 3: Es/Iot, RSRP and Io level has been derived from other parameters for information purpose. They are not settable parameters themselves. | | | |

Table A.14.3.2.3.1-3: RACH-Configuration parameters for FDD contention based random access test

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Field** | **Value** | | | | **Comment** |
| **Parameters not per CE Levels** | | | | | |
| powerRampingStep | dB2 | | | |  |
| preambleInitialReceivedTargetPower | dBm-120 | | | |  |
| preambleTransMax | n6 | | | |  |
| maxHARQ-Msg3Tx | 4 | | | |  |
| rar-HoppingConfig | Off | | | |  |
| **Parameters per CE Levels** | | | | | |
| ***CE Level*** | ***Level 0*** | ***Level 1*** | ***Level 2*** | ***Level 3*** |  |
| ra-ResponseWindowSize (per CE) | sf20 | sf80 | sf180 | sf320 |  |
| mac-ContentionResolutionTimer (per CE) | sf80 | sf120 | sf200 | sf480 |  |
| PreambleMappingInfo  {firstPreamble, lastPreamble} | {0, 9} | {10,19} | {20,29} | {30,39} |  |
| Note: For further information see Clause 6.3.2 in TS 36.331. | | | | | |

Table A.14.3.2.3.1-4: PRACH-Configuration parameters for FDD contention based random access test

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Field** | **Value** | | | | **Comment** |
| **Parameters not per CE Levels** | | | | | |
| rsrp-ThresholdsPrach | {23,37,47} | | | | Corresponding to {-117, -103, -93} dBm as defined in Section 9.1.21.5 |
| mpdcch-startSF-CSS-RA | v1 | | | |  |
| referenceSignalPower | -5 dBm/15 KHz | | | | As defined in clause 6.3.2 in TS 36.331. |
| maxHARQ-Msg3Tx | 4 | | | | As defined in table 5.7.1-2 in TS 36.211 |
| Backoff Parameter Index | 2 | | | | As defined in table 7.2-1 in TS 36.321 |
| Configured UE transmitted power () | Maximum value allowed by the applicable UE power class | | | | As defined in clause 6.2.5 in TS 36.102 |
| **Parameters per PRACH CE Levels** | | | | | |
| ***CE Level*** | ***Level 0*** | ***Level 1*** | ***Level 2*** | ***Level 3*** |  |
| prach-ConfigIndex | 4 | 4 | 4 | 4 | As defined in table 5.7.1-2 in TS 36.211 |
| prach-FreqOffset | 0 | 0 | 0 | 0 |  |
| prach-StartingSubframe | sf2 | sf4 | sf16 | sf64 |  |
| maxNumPreambleAttempt | n3 | n5 | n7 | n10 |  |
| numRepetitionPerPreambleAttempt | n1 | n4 | n16 | n64 |  |
| mpdcch-NarrowbandsToMonitor | 2 | 2 | 2 | 2 |  |
| mpdcch-NumRepetition-RA | r8 | r8 | r128 | r128 |  |
| prach-HoppingConfig | Off | Off | Off | Off |  |
| Note 1: See Clause 6.3.2 in TS 36.331 for further information on the parameters in this table. | | | | | |

##### A.14.3.2.3.2 Test Requirements

Contention based random access is triggered by *not* explicitly assigning a random access preamble via dedicated signalling in the downlink.

A.14.3.2.3.2.1 Random Access Response Reception

To test the UE behavior specified in Subclause 6.2.2, the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preamble transmission attempts (the preamble may be transmitted multiple times in each attempt) have been received by the System Simulator. In response to the first 4 preamble transmission attempts, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble.

The UE may stop monitoring for Random Access Response(s) and shall transmit the msg3 if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble.

The UE shall re-select a preamble and transmit with the calculated PRACH transmission power when the backoff time expires if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Subclause 6.2.2. The power of the first preamble shall be -27 dBm. The power of the first preamble shall be -27 dBm with an accuracy specified in clause 6.3.5.1.1 of TS 36.102 [60]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.102 [60].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Subclause7.24A.2.

A.14.3.2.3.2.2 No Random Access Response Reception

To test the UE behavior specified in subclause 6.2.2.1.2, the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preamble transmission attempts have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preamble transmission attempts.

The UE shall re-select a preamble and transmit with the calculated PRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window.

In addition, the power applied to all preambles shall be in accordance with what is specified in Subclause 6.2.2. The power of the first preamble shall be -27 dBm with an accuracy specified in clause 6.3.5.1.1 of TS 36.102 [60]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.102 [60].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Subclause 7.24A.2.

A.14.3.2.3.2.3 Receiving a NACK on msg3

To test the UE behavior specified in subclause 6.2.2.1.3, the System Simulator shall NACK *all* UE msg3 following a successful Random Access Response.

The UE shall re-transmit the msg3 upon the reception of a NACK on msg3 until the maximum number of HARQ re-transmissions is reached.

A.14.3.2.3.2.4 Reception of an Incorrect Message over Temporary C-RNTI

To test the UE behavior specified in Subclause 6.2.2.1.5, the System Simulator shall send a message addressed to the temporary C-RNTI with a UE Contention Resolution Identity included in the MAC control element *not* matching the CCCH SDU transmitted in msg3 uplink message.

The UE shall re-select a preamble and transmit with the calculated PRACH transmission power when the backoff time expires unless the received message includes a UE Contention Resolution Identity MAC control element and the UE Contention Resolution Identity included in the MAC control element matches the CCCH SDU transmitted in the uplink message.

A.14.3.2.3.2.5 Reception of a Correct Message over Temporary C-RNTI

To test the UE behavior specified in Subclause 6.2.2.1.5, the System Simulator shall send a message addressed to the temporary C-RNTI with a UE Contention Resolution Identity included in the MAC control element matching the CCCH SDU transmitted in the msg3 uplink message.

The UE shall send ACK if the Contention Resolution is successful.

A.14.3.2.3.2.6 Contention Resolution Timer expiry

To test the UE behavior specified in Subclause 6.2.2.1.6, the System Simulator shall *not* send a response to a msg3.

The UE shall re-select a preamble and transmit with the calculated PRACH transmission power when the backoff time expires if the Contention Resolution Timer expires.

A.14.3.2.3.2.7 PRACH Resource Selection

The UE shall select PRACH resources and transmits or re- transmits PRACH preambles using the PRACH resources and PRACH configuration corresponding to the coverage enhancement level 2.

Note: The PRACH Resource Selection requirement is already assumed for testing the other PRACH requirements.

#### A.14.3.2.4 E-UTRAN HD-FDD Contention Based Random Access Test for Cat-M1 UEs in Enhanced Coverage for satellite access

##### A.14.3.2.4.1 Test Purpose and Environment

The purpose of this test is to verify whether the behavior of the random access procedure of a Cat-M1 UE in Enhanced Coverage for satellite access is according to the requirements, whether the PRACH power settings and timing are within specified limits, and whether the UE determines properly the enhanced coverage level based on the RSRP measurement and the configured criterion in RSRP-ThresholdsPrach [2]. This test will verify the requirements in Clause 6.2.2, Clause 6.2.3A and Clause 7.24A.2 in an AWGN model.

During the test, the test system shall emulate and send the GNSS signal to the test UE by AT command. The UE shall be provided with the valid information about the SAN serving cells before the test.

For this test a single cell is used. The test parameters are given in tables A.14.3.2.4.1-1 to A.14.3.2.4.1-4.

Table A.14.3.2.4-1: Supported test configurations

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | GSO, HD-FDD duplex mode |
| 2 | NGSO, HD-FDD duplex mode |
| Note: If UE supports both NGSO and GSO, the test case Config 1 can be skipped if the UE passes test case Config 2. | |

Table A.14.3.2.4.1-2: General test parameters for HD-FDD contention based random access test

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comments** |
| E-UTRA RF Channel Number |  | 1 |  | |
| BWchannel | MHz | 1.4 |  | |
| OCNG Pattern Note 1 |  | OP.21 FDD | As defined in A.3.2.1.21. | |
| PDSCH parameters Note 2 |  | R.53 HD-FDD | As defined in A.3.1.4.5 | |
| MPDCCH parameters Note 2 |  | R.51 HD-FDD | As defined in A.3.1.3.5 | |
| PBCH\_RA | dB | 0 |  | |
| PBCH\_RB | dB |  | |
| PSS\_RA | dB |  | |
| SSS\_RA | dB |  | |
| MPDCCH\_RA | dB |  | |
| MPDCCH\_RB | dB |  | |
| PDSCH\_RA | dB |  | |
| PDSCH\_RB | dB |  | |
| OCNG\_RA Note 1 | dB |  | |
| OCNG\_RB Note 1 | dB |  | |
|  | dBm/15 KHz | -98 |  | |
|  | dB | -12 |  | |
| Note 3 | dB | -12 |  | |
| RSRP Note 3 | dBm/15 KHz | -110 |  | |
| Io Note 3 | dBm/9 MHz | -70 |  | |
| Propagation Condition | - | AWGN |  | |
| Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.  Note 2: The PDSCH and MPDCCH reference measurement channels are used in the test only when a downlink transmission dedicated to the UE under test is required.  Note 3: Es/Iot, RSRP and Io level has been derived from other parameters for information purpose. They are not settable parameters themselves. | | | |

Table A.14.3.2.4.1-3: RACH-Configuration parameters for HD-FDD contention based random access test

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Field** | **Value** | | | | **Comment** |
| **Parameters not per CE Levels** | | | | | |
| powerRampingStep | dB2 | | | |  |
| preambleInitialReceivedTargetPower | dBm-120 | | | |  |
| preambleTransMax | n6 | | | |  |
| maxHARQ-Msg3Tx | 4 | | | |  |
| rar-HoppingConfig | Off | | | |  |
| **Parameters per CE Levels** | | | | | |
| ***CE Level*** | ***Level 0*** | ***Level 1*** | ***Level 2*** | ***Level 3*** |  |
| ra-ResponseWindowSize (per CE) | sf20 | sf80 | sf180 | sf320 |  |
| mac-ContentionResolutionTimer (per CE) | sf80 | sf120 | sf200 | sf480 |  |
| PreambleMappingInfo  {firstPreamble, lastPreamble} | {0, 9} | {10,19} | {20,29} | {30,39} |  |
| Note: For further information see Clause 6.3.2 in TS 36.331. | | | | | |

Table A.14.3.2.4.1-4: PRACH-Configuration parameters for HD-FDD contention based random access test

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Field** | **Value** | | | | **Comment** |
| **Parameters not per CE Levels** | | | | | |
| rsrp-ThresholdsPrach | {23,37,47} | | | | Corresponding {-117, -103, -93} dBm as defined in Section 9.1.21.5 |
| mpdcch-startSF-CSS-RA | v1 | | | |  |
| referenceSignalPower | -5 dBm/15 KHz | | | | As defined in clause 6.3.2 in TS 36.331. |
| maxHARQ-Msg3Tx | 4 | | | | As defined in table 5.7.1-2 in TS 36.211 |
| Backoff Parameter Index | 2 | | | | As defined in table 7.2-1 in TS 36.321 |
| Configured UE transmitted power () | Maximum value allowed by the applicable UE power class | | | | As defined in clause 6.2.5 in TS 36.102 |
| **Parameters per PRACH CE Levels** | | | | | |
| ***CE Level*** | ***Level 0*** | ***Level 1*** | ***Level 2*** | ***Level 3*** |  |
| prach-ConfigIndex | 4 | 4 | 4 | 4 | As defined in table 5.7.1-2 in TS 36.211 |
| prach-FreqOffset | 0 | 0 | 0 | 0 |  |
| prach-StartingSubframe | sf2 | sf4 | sf16 | sf64 |  |
| maxNumPreambleAttempt | n3 | n5 | n7 | n10 |  |
| numRepetitionPerPreambleAttempt | n1 | n4 | n16 | n64 |  |
| mpdcch-NarrowbandsToMonitor | 2 | 2 | 2 | 2 |  |
| mpdcch-NumRepetition-RA | r8 | r8 | r128 | r128 |  |
| prach-HoppingConfig | Off | Off | Off | Off |  |
| Note 1: See Clause 6.3.2 in TS 36.331 for further information on the parameters in this table. | | | | | |

##### A.14.3.2.4.2 Test Requirements

Contention based random access is triggered by *not* explicitly assigning a random access preamble via dedicated signalling in the downlink.

A.14.3.2.4.2.1 Random Access Response Reception

To test the UE behavior specified in Subclause 6.2.2, the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preamble transmission attempts (the preamble may be transmitted multiple times in each attempt) have been received by the System Simulator. In response to the first 4 preamble transmission attempts, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble.

The UE may stop monitoring for Random Access Response(s) and shall transmit the msg3 if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble.

The UE shall re-select a preamble and transmit with the calculated PRACH transmission power when the backoff time expires if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Subclause 6.2.2. The power of the first preamble shall be -27 dBm. The power of the first preamble shall be -27 dBm with an accuracy specified in clause 6.3.5.1.1 of TS 36.102 [60]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.102 [60].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Subclause 7.24A.2.

A.14.3.2.4.2.2 No Random Access Response Reception

To test the UE behavior specified in subclause 6.2.2.1.2, the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preamble transmission attempts have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preamble transmission attempts.

The UE shall re-select a preamble and transmit with the calculated PRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window.

In addition, the power applied to all preambles shall be in accordance with what is specified in Subclause 6.2.2. The power of the first preamble shall be -27 dBm with an accuracy specified in clause 6.3.5.1.1 of TS 36.102 [60]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.5.2.1 of TS 36.102 [60].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Subclause 7.24A.2.

A.14.3.2.4.2.3 Receiving a NACK on msg3

To test the UE behavior specified in subclause 6.2.2.1.3, the System Simulator shall NACK *all* UE msg3 following a successful Random Access Response.

The UE shall re-transmit the msg3 upon the reception of a NACK on msg3 until the maximum number of HARQ re-transmissions is reached.

A.14.3.2.4.2.4 Reception of an Incorrect Message over Temporary C-RNTI

To test the UE behavior specified in Subclause 6.2.2.1.5, the System Simulator shall send a message addressed to the temporary C-RNTI with a UE Contention Resolution Identity included in the MAC control element *not* matching the CCCH SDU transmitted in msg3 uplink message.

The UE shall re-select a preamble and transmit with the calculated PRACH transmission power when the backoff time expires unless the received message includes a UE Contention Resolution Identity MAC control element and the UE Contention Resolution Identity included in the MAC control element matches the CCCH SDU transmitted in the uplink message.

A.14.3.2.4.2.5 Reception of a Correct Message over Temporary C-RNTI

To test the UE behavior specified in Subclause 6.2.2.1.5, the System Simulator shall send a message addressed to the temporary C-RNTI with a UE Contention Resolution Identity included in the MAC control element matching the CCCH SDU transmitted in the msg3 uplink message.

The UE shall send ACK if the Contention Resolution is successful.

A.14.3.2.4.2.6 Contention Resolution Timer expiry

To test the UE behavior specified in Subclause 6.2.2.1.6, the System Simulator shall *not* send a response to a msg3.

The UE shall re-select a preamble and transmit with the calculated PRACH transmission power when the backoff time expires if the Contention Resolution Timer expires.

A.14.3.2.4.2.7 PRACH Resource Selection

The UE shall select PRACH resources and transmits or re- transmits PRACH preambles using the PRACH resources and PRACH configuration corresponding to the coverage enhancement level 2.

Note: The PRACH Resource Selection requirement is already assumed for testing the other PRACH requirements.

<End of Change 2>

<Start of Change 3>

### A.14.4.2 UE timing advance for satellite access

This clause provides the UE timing advance test cases for Cat-M1 UEs using satellite access, the supported test configurations are provided in Table A.14.4.2-1.

Table A.14.4.2-1: Supported test configurations

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | GSO, HD-FDD duplex mode |
| 2 | NGSO, HD-FDD duplex mode |
| Note: If UE supports both NGSO and GSO, the test case Config 1 can be skipped if the UE passes test case Config 2. | |

#### A.14.4.2.1 E-UTRAN FDD Timing Advance Adjustment Accuracy Test for Cat-M1 UE in CEModeA

##### A.14.4.2.1.1 Test Purpose and Environment

The purpose of the test is to verify E-UTRAN FDD Timing Advance adjustment accuracy requirements for Cat-M1 UE configured with CEModeA, defined in clause 7.28A.2.2, in an AWGN model.

The test parameters are given in tables A.14.4.2.1.1-1, A.14.4.2.1.1-2, and A.14.4.2.1.1-3. The test consists of two successive time periods, with time duration of T1 and T2 respectively. In each time period, timing advance commands are sent to the UE and Sounding Reference Signals (SRS), as specified in table A.14.4.2.1.1-3, are sent from the UE and received by the test equipment. By measuring the reception of the SRS, the transmit timing, and hence the timing advance adjustment accuracy, can be measured.

The UE shall be provided with the valid information about the Satellite Access Node serving cell before and during the test via SI messages configured as provided in Table A.14.4.2.1.1-4. During time period T1, the test equipment shall send one message with a Timing Advance Command MAC Control Element, as specified in Clause 6.1.3.5 in TS 36.321. The Timing Advance Command value shall be set to 31, which according to Clause 4.2.3 in TS 36.213 results in zero adjustment of the Timing Advance. In this way, a reference value for the timing advance used by the UE is established. The reference timing advance used by the UE is equal to: .

During time period T2, the test equipment shall send a sequence of messages with Timing Advance Command MAC Control Elements, with Timing Advance Command value specified in table A.14.4.2.1.1-2. This value shall result in changes of the timing advance used by the UE, and the accuracy of the change shall then be measured, using the SRS sent from the UE.

As specified in Clause 7.28A.2.1, the UE adjusts its uplink timing at sub-frame *n*+6+Koffset for a timing advance command received in sub-frame n. This delay must be taken into account when measuring the timing advance adjustment accuracy, via the SRS sent from the UE.

The UE Time Alignment Timer, described in Clause 5.2 in TS 36.321, shall be configured so that it does not expire in the duration of the test.

Table A.14.4.2.1.1-1: General Test Parameters for E-UTRAN FDD Timing Advance Accuracy Test for Cat-M1 UE in CEModeA

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comment** |
| PDSCH parameters:  DL Reference Measurement Channel |  | R.48 FDD | As specified in clause A.3.1.4.1 |
| MPDCCH parameters:  DL Reference Measurement Channel |  | R. 46 FDD | As specified in clause A.3.1.3.1 |
| Timing Advance Command (*TA*) value during T1 |  | 31 | *NTA* = 0 for the purpose of establishing a reference value from which the timing advance adjustment accuracy can be measured during T2 |
| Timing Advance Command (*TA*) value during T2 |  | 39 | *NTA* = 128 |
| DRX |  | OFF |  |
| T1 | s | 5 |  |
| T2 | s | 5 |  |

Table A.14.4.2.1.1-2: Cell specific Test Parameters for E-UTRAN FDD UE Timing Advance Accuracy Test for Cat-M1 UE in CEModeA

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | |
| **T1** | **T2** |
| E-UTRA RF Channel Number |  | 1 | |
| BWchannel | MHz | 1.4 | |
| PDSCH parameters:  DL Reference Measurement Channel |  | R.48 FDD | |
| MPDCCH parameters:  DL Reference Measurement Channel |  | R. 46 FDD | |
| OCNG Patterns defined in A.3.2.1.21 |  | OP.21 FDD | |
| PBCH\_RA | dB |  | |
| PBCH\_RB | dB |  | |
| PSS\_RA | dB |  | |
| SSS\_RA | dB |  | |
| MPDCCH\_RA | dB |  | |
| MPDCCH\_RB | dB | 0 | |
| PDSCH\_RA | dB |  | |
| PDSCH\_RB | dB |  | |
| OCNG\_RANote1 | dB |  | |
| OCNG\_RBNote1 | dB |  | |
| Timing Advance Command (*TA*) |  | 31 | 39 |
|  | dB | 3 | |
|  | dBm/15 KHz | -98 | |
|  | dB | 3 | |
| IoNote2 | dBm/9 MHz | -65.5 | |
| Propagation Condition |  | AWGN | |
| Antenna configuration |  | 1x1 | |
| Note 1: OCNG shall be used such that cells is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Io level has been derived from other parameters for information purpose. It is not a settable parameter. | | | |

Table A.14.4.2.1.1-3: Sounding Reference Symbol Configuration for E-UTRAN FDD UE Transmit Timing Accuracy Test for Cat-M1 UE in CEModeA

|  |  |  |
| --- | --- | --- |
| **Field** | **Value** | **Comment** |
| srsBandwidthConfiguration | Bw5 |  |
| srsSubframeConfiguration | sc3 | Once every 5 subframes |
| ackNackSrsSimultaneousTransmission | FALSE |  |
| srsMaxUpPTS | N/A | Not applicable for E-UTRAN FDD |
| srsBandwidth | 0 | No hopping |
| srsHoppingBandwidth | hbw0 |
| frequencyDomainPosition | 0 |  |
| Duration | TRUE | Indefinite duration |
| Srs-ConfigurationIndex | 17 | SRS periodicity of 20. |
| transmissionComb | 0 |  |
| cyclicShift | cs0 | No cyclic shift |
| SRS-AntennaPort | an1 | Number of antenna ports used for SRS transmission |
| Note 1: For further information see clause 6.3.2 in TS 36.331. | | |

Table A.14.4.2.1.1-4: NTN specific test for E-UTRAN FDD UE Transmit Timing Accuracy Test for Cat-M1 UE in CEModeA

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Value** | **Comment** |
| Configuration 1 | SCC1 | GSO Test Configuration |
| Configuration 2 | SCC2 | NGSO Test Configuration |

##### A.14.4.2.1.2 Test Requirements

The UE shall apply the signalled Timing Advance value to the transmission timing at the designated activation time i.e. 6 + Koffset sub frames after the reception of the timing advance command. The applied timing advance shall be additional to any variation on the timing advance components caused by the satellite ephemeris and common delay information.

The Timing Advance adjustment accuracy shall be within the limits specified in clause 7.28A.2.2.

The rate of correct Timing Advance adjustments observed during repeated tests shall be at least 90%.

#### A.14.4.2.2 E-UTRAN HD-FDD UE Timing Advance Adjustment Accuracy Test for Cat-M1 UE in CEModeA

##### A.14.4.2.2.1 Test Purpose and Environment

The purpose of the test is to verify E-UTRAN HD-FDD Timing Advance adjustment accuracy requirements for Cat-M1 UE configured with CEModeA, defined in clause 7.28A.2.2, in an AWGN model.

The test parameters are given in tables A.14.4.2.2.1-1, A.14.4.2.2.1-2, and A.14.4.2.2.1-3. The test consists of two successive time periods, with time duration of T1 and T2 respectively. In each time period, timing advance commands are sent to the UE and Sounding Reference Signals (SRS), as specified in table A.14.4.2.2.1-3, are sent from the UE and received by the test equipment. By measuring the reception of the SRS, the transmit timing, and hence the timing advance adjustment accuracy, can be measured.

The UE shall be provided with the valid information about the Satellite Access Node serving cell before and during the test via SI messages configured as provided in Table A.14.4.2.2.1-4. During time period T1, the test equipment shall send one message with a Timing Advance Command MAC Control Element, as specified in Clause 6.1.3.5 in TS 36.321. The Timing Advance Command value shall be set to 31, which according to Clause 4.2.3 in TS 36.213 results in zero adjustment of the Timing Advance. In this way, a reference value for the timing advance used by the UE is established. The reference timing advance used by the UE is equal to: .

During time period T2, the test equipment shall send a sequence of messages with Timing Advance Command MAC Control Elements, with Timing Advance Command value specified in table A.14.4.2.2.1-2. This value shall result in changes of the timing advance used by the UE, and the accuracy of the change shall then be measured, using the SRS sent from the UE.

As specified in Clause 7.28A.2.1, the UE adjusts its uplink timing at sub-frame *n*+6+Koffset for a timing advance command received in sub-frame n. This delay must be taken into account when measuring the timing advance adjustment accuracy, via the SRS sent from the UE.

The UE Time Alignment Timer, described in Clause 5.2 in TS 36.321, shall be configured so that it does not expire in the duration of the test.

Table A.14.4.2.2.1-1: General Test Parameters for E-UTRAN HD-FDD Timing Advance Accuracy Test for Cat-M1 UE in CEModeA

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comment** |
| PDSCH parameters:  DL Reference Measurement Channel |  | R.49 HD-FDD | As specified in clause A.3.1.4.2 |
| MPDCCH parameters:  DL Reference Measurement Channel |  | R.47 HD-FDD | As specified in clause A.3.1.3.2 |
| Timing Advance Command (*TA*) value during T1 |  | 31 | *NTA* = 0 for the purpose of establishing a reference value from which the timing advance adjustment accuracy can be measured during T2 |
| Timing Advance Command (*TA*) value during T2 |  | 39 | *NTA* = 128 |
| DRX |  | OFF |  |
| T1 | s | 5 |  |
| T2 | s | 5 |  |

Table A.14.4.2.2.1-2: Cell specific Test Parameters for E-UTRAN HD-FDD Timing Advance Accuracy Test for Cat-M1 UE in CEModeA

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | |
| **T1** | **T2** |
| E-UTRA RF Channel Number |  | 1 | |
| BWchannel | MHz | 1.4 | |
| PDSCH parameters:  DL Reference Measurement Channel |  | [R.10 HD-FDD] | |
| MPDCCH parameters:  DL Reference Measurement Channel |  | [R.6 HD-FDD] | |
| OCNG Patterns defined in A.3.2.1.21 |  | OP.21 FDD | |
| PBCH\_RA | dB |  | |
| PBCH\_RB | dB |  | |
| PSS\_RA | dB |  | |
| SSS\_RA | dB |  | |
| MPDCCH\_RA | dB | 0 | |
| MPDCCH\_RB | dB |  | |
| PDSCH\_RA | dB |  | |
| PDSCH\_RB | dB |  | |
| OCNG\_RANote1 | dB |  | |
| OCNG\_RBNote1 | dB |  | |
| Timing Advance Command (*TA*) |  | 31 | 39 |
|  | dB | 3 | |
|  | dBm/15 KHz | -98 | |
|  | dB | 3 | |
| IoNote2 | dBm/9 MHz | -65.5 | |
| Propagation Condition |  | AWGN | |
| Antenna configuration |  | 1x1 | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Io level has been derived from other parameters for information purpose. It is not a settable parameter. | | | |

Table A.14.4.2.2.1-3: Sounding Reference Symbol Configuration for E-UTRAN HD-FDD Transmit Timing Accuracy Test for Cat-M1 UE in CEModeA

|  |  |  |
| --- | --- | --- |
| **Field** | **Value** | **Comment** |
| srsBandwidthConfiguration | Bw5 |  |
| srsSubframeConfiguration | sc3 | Once every 5 subframes |
| ackNackSrsSimultaneousTransmission | FALSE |  |
| srsMaxUpPTS | N/A |  |
| srsBandwidth | 0 | No hopping |
| srsHoppingBandwidth | hbw0 |
| frequencyDomainPosition | 0 |  |
| Duration | TRUE | Indefinite duration |
| Srs-ConfigurationIndex | 17 | SRS periodicity of 20. |
| transmissionComb | 0 |  |
| cyclicShift | cs0 | No cyclic shift |
| SRS-AntennaPort | an1 | Number of antenna ports used for SRS transmission |
| Note 1: For further information see clause 6.3.2 in TS 36.331. | | |

Table A.14.4.2.2.1-4: NTN specific test parameters for E-UTRAN HD-FDD Transmit Timing Accuracy Test for Cat-M1 UE in CEModeA

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Value** | **Comment** |
| Configuration 1 | SCC1 | GSO Test Configuration |
| Configuration 2 | SCC2 | NGSO Test Configuration |

##### A.14.4.2.2.2 Test Requirements

The UE shall apply the signalled Timing Advance value to the transmission timing at the designated activation time i.e. 6+ Koffset sub frames after the reception of the timing advance command.

The Timing Advance adjustment accuracy shall be within the limits specified in clause 7.28A.2.2. The applied timing advance shall be additional to any variation on the timing advance components caused by the satellite ephemeris and common delay information.

The rate of correct Timing Advance adjustments observed during repeated tests shall be at least 90%.

#### A.14.4.2.3 E-UTRAN FDD UE Timing Advance Adjustment Accuracy Test in CEModeB

##### A.14.4.2.3.1 Test Purpose and Environment

The purpose of the test is to verify E-UTRAN FDD Timing Advance adjustment accuracy requirements for Cat-M1 UE configured with CEModeB, defined in clause 7.28A.2.2, in an AWGN model.

The test parameters are given in tables A.14.4.2.3.1-1and A.14.4.2.3.1-2. The test consists of two successive time periods, with time duration of T1 and T2 respectively. In each time period, timing advance commands are sent to the UE and PUSCH are sent from the UE and received by the test equipment. By measuring the reception of the PUSCH, the transmit timing, and hence the timing advance adjustment accuracy, can be measured.

The UE shall be provided with the valid information about the Satellite Access Node serving cell before and during the test via SI messages configured as provided in Table A.14.4.2.3.1-3. During time period T1, the test equipment shall send one message with a Timing Advance Command MAC Control Element, as specified in Clause 6.1.3.5 in TS 36.321. The Timing Advance Command value shall be set to 31, which according to Clause 4.2.3 in TS 36.213 results in zero adjustment of the Timing Advance. In this way, a reference value for the timing advance used by the UE is established. The reference timing advance used by the UE is equal to: .

During time period T2, the test equipment shall send a sequence of messages with Timing Advance Command MAC Control Elements, with Timing Advance Command value specified in table A.14.4.2.3.1-2. This value shall result in changes of the timing advance used by the UE, and the accuracy of the change shall then be measured, using PUSCH sent from the UE.

As specified in Clause 7.28A.2.1, the UE adjusts its uplink timing at sub-frame *n*+6+Koffset for a timing advance command received in sub-frame n. This delay must be taken into account when measuring the timing advance adjustment accuracy, via PUSCH sent from the UE.

The UE Time Alignment Timer, described in Clause 5.2 in TS 36.321, shall be configured so that it does not expire in the duration of the test.

Table A.14.4.2.3.1-1: General Test Parameters for E-UTRAN FDD UE Timing Advance Adjustment Accuracy Test in CEModeB

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comment** |
| Timing Advance Command (*TA*) value during T1 |  | 31 | *NTA* = 0 for the purpose of establishing a reference value from which the timing advance adjustment accuracy can be measured during T2 |
| Timing Advance Command (*TA*) value during T2 |  | 39 | *NTA* = 128 |
| DRX |  | OFF |  |
| T1 | s | 5 |  |
| T2 | s | 5 |  |
| Number of repetitions of MPDCCH |  | 128 |  |
| Number of repetitions of PUSCH |  | 32 |  |

Table A.14.4.2.3.1-2: Cell specific Test Parameters for E-UTRAN FDD UE Timing Advance Adjustment Accuracy Test in CEModeB

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | |
| **T1** | **T2** |
| E-UTRA RF Channel Number |  | 1 | |
| BWchannel | MHz | 1.4 | |
| PDSCH Reference Measurement Channel in clause A.3.1.4.4 |  | R.52 FDD | |
| MPDCCH Reference Measurement Channel in clause A.3.1.3.4 |  | R.50 FDD | |
| OCNG Patterns defined in A.3.2.1.21 |  | OP.21 FDD | |
| PBCH\_RA | dB | 0 | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| MPDCCH\_RA | dB |
| MPDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote1 | dB |
| OCNG\_RBNote1 | dB |
| Timing Advance Command (*TA*) |  | 31 | 39 |
|  | dBm/15 KHz | -98 | |
|  | dB | -12 | |
| Note2 | dB | -12 | |
| RSRP Note2 | dBm/15 KHz | -110 | |
| Io Note2 | dBm/9 MHz | -69.95 | |
| Propagation Condition |  | AWGN | |
| Antenna Configuration |  | 1x1 | |
| Note 1: OCNG shall be used such that cells is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: , RSRP, Io level has been derived from other parameters for information purpose. It is not a settable parameter. | | | |

Table A.14.4.2.3.1-3: NTN specific test for E-UTRAN FDD UE Timing Advance Adjustment Accuracy Test in CEModeB

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Value** | **Comment** |
| Configuration 1 | SCC1 | GSO Test Configuration |
| Configuration 2 | SCC2 | NGSO Test Configuration |

##### A.14.4.2.3.2 Test Requirements

The UE shall apply the signalled Timing Advance value to the transmission timing at the designated activation time i.e. 6 subframes after the reception of the timing advance command.

The Timing Advance adjustment accuracy shall be within the limits specified in clause 7.28A.2.2. The applied timing advance shall be additional to any variation on the timing advance components caused by the satellite ephemeris and common delay information.

The rate of correct Timing Advance adjustments observed during repeated tests shall be at least 90%.

When a repetition period is configured on the uplink, the UE shall not adjust the uplink transmission timing autonomously during an ongoing repetition segment period for which R>1. The repetition segment period is given by the higher layer parameter Tx-Duration as specified in TS 36.331.

#### A.14.4.2.4 E-UTRAN HD-FDD UE Timing Advance Adjustment Accuracy Test in CEModeB

##### A.14.4.2.4.1 Test Purpose and Environment

The purpose of the test is to verify E-UTRAN HD-FDD Timing Advance adjustment accuracy requirements for Cat-M1 UE configured with CEModeB, defined in clause 7.28A.2.2, in an AWGN model.

The test parameters are given in tables A.14.4.2.4.1-1and A.14.4.2.4.1-2. The test consists of two successive time periods, with time duration of T1 and T2 respectively. In each time period, timing advance commands are sent to the UE and PUSCH are sent from the UE and received by the test equipment. By measuring the reception of the PUSCH, the transmit timing, and hence the timing advance adjustment accuracy, can be measured.

The UE shall be provided with the valid information about the Satellite Access Node serving cell before and during the test via SI messages configured as provided in Table A.14.4.2.4.1-3. During time period T1, the test equipment shall send one message with a Timing Advance Command MAC Control Element, as specified in Clause 6.1.3.5 in TS 36.321. The Timing Advance Command value shall be set to 31, which according to Clause 4.2.3 in TS 36.213 results in zero adjustment of the Timing Advance. In this way, a reference value for the timing advance used by the UE is established. The reference timing advance used by the UE is equal to: .

During time period T2, the test equipment shall send a sequence of messages with Timing Advance Command MAC Control Elements, with Timing Advance Command value specified in table A.14.4.2.4.1-2. This value shall result in changes of the timing advance used by the UE, and the accuracy of the change shall then be measured, using PUSCH sent from the UE.

As specified in Clause 7.28A.2.1, the UE adjusts its uplink timing at sub-frame *n*+6+Koffset for a timing advance command received in sub-frame n. This delay must be taken into account when measuring the timing advance adjustment accuracy, via PUSCH sent from the UE.

The UE Time Alignment Timer, described in Clause 5.2 in TS 36.321, shall be configured so that it does not expire in the duration of the test.

Table A.14.4.2.4.1-1: General Test Parameters for E-UTRAN HD-FDD UE Timing Advance Adjustment Accuracy Test in CEModeB

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comment** |
| Timing Advance Command (*TA*) value during T1 |  | 31 | *NTA* = 0 for the purpose of establishing a reference value from which the timing advance adjustment accuracy can be measured during T2 |
| Timing Advance Command (*TA*) value during T2 |  | 39 | *NTA* = 128 |
| DRX |  | OFF |  |
| T1 | s | 5 |  |
| T2 | s | 5 |  |
| Number of repetitions of MPDCCH |  | 128 |  |
| Number of repetitions of PUSCH |  | 32 |  |

Table A.14.4.2.4.1-2: Cell specific Test Parameters for E-UTRAN HD-FDD UE Timing Advance Adjustment Accuracy Test in CEModeB

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | |
| **T1** | **T2** |
| E-UTRA RF Channel Number |  | 1 | |
| BWchannel | MHz | 1.4 | |
| PDSCH Reference Measurement Channel in clause A.3.1.4.5 |  | R.53 HD-FDD | |
| MPDCCH Reference Measurement Channel in clause A.3.1.3.5 |  | R.51 HD-FDD | |
| OCNG Patterns defined in A.3.2.1.21 |  | OP.21 FDD | |
| PBCH\_RA | dB | 0 | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote1 | dB |
| OCNG\_RBNote1 | dB |
| Timing Advance Command (*TA*) |  | 31 | 39 |
|  | dBm/15 KHz | -98 | |
|  | dB | -12 | |
| Note2 | dB | -12 | |
| RSRP Note2 | dBm/15 KHz | -110 | |
| IoNote2 | dBm/9 MHz | -69.95 | |
| Propagation Condition |  | AWGN | |
| Antenna Configuration |  | 1x1 | |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: , RSRP, Io level has been derived from other parameters for information purpose. It is not a settable parameter. | | | |

Table A.14.4.2.3.3-3: NTN specific test for E-UTRAN FDD UE Timing Advance Adjustment Accuracy Test in CEModeB

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Value** | **Comment** |
| Configuration 1 | SCC1 | GSO Test Configuration |
| Configuration 2 | SCC2 | NGSO Test Configuration |

##### A.14.4.2.4.2 Test Requirements

The UE shall apply the signalled Timing Advance value to the transmission timing at the designated activation time i.e. 6 + Koffset sub frames after the reception of the timing advance command.

The Timing Advance adjustment accuracy shall be within the limits specified in clause 7.28A.2.2. The applied timing advance shall be additional to any variation on the timing advance components caused by the satellite ephemeris and common delay information.

The rate of correct Timing Advance adjustments observed during repeated tests shall be at least 90%.

When a repetition period is configured on the uplink, the UE shall not adjust the uplink transmission timing autonomously during an ongoing repetition segment period for which R>1. The repetition segment period is given by the higher layer parameter Tx-Duration as specified in TS 36.331.

<End of Change 3>

<Start of Change 4>

### A.14.4.3 Radio Link Monitoring for satellite access

#### A.14.4.3.1 E-UTRAN FD-FDD Radio Link Monitoring Test for Out-of-sync for Cat-M1 UE in CEMode A for Satellite access

##### A.14.4.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that the FD-FDD Cat-M1 UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the SAN PCell in CEModeA. This test will partly verify the E-UTRAN FDD radio link monitoring requirements for Cat-M1 UE defined in clause 7.19A.

The test parameters are given in Tables A.14.4.3.1.1-1, A.14.4.3.1.1-2 and A.14.4.3.1.1-3 below. There is one cell (cell 1), which is the active cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.14.4.3.1.1-2 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode without repetition with a reporting periodicity of 2 ms.

In the test, the RRC parameter *numberPRB-Pairs* is set to 6 and the RRC parameter *mPDCCH-NumRepetition* is set to 8. UE shall successfully complete the RRC reconfiguration accordingly prior to the start of time duration T1.

During the test, the test system shall emulate and send the GNSS signal to the test UE by AT command. The UE shall be provided with the valid information about the SAN serving cells before the test.

Table A.14.4.3.1.1-1: Supported test configurations

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | GSO, FD-FDD duplex mode |
| 2 | NGSO, FD-FDD duplex mode |
| Note: If UE supports both NGSO and GSO, the test case Config 1 can be skipped if the UE passes test case Config 2. | |

Table A.14.4.3.1.1-2: General test parameters for E-UTRAN FD-FDD out-of-sync testing for UE Cat-M1 in CEMode A

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | | | Unit | Value | Comment |
| Active cell | | |  | Cell 1 |  |
| CP length | | |  | Normal |  |
| Satellite information | | Config 1 |  | SSC.1 | GSO |
| Config 2 | SSC.2 | NGSO |
| Out of sync transmission parameters (Note 1) | DCI format | |  | 6-1A | As defined in section 5.3.3.1.12 in TS 36.212 |
| Number of OFDM symbols for legacy control channels | |  | 2 | Out of sync threshold Qout and the corresponding hypothetical MPDCCH transmission parameters are as specified in section 7.19.2 and Table 7.19.2-1 respectively. |
| M-PDCCH aggregation level | | eCCE | 24 |
| M-PDCCH repetition level | |  | 8 |
| ρA, ρB | |  | -3 |
| DRX | | |  | OFF |  |
| Layer 3 filtering | | |  | Enabled | Counters:  N310 = 1; N311 = 1 |
| T310 timer | | | ms | 0 | T310 is disabled |
| T311 timer | | | ms | 1000 | T311 is enabled |
| Periodic CQI reporting mode | | |  | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |
| CQI reporting periodicity | | | ms | 2 | Minimum CQI reporting periodicity |
| T1 | | | s | 2 |  |
| T2 | | | s | 0.8 |  |
| T3 | | | s | 1.8 |  |
| Note 1: MPDCCH corresponding to the out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | | | |

Table A.14.4.3.1.1-3: Cell specific test parameters for E-UTRAN FD-FDD (cell # 1) for out-of-sync radio link monitoring tests for Cat-M1 in CEMode A

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test 1** | | |
| **T1** | **T2** | **T3** |
| E-UTRA RF Channel Number |  | 1 | | |
| BWchannel | MHz | 1.4 | | |
| MPDCCH parameters as defined in A.3.1.3.1 |  | R.46 FDD | | |
| OCNG Pattern defined in A.3.2.1.21 (FDD) |  | OP.21 FDD | | |
| ρA, ρB |  | -3 | | |
| MPDCCH\_RA | dB | 0 | | |
| MPDCCH\_RB | dB | 0 | | |
| PBCH\_RA | dB | -3 | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
|  | dBm/15 kHz | -98 | | |
| SNR Note 6 | dB | 0.1 | -6.8 | -15.8 |
| Propagation condition |  | ETU 30Hz | | |
| Correlation Matrix and Antenna Configuration |  | 1x1 Low | | |
| Note 1: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.  Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 4: The signal contains MPDCCH for UEs other than the device under test as part of OCNG.  Note 5: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.  Note 6: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.14.4.3.1.1-1. | | | | |



**Figure A.14.4.3.1.1-1: SNR variation for out-of-sync testing**

##### A.14.4.3.1.2 Test Requirements

The UE behaviour in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least in all subframes configured for CQI transmission according to the configured CQI reporting mode (PUCCH 1-0).

The UE shall stop transmitting uplink signal no later than time point C (440 ms after the start of time duration T3).

The rate of correct events observed during repeated tests shall be at least 90%.

#### A.14.4.3.2 E-UTRAN FD-FDD Radio Link Monitoring Test for In-Sync for Cat-M1 UE in CEMode A for Satellite access

##### A.14.4.3.2.1 Test Purpose and Environment

The purpose of this test is to verify that the FD-FDD Cat-M1 UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the SAN PCell in CEModeA. This test will partly verify the E-UTRAN FDD radio link monitoring requirements for Cat-M1 UE defined in clause 7.19A.

The test parameters are given in Tables A.14.4.3.2.1-1, A.14.4.3.2.1-2 and A.14.4.3.2.1-3 below. There is one cell (cell 1), which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.14.4.3.2.1-2 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode without repetition with a reporting periodicity of 2 ms.

In the test, the RRC parameter *numberPRB-Pairs* is set to 4 and the RRC parameter *mPDCCH-NumRepetition* is set to 4. UE shall successfully complete the RRC reconfiguration accordingly prior to the start of time duration T1.

During the test, the test system shall emulate and send the GNSS signal to the test UE by AT command. The UE shall be provided with the valid information about the SAN serving cells before the test.

**Table A.14.4.3.2.1-1: Supported test configurations**

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | GSO, FD-FDD duplex mode |
| 2 | NGSO, FD-FDD duplex mode |
| Note: If UE supports both NGSO and GSO, the test case Config 1 can be skipped if the UE passes test case Config 2. | |

Table A.14.4.3.2.1-1: General test parameters for E-UTRAN FD-FDD in-sync testing for UE Cat-M1 in CEMode A

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Value** | **Comment** |
| Active cell | | |  | Cell 1 |  |
| CP length | | |  | Normal |  |
| Satellite information | | Config 1 |  | SSC.1 | GSO |
| Config 2 | SSC.2 | NGSO |
| In sync transmission parameters (Note 1) | DCI format | |  | 6-1A | As defined in section 5.3.3.1.12 in TS 36.212 |
| Number of OFDM symbols for legacy control channels | |  | 2 | In sync threshold Qin and the corresponding hypothetical MPDCCH transmission parameters are as specified in section 7.19.2 and Table 7.19.2-1 respectively. |
| MPDCCH aggregation level | | eCCE | 4 |
| MPDCCH repetition level | |  | 2 |
| ρA, ρB | |  | -3 |
| Out of sync transmission parameters  (Note 1) | DCI format | |  | 6-1A | As defined in section 5.3.3.1.12 in TS 36.212 |
| Number of OFDM symbols for legacy control channels | |  | 2 | Out of sync threshold Qout and the corresponding hypothetical MPDCCH transmission parameters are as specified in section 7.19.2 and Table 7.19.2-1 respectively. |
| MPDCCH aggregation level | | eCCE | 16 |
| MPDCCH repetition level | |  | 4 |
| ρA, ρB | |  | -3 |
| DRX | | |  | OFF |  |
| Layer 3 filtering | | |  | Enabled | Counters:  N310 = 1; N311 = 1 |
| T310 timer | | | ms | 2000 | T310 is enabled |
| T311 timer | | | ms | 1000 | T311 is enabled |
| Periodic CQI reporting mode | | |  | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |
| CQI reporting periodicity | | | ms | 2 | Minimum CQI reporting periodicity |
| T1 | | | s | 2 |  |
| T2 | | | s | 0.8 |  |
| T3 | | | s | 1.36 |  |
| T4 | | | s | 0.4 |  |
| T5 | | | s | 2 |  |
| Note 1: MPDCCH corresponding to the out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | | | |

Table A.14.4.3.2.1-2: Cell specific test parameters for E-UTRAN FD-FDD (cell # 1) for in-sync radio link monitoring tests for Cat-M1 in CEMode A

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test 1** | | | | |
| **T1** | **T2** | **T3** | **T4** | **T5** |
| E-UTRA RF Channel Number |  | 1 | | | | |
| BWchannel | MHz | 1.4 | | | | |
| MPDCCH parameters as defined in A.3.1.3.1 |  | R.46 FDD | | | | |
| OCNG Pattern defined in A.3.2.1.21 (FDD) |  | OP.21 FDD | | | | |
| ρA, ρB |  | -3 | | | | |
| MPDCCH\_RA | dB | 0 | | | | |
| MPDCCH\_RB | dB | 0 | | | | |
| PBCH\_RA | dB | -3 | | | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
|  | dBm/15 kHz | -98 | | | | |
| SNR Note 6 | dB | 5.4 | -3.8 | -12.8 | -1.6 | 5.4 |
| Propagation condition |  | ETU 30Hz | | | | |
| Correlation Matrix and Antenna Configuration |  | 1x1 Low | | | | |
| Note 1: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.  Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 4: The signal contains MPDCCH for UEs other than the device under test as part of OCNG.  Note 5: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.  Note 6: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.14.4.3.2.1-1. | | | | | | |



Figure A.14.4.3.2.1-1: SNR variation for in-sync testing

##### A.14.4.3.2.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (720 ms after the start of time duration T5) the UE shall transmit uplink signal at least in all subframes configured for CQI transmission according to the configured CQI reporting mode (PUCCH 1-0).

The rate of correct events observed during repeated tests shall be at least 90%.

#### A.14.4.3.3 E-UTRAN HD-FDD Radio Link Monitoring Test for Out-of-sync for Cat-M1 UE in CEMode A for Satellite access

##### A.14.4.3.3.1 Test Purpose and Environment

The purpose of this test is to verify that the HD-FDD Cat-M1 UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the SAN PCell in CEModeA. This test will partly verify the E-UTRAN FDD radio link monitoring requirements for Cat-M1 UE defined in clause 7.19A.

The test parameters are given in Tables A.14.4.3.3.1-1, A.14.4.3.3.1-2 and A.14.4.3.3.1-3 below. There is one cell (cell 1), which is the active cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.14.4.3.3.1-2 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode without repetition with a reporting periodicity of 20 ms.

In the test, the RRC parameter *numberPRB-Pairs* is set to 6and the *RRC parameter mPDCCH-NumRepetition* is set to 8. UE shall successfully complete the RRC reconfiguration accordingly prior to the start of time duration T1.

During the test, the test system shall emulate and send the GNSS signal to the test UE by AT command. The UE shall be provided with the valid information about the SAN serving cells before the test.

Table A.14.4.3.3.1-1: Supported test configurations

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | GSO, HD-FDD duplex mode |
| 2 | NGSO, HD-FDD duplex mode |
| Note: If UE supports both NGSO and GSO, the test case Config 1 can be skipped if the UE passes test case Config 2. | |

Table A.14.4.3.3.1-1: General test parameters for E-UTRAN HD-FDD out-of-sync testing for UE Cat-M1 in CEMode A

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Value** | **Comment** |
| Active cell | | |  | Cell 1 |  |
| CP length | | |  | Normal |  |
| Satellite information | | Config 1 |  | SSC.1 | GSO |
| Config 2 | SSC.2 | NGSO |
| Out of sync transmission parameters  (Note 1) | DCI format | |  | 6-1A | As defined in section 5.3.3.1.12 in TS 36.212 |
| Number of OFDM symbols for legacy control channels | |  | 2 | Out of sync threshold Qout and the corresponding hypothetical MPDCCH transmission parameters are as specified in section 7.19.2 and Table 7.19.2-1 respectively. |
| MPDCCH aggregation level | | eCCE | 24 |
| MPDCCH repetition level | |  | 8 |
| ρA, ρB | |  | -3 |
| DRX | | |  | OFF |  |
| Layer 3 filtering | | |  | Enabled | Counters:  N310 = 1; N311 = 1 |
| T310 timer | | | ms | 0 | T310 is disabled |
| T311 timer | | | ms | 1000 | T311 is enabled |
| Periodic CQI reporting mode | | |  | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |
| CQI reporting periodicity | | | ms | 20 | Minimum CQI reporting periodicity |
| T1 | | | s | 2 |  |
| T2 | | | s | 0.8 |  |
| T3 | | | s | 1.8 |  |
| Note 1: MPDCCH transmission parameters corresponding to the in-sync and out of sync transmission need not be included in the Reference Measurement Channel. | | | | | |

Table A.14.4.3.3.1-2: Cell specific test parameters for E-UTRAN HD-FDD (cell # 1) for out-of-sync radio link monitoring tests for Cat-M1 in CEMode A

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test 1** | | |
| **T1** | **T2** | **T3** |
| E-UTRA RF Channel Number |  | 1 | | |
| BWchannel | MHz | 1.4 | | |
| MPDCCH parameters as defined in A.3.1.3.1 |  | R.47 HD-FDD | | |
| OCNG Pattern defined in A.3.2.1.21 (FDD) |  | OP.21 FDD | | |
| ρA, ρB |  | -3 | | |
| MPDCCH\_RA | dB | 0 | | |
| MPDCCH\_RB | dB | 0 | | |
| PBCH\_RA | dB | -3 | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
|  | dBm/15 kHz | -98 | | |
| SNR Note 6 | dB | 0.1 | -6.8 | -15.8 |
| Propagation condition |  | ETU 30Hz | | |
| Correlation Matrix and Antenna Configuration |  | 1x1 Low | | |
| Note 1: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.  Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 4: The signal contains MPDCCH for UEs other than the device under test as part of OCNG.  Note 5: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.  Note 6: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.14.4.3.3.1-1. | | | | |



**Figure A.14.4.3.3.1-1: SNR variation for out-of-sync testing**

##### A.14.4.3.3.2 Test Requirements

The UE behaviour in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least in all subframes configured for CQI transmission according to the configured CQI reporting mode (PUCCH 1-0).

The UE shall stop transmitting uplink signal no later than time point C (440 ms after the start of time duration T3).

The rate of correct events observed during repeated tests shall be at least 90%.

#### A.14.4.3.4 E-UTRAN HD-FDD Radio Link Monitoring Test for In-Sync for Cat-M1 UE in CEMode A for Satellite access

##### A.14.4.3.4.1 Test Purpose and Environment

The purpose of this test is to verify that the HD-FDD Cat-M1 UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the SAN PCell in CEModeA. This test will partly verify the E-UTRAN FDD radio link monitoring requirements for Cat-M1 UE defined in clause 7.19A.

The test parameters are given in Tables A.14.4.3.4.1-1, A.14.4.3.4.1-2 and A.14.4.3.4.1-3 below. There is one cell (cell 1), which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.14.4.3.4.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode without repetition with a reporting periodicity of 20 ms.

In the test, the RRC parameter *numberPRB-Pairs* is set to 4 and the RRC parameter *mPDCCH-NumRepetition* is set to 4. UE shall successfully complete the RRC reconfiguration accordingly prior to the start of time duration T1.

During the test, the test system shall emulate and send the GNSS signal to the test UE by AT command. The UE shall be provided with the valid information about the SAN serving cells before the test.

Table A.14.4.3.4.1-1: Supported test configurations

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | GSO, HD-FDD duplex mode |
| 2 | NGSO, HD-FDD duplex mode |
| Note: If UE supports both NGSO and GSO, the test case Config 1 can be skipped if the UE passes test case Config 2. | |

Table A.14.4.3.4.1-1: General test parameters for E-UTRAN HD-FDD in-sync testing for UE Cat-M1 in CEMode A

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Value** | **Comment** |
| Active cell | | |  | Cell 1 |  |
| CP length | | |  | Normal |  |
| Satellite information | | Config 1 |  | SSC.1 | GSO |
| Config 2 | SSC.2 | NGSO |
| In sync transmission parameters (Note 1) | DCI format | |  | 6-1A | As defined in section 5.3.3.1.12 in TS 36.212 |
| Number of OFDM symbols for legacy control channels | |  | 2 | In sync threshold Qin and the corresponding hypothetical MPDCCH transmission parameters are as specified in section 7.19.2 and Table 7.19.2-1 respectively. |
| MPDCCH aggregation level | | eCCE | 4 |
| MPDCCH  repetition level | |  | 2 |
| ρA, ρB | |  | -3 |
| Out of sync transmission parameters (Note 1) | DCI format | |  | 6-1A | As defined in section 5.3.3.1.12 in TS 36.212 |
| Number of OFDM symbols for legacy control channels | |  | 2 | Out of sync threshold Qout and the corresponding hypothetical MPDCCH transmission parameters are as specified in section 7.19.2 and Table 7.19.2-1 respectively. |
| MPDCCH aggregation level | | eCCE | 16 |
| MPDCCH repetition level | |  | 4 |
| ρA, ρB | |  | -3 |
| DRX | | |  | OFF |  |
| Layer 3 filtering | | |  | Enabled | Counters:  N310 = 1; N311 = 1 |
| T310 timer | | | ms | 2000 | T310 is enabled |
| T311 timer | | | ms | 1000 | T311 is enabled |
| Periodic CQI reporting mode | | |  | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |
| CQI reporting periodicity | | | ms | 20 | Minimum CQI reporting periodicity |
| T1 | | | s | 2 |  |
| T2 | | | s | 0.8 |  |
| T3 | | | s | 1.36 |  |
| T4 | | | s | 0.4 |  |
| T5 | | | s | 2 |  |
| Note 1: MPDCCH corresponding to the out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | | | |

Table A.14.4.3.4.1-2: Cell specific test parameters for E-UTRAN HD-FDD (cell # 1) for in-sync radio link monitoring tests for Cat-M1 in CEMode A

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test 1** | | | | |
| **T1** | **T2** | **T3** | **T4** | **T5** |
| E-UTRA RF Channel Number |  | 1 | | | | |
| BWchannel | MHz | 1.4 | | | | |
| MPDCCH parameters as defined in A.3.1.3.1 |  | R.47 HD-FDD | | | | |
| OCNG Pattern defined in A.3.2.1.21 (FDD) |  | OP.21 FDD | | | | |
| ρA, ρB |  | -3 | | | | |
| MPDCCH\_RA | dB | 0 | | | | |
| MPDCCH\_RB | dB | 0 | | | | |
| PBCH\_RA | dB | -3 | | | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
|  | dBm/15 kHz | -98 | | | | |
| SNR Note 6 | dB | 5.4 | -3.8 | -12.8 | -1.6 | 5.4 |
| Propagation condition |  | ETU 30Hz | | | | |
| Correlation Matrix and Antenna Configuration |  | 1x1 Low | | | | |
| Note 1: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.  Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 4: The signal contains MPDCCH for UEs other than the device under test as part of OCNG.  Note 5: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.  Note 6: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.14.4.3.4.1-1. | | | | | | |



Figure A.14.4.3.4.1-1: SNR variation for in-sync testing

##### A.14.4.3.4.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (740 ms after the start of time duration T5) the UE shall transmit uplink signal at least in all subframes configured for CQI transmission according to the configured CQI reporting mode (PUCCH 1-0).

The rate of correct events observed during repeated tests shall be at least 90%.

#### A.14.4.3.5 E-UTRAN FD-FDD Radio Link Monitoring Test for Out-of-sync in DRX for UE category M1 configured in CEMode A

##### A.14.4.3.5.1 Test Purpose and Environment

The purpose of this test is to verify that the FD-FDD category M1 UE configured in CEMode A properly detects the out of sync for the purpose of monitoring downlink radio link quality of the PCell served by satellite access node (SAN) when DRX is used. This test will partly verify the E-UTRAN FD-FDD radio link monitoring requirements in clause 7.19A.

The test configurations are given in Table A.14.4.3.5.1-1, the test parameters are given in Tables A.14.4.3.5.1-2, A.14.4.3.5.1-3, A.14.4.3.5.1-4 and A.14.4.3.5.1-5. There is one cell (cell 1), which is the active cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.14.4.3.5.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode with a reporting periodicity of 2 ms without repetition. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode MPDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test.

In the test, the RRC parameter *numberPRB-Pairs* is set to 4 and the RRC parameter *mPDCCH-NumRepetition* is set 4. UE shall successfully complete the RRC reconfiguration accordingly prior to the start of time duration T1.

During the test, the test system shall emulate and send the GNSS signal to the test UE. The test parameters for GNSS signals are defined in TBD. The UE shall be provided with the valid information about each cell served by SAN in the test before the test.

Table A.14.4.3.5.1-1: Supported test configurations

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | GSO, FD-FDD duplex mode |
| 2 | NGSO, FD-FDD duplex mode |
| Note: If UE supports both NGSO and GSO, the test case Config 1 can be skipped if the UE passes test case Config 2. | |

Table A.14.4.3.5.1-2: General test parameters for E-UTRAN FD-FDD out-of-sync tests in DRX for UE category M1 configured in CEMode A

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** | **Comment** |
| Active cell | |  | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |
| CP length | |  | Normal |  |
| Satellite information | Config 1 |  | SSC.1 | GSO |
| Config 2 |  | SSC.2 | NGSO |
| Out of sync transmission parameters (Note 1) | DCI format |  | 6-1A | As defined in section 5.3.3.1.12 in TS 36.212 |
| Number of OFDM symbols for legacy control channels |  | 2 | Out of sync threshold Qout, Cat M1 and the corresponding hypothetical MPDCCH transmission parameters are as specified in clause 7.19A.2 and Table 7.19A.2-1 respectively. |
| MPDCCH aggregation level | eCCE | 16 |
| MPDCCH repetition level |  | 4 |
| Ratio of MPDCCH to RS EPRE |  | 0 |
| ρA, ρB |  | -3 |
| DRX cycle | | ms | 1280 | See Table A.14.4.3.5.1-4 |
| Layer 3 filtering | |  | Enabled | Counters:  N310 = 1; N311 = 1 |
| T310 timer | | ms | 0 | T310 is disabled |
| T311 timer | | ms | 1000 | T311 is enabled |
| Periodic CQI reporting mode | |  | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |
| CQI reporting periodicity | | ms | 2 | Minimum CQI reporting periodicity |
| T1 | | s | 32 |  |
| T2 | | s | 12.8 |  |
| T3 | | s | 13 |  |
| Note 1: MPDCCH corresponding to the out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | | |

Table A.14.4.3.5.1-3: Cell specific test parameters for E-UTRAN FD-FDD (cell # 1) for out-of-sync radio link monitoring tests in DRX for UE category M1 configured in CEMode A

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test 1** | | |
| **T1** | **T2** | **T3** |
| E-UTRA RF Channel Number |  | 1 | | |
| BWchannel | MHz | 1.4 | | |
| MPDCCH parameters defined in A.3.1.3 |  | R.46 FDD | | |
| OCNG Pattern defined in A.3.2.1 (FDD) |  | OP.21 FDD | | |
| ρA, ρB |  | -3 | | |
| MPDCCH\_RA | dB | 0 | | |
| MPDCCH\_RB | dB | 0 | | |
| PBCH\_RA | dB | -3 | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| OCNG\_RANote1 | dB |
| OCNG\_RBNote1 | dB |
|  | dBm/15 kHz | -98 | | |
| SNR Note 6 | dB | 0.37 | -6.98 | -14.98 |
| Propagation condition |  | AWGN | | |
| Correlation Matrix and Antenna Configuration |  | 1x1 | | |
| Note 1: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.  Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 4: The signal contains MPDCCH for UEs other than the device under test as part of OCNG.  Note 5: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.  Note 6: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.14.4.3.5.1-1. | | | | |

Table A.14.4.3.5.1-4: DRX-Configuration for E-UTRAN FD-FDD out-of-sync tests for UE category M1 configured in CEMode A

|  |  |  |
| --- | --- | --- |
| **Field** | **Value** | **Comment** |
| onDurationTimer | psf10 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 |
| drx-RetransmissionTimer | psf1 |
| longDRX-CycleStartOffset | sf1280 |
| shortDRX | disable |

Table A.14.4.3.5.1-5: *TimeAlignmentTimer* -Configuration for E-UTRAN FD-FDD out-of-sync testing for UE category M1 configured in CEMode A

|  |  |  |
| --- | --- | --- |
| **Field** | **Value** | **Comment** |
| TimeAlignmentTimer | infinity | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 30 | For further information see clause 6.3.2 in TS 36.331 and section 10.1 in TS 36.213. |



Figure A.14.4.3.5.1-1: SNR variation for out-of-sync testing in DRX

##### A.14.4.3.5.2 Test Requirements

The UE behaviour in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least once every DRX cycle, in the On-duration part of the cycle in the subframe according to the configured CQI reporting mode (PUCCH 1-0).

The UE shall stop transmitting uplink signal no later than time point C (duration D1 = 6500 ms after the start of time duration T3.

The rate of correct events observed during repeated tests shall be at least 90%.

#### A.14.4.3.6 E-UTRAN FD-FDD Radio Link Monitoring Test for In-sync in DRX for UE Category M1 configured in CEMode A

##### A.14.4.3.6.1 Test Purpose and Environment

The purpose of this test is to verify that the FD-FDD category M1 UE configured in CEMode A properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell served by satellite access node (SAN) when DRX is used. This test will partly verify the E-UTRAN FD-FDD radio link monitoring requirements in clause 7.19A.

The test configurations are given in Table A.14.4.3.6.1-1, the test parameters are given in Tables A.14.4.3.6.1-2, A.14.4.3.6.1-3, A.14.4.3.6.1-4 and A.14.4.3.6.1-5. There is one cell (cell 1), which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.14.4.3.6.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode with a reporting periodicity of 2 ms without repetition. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode MPDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test.

In the test, the RRC parameter *numberPRB-Pairs* is set to 6 and the RRC parameter *mPDCCH-NumRepetition* is set 8. UE shall successfully complete the RRC reconfiguration accordingly prior to the start of time duration T1.

During the test, the test system shall emulate and send the GNSS signal to the test UE. The test parameters for GNSS signals are defined in TBD. The UE shall be provided with the valid information about each cell served by SAN in the test before the test.

Table A.14.4.3.6.1-1: Supported test configurations

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | GSO, FD-FDD duplex mode |
| 2 | NGSO, FD-FDD duplex mode |
| Note: If UE supports both NGSO and GSO, the test case Config 1 can be skipped if the UE passes test case Config 2. | |

Table A.14.4.3.6.1-2: General test parameters for E-UTRAN FD-FDD in-sync test in DRX for UE category M1 configured in CEMode A

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** | **Comment** |
| Active cell | |  | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |
| CP length | |  | Normal |  |
| Satellite information | Config 1 |  | SSC.1 | GSO |
| Config 2 |  | SSC.2 | NGSO |
| In sync transmission parameters  (Note 1) | DCI format |  | 6-1A | As defined in section 5.3.3.1.12 in TS 36.212 |
| Number of OFDM symbols for legacy control channels |  | 2 | In sync threshold Qin, Cat M1 and the corresponding hypothetical MPDCCH transmission parameters are as specified in clause 7.19A.2 and Table 7.19A.2-1 respectively. |
| MPDCCH aggregation level | eCCE | 8 |
| MPDCCH repetition level |  | 4 |
| ρA, ρB |  | -3 |
| Ratio of MPDCCH to RS EPRE |  | 0 |
| Out of sync transmission parameters  (Note 1) | DCI format |  | 6-1A | As defined in section 5.3.3.1.12 in TS 36.212 |
| Number of OFDM symbols for legacy control channels |  | 2 | Out of sync threshold Qout, Cat M1 and the corresponding hypothetical MPDCCH transmission parameters are as specified in clause 7.19A.2 and Table 7.19A.2-1 respectively. |
| MPDCCH aggregation level | eCCE | 24 |
| MPDCCH repetition level |  | 8 |
| ρA, ρB |  | -3 |
| Ratio of MPDCCH to RS EPRE | dB | 0 |
| DRX cycle | | ms | 40 | See Table A.14.4.3.6.1-4 |
| Layer 3 filtering | |  | Enabled | Counters:  N310 = 1; N311 = 1 |
| T310 timer | | ms | 2000 | T310 is enabled |
| T311 timer | | ms | 1000 | T311 is enabled |
| Periodic CQI reporting mode | |  | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |
| CQI reporting periodicity | | ms | 2 | Minimum CQI reporting periodicity |
| T1 | | s | 4 |  |
| T2 | | s | 1.6 |  |
| T3 | | s | 1.46 |  |
| T4 | | s | 0.4 |  |
| T5 | | s | 4 |  |
| Note 1: MPDCCH corresponding to the in-sync and out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | | |

Table A.14.4.3.6.1-3: Cell specific test parameters for E-UTRAN FD-FDD (cell # 1) for in-sync radio link monitoring test in DRX for UE category M1 configured in CEMode A

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test 1** | | | | |
| **T1** | **T2** | **T3** | **T4** | **T5** |
| E-UTRA RF Channel Number |  | 1 | | | | |
| BWchannel | MHz | 1.4 | | | | |
| MPDCCH parameters defined in A.3.1.3 |  | R.46 FDD | | | | |
| OCNG Pattern defined in A.3.2.1 (FDD) |  | OP.21 FDD | | | | |
| ρA, ρB |  | -3 | | | | |
| MPDCCH\_RA | dB | 0 | | | | |
| MPDCCH\_RB | dB | 0 | | | | |
| PBCH\_RA | dB | -3 | | | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| OCNG\_RANote1 | dB |
| OCNG\_RBNote1 | dB |
|  | dBm/15 kHz | -98 | | | | |
| SNR Note 8 | dB | -4.58 | -10 | -18 | -10.58 | -4.58 |
| Propagation condition |  | AWGN | | | | |
| Correlation Matrix and Antenna Configuration |  | 1x1 | | | | |
| Note 1: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.  Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 4: The signal contains MPDCCH for UEs other than the device under test as part of OCNG.  Note 5: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.  Note 6: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.14.4.3.6.1-1. | | | | | | |

Table A.14.4.3.6.1-4: DRX-Configuration for E-UTRAN FD-FDD out-of-sync tests for UE category M1 configured in CEMode A

|  |  |  |
| --- | --- | --- |
| **Field** | **Value** | **Comment** |
| onDurationTimer | psf10 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 |
| drx-RetransmissionTimer | psf1 |
| longDRX-CycleStartOffset | sf40 |
| shortDRX | disable |

Table A.14.4.3.6.1-5: *TimeAlignmentTimer* -Configuration for E-UTRAN FD-FDD out-of-sync testing for UE category M1 configured in CEMode A

|  |  |  |
| --- | --- | --- |
| **Field** | **Value** | **Comment** |
| TimeAlignmentTimer | infinity | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 30 | For further information see clause 6.3.2 in TS 36.331 and section 10.1 in TS 36.213. |



Figure A.14.4.3.6.1-1: SNR variation for in-sync testing in DRX

##### A.14.4.3.6.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (1120 ms after the start of time duration T5) the UE shall transmit uplink signal at least once every DRX cycle, in the On-duration part of the cycle in the subframe according to the configured CQI reporting mode (PUCCH 1-0).

The rate of correct events observed during repeated tests shall be at least 90%.

#### A.14.4.3.7 E-UTRAN HD-FDD Radio Link Monitoring Test for Out-of-sync in DRX for UE category M1 configured in CEMode A

##### A.14.4.3.7.1 Test Purpose and Environment

The purpose of this test is to verify that the HD-FDD category M1 UE configured in CEMode A properly detects the out of sync for the purpose of monitoring downlink radio link quality of the PCell served by satellite access node (SAN) when DRX is used. This test will partly verify the E-UTRAN HD-FDD radio link monitoring requirements in clause 7.19A.

The test configurations are given in Table A.14.4.3.7.1-1, the test parameters are given in Tables A.14.4.3.7.1-2, A.14.4.3.7.1-3, A.14.4.3.7.1-4 and A.14.4.3.7.1-5. There is one cell (cell 1), which is the active cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.14.4.3.7.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode with a reporting periodicity of 20 ms without repetition. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode MPDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test.

In the test, the RRC parameter *numberPRB-Pairs* is set to 4 and the RRC parameter *mPDCCH-NumRepetition* is set 4. UE shall successfully complete the RRC reconfiguration accordingly prior to the start of time duration T1.

During the test, the test system shall emulate and send the GNSS signal to the test UE. The test parameters for GNSS signals are defined in TBD. The UE shall be provided with the valid information about each cell served by SAN in the test before the test.

Table A.14.4.3.7.1-1: Supported test configurations

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | GSO, HD-FDD duplex mode |
| 2 | NGSO, HD-FDD duplex mode |
| Note: If UE supports both NGSO and GSO, the test case Config 1 can be skipped if the UE passes test case Config 2. | |

Table A.14.4.3.7.1-2: General test parameters for E-UTRAN HD-FDD out-of-sync tests in DRX for UE category M1 configured in CEMode A

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** | **Comment** |
| Active cell | |  | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |
| CP length | |  | Normal |  |
| Satellite information | Config 1 |  | SSC.1 | GSO |
| Config 2 |  | SSC.2 | NGSO |
| Out of sync transmission parameters (Note 1) | DCI format |  | 6-1A | As defined in section 5.3.3.1.12 in TS 36.212 |
| Number of OFDM symbols for legacy control channels |  | 2 | Out of sync threshold Qout, Cat M1 and the corresponding hypothetical MPDCCH transmission parameters are as specified in clause 7.19A.3 and Table 7.19A.3-1 respectively. |
| MPDCCH aggregation level | eCCE | 16 |
| MPDCCH repetition level |  | 4 |
| ρA, ρB |  | -3 |
| Ratio of PDCCH to RS EPRE | dB | 0 |
| DRX cycle | | ms | 1280 | See Table A.14.4.3.7.1-4 |
| Layer 3 filtering | |  | Enabled | Counters:  N310 = 1; N311 = 1 |
| T310 timer | | ms | 0 | T310 is disabled |
| T311 timer | | ms | 1000 | T311 is enabled |
| Periodic CQI reporting mode | |  | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |
| CQI reporting periodicity | | ms | 20 |  |
| T1 | | s | 32 |  |
| T2 | | s | 12.8 |  |
| T3 | | s | 13 |  |
| Note 1: MPDCCH corresponding to the out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | | |

Table A.14.4.3.7.1-3: Cell specific test parameters for E-UTRAN HD-FDD (cell # 1) for out-of-sync radio link monitoring tests in DRX for UE category M1 configured in CEMode A

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test 1** | | |
| **T1** | **T2** | **T3** |
| E-UTRA RF Channel Number |  | 1 | | |
| BWchannel | MHz | 1.4 | | |
| MPDCCH parameters defined in A.3.1.3 |  | R.47 HD-FDD | | |
| OCNG Pattern defined in A.3.2.1 (FDD) |  | OP.21 FDD | | |
| ρA, ρB |  | -3 | | |
| MPDCCH\_RA | dB | 0 | | |
| MPDCCH\_RB | dB | 0 | | |
| PBCH\_RA | dB | -3 | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| OCNG\_RANote1 | dB |
| OCNG\_RBNote1 | dB |
|  | dBm/15 kHz | -98 | | |
| SNR Note 6 | dB | 0.37 | -6.98 | -14.98 |
| Propagation condition |  | AWGN | | |
| Correlation Matrix and Antenna Configuration |  | 1x1 | | |
| Note 1: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.  Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 4: The signal contains MPDCCH for UEs other than the device under test as part of OCNG.  Note 5: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.  Note 6: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.14.4.3.7.1-1. | | | | |

Table A.14.4.3.7.1-4: DRX-Configuration for E-UTRAN HD-FDD out-of-sync tests for UE category M1 configured in CEMode A

|  |  |  |
| --- | --- | --- |
| **Field** | **Value** | **Comment** |
| onDurationTimer | psf20 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 |
| drx-RetransmissionTimer | psf1 |
| longDRX-CycleStartOffset | sf1280 |
| shortDRX | disable |

Table A.14.4.3.7.1-5: *TimeAlignmentTimer* -Configuration for E-UTRAN HD-FDD out-of-sync testing for UE category M1 configured in CEMode A

|  |  |  |
| --- | --- | --- |
| **Field** | **Value** | **Comment** |
| TimeAlignmentTimer | infinity | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 30 | For further information see clause 6.3.2 in TS 36.331 and section 10.1 in TS 36.213. |



Figure A.14.4.3.7.1-1: SNR variation for out-of-sync testing in DRX

A.14.4.3.7.2 Test Requirements

The UE behaviour in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least once every DRX cycle, in the On-duration part of the cycle in the subframe according to the configured CQI reporting mode (PUCCH 1-0).

The UE shall stop transmitting uplink signal no later than time point C (duration D1 = 6520 ms after the start of time duration T3.

The rate of correct events observed during repeated tests shall be at least 90%.

#### A.14.4.3.8 E-UTRAN HD-FDD Radio Link Monitoring Test for In-sync in DRX for UE Category M1 configured in CEMode A

##### A.14.4.3.8.1 Test Purpose and Environment

The purpose of this test is to verify that the HD-FDD category M1 UE configured in CEMode A properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell served by satellite access node (SAN) when DRX is used. This test will partly verify the E-UTRAN HD-FDD radio link monitoring requirements in clause 7.19A.

The test configurations are given in Table A.14.4.3.8.1-1, the test parameters are given in Tables A.14.4.3.8.1-2, A.14.4.3.8.1-3, A.14.4.3.8.1-4 and A.14.4.3.8.1-5. There is one cell (cell 1), which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.14.4.3.8.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CQI reporting in PUCCH 1-0 mode with a reporting periodicity of 20 ms without repetition. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode MPDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to “infinity” so that UL timing alignment is maintained during the test.

In the test, the RRC parameter *numberPRB-Pairs* is set to 6 and the RRC parameter *mPDCCH-NumRepetition* is set 8. UE shall successfully complete the RRC reconfiguration accordingly prior to the start of time duration T1.

During the test, the test system shall emulate and send the GNSS signal to the test UE. The test parameters for GNSS signals are defined in TBD. The UE shall be provided with the valid information about each cell served by SAN in the test before the test.

Table A.14.4.3.8.1-1: Supported test configurations

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | GSO, HD-FDD duplex mode |
| 2 | NGSO, HD-FDD duplex mode |
| Note: If UE supports both NGSO and GSO, the test case Config 1 can be skipped if the UE passes test case Config 2. | |

Table A.14.4.3.8.1-2: General test parameters for E-UTRAN HD-FDD in-sync test in DRX for UE category M1 configured in CEMode A

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** | **Comment** |
| Active cell | |  | Cell 1 | Cell 1 is on E-UTRA RF channel number 1 |
| CP length | |  | Normal |  |
| Satellite information | Config 1 |  | SSC.1 | GSO |
| Config 2 |  | SSC.2 | NGSO |
| In sync transmission parameters  (Note 1) | DCI format |  | 6-1A | As defined in section 5.3.3.1.12 in TS 36.212 |
| Number of OFDM symbols for legacy control channels |  | 2 | In sync threshold Qin, Cat M1 and the corresponding hypothetical MPDCCH transmission parameters are as specified in clause 7.19A.3 and Table 7.19A.3-1 respectively. |
| MPDCCH aggregation level | eCCE | 8 |
| MPDCCH repetition level |  | 4 |
| ρA, ρB |  | -3 |
| Ratio of MPDCCH to RS EPRE |  | 0 |
| Out of sync transmission parameters  (Note 1) | DCI format |  | 6-1A | As defined in TS 36.212 |
| Number of OFDM symbols for legacy control channels |  | 2 | Out of sync threshold Qout, Cat M1 and the corresponding hypothetical MPDCCH transmission parameters are as specified in clause 7.19A.3 and Table 7.19A.3-1 respectively. |
| MPDCCH aggregation level | eCCE | 24 |
| MPDCCH repetition level |  | 8 |
| ρA, ρB |  | -3 |
| Ratio of MPDCCH to RS EPRE | dB | 0 |
| DRX cycle | | ms | 40 | See Table A.14.4.3.8.1-4 |
| Layer 3 filtering | |  | Enabled | Counters:  N310 = 1; N311 = 1 |
| T310 timer | | ms | 2000 | T310 is enabled |
| T311 timer | | ms | 1000 | T311 is enabled |
| Periodic CQI reporting mode | |  | PUCCH 1-0 | As defined in table 7.2.2-1 in TS 36.213. |
| CQI reporting periodicity | | ms | 20 |  |
| T1 | | s | 4 |  |
| T2 | | s | 1.6 |  |
| T3 | | s | 1.46 |  |
| T4 | | s | 0.4 |  |
| T5 | | s | 4 |  |
| Note 1: MPDCCH corresponding to the in-sync and out of sync transmission parameters need not be included in the Reference Measurement Channel. | | | | |

Table A.14.4.3.8.1-3: Cell specific test parameters for E-UTRAN HD-FDD (cell # 1) for in-sync radio link monitoring test in DRX for UE category M1 configured in CEMode A

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test 1** | | | | |
| **T1** | **T2** | **T3** | **T4** | **T5** |
| E-UTRA RF Channel Number |  | 1 | | | | |
| BWchannel | MHz | 1.4 | | | | |
| MPDCCH parameters defined in A.3.1.3 |  | R.47 HD-FDD | | | | |
| OCNG Pattern defined in A.3.2.1 (FDD) |  | OP.21 FDD | | | | |
| ρA, ρB |  | -3 | | | | |
| MPDCCH\_RA | dB | 0 | | | | |
| MPDCCH\_RB | dB | 0 | | | | |
| PBCH\_RA | dB | -3 | | | | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| OCNG\_RANote1 | dB |
| OCNG\_RBNote1 | dB |
|  | dBm/15 kHz | -98 | | | | |
| SNR Note 8 | dB | -4.58 | -10 | -18 | -10.58 | -4.58 |
| Propagation condition |  | AWGN | | | | |
| Correlation Matrix and Antenna Configuration |  | 1x1 | | | | |
| Note 1: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The uplink resources for CQI reporting are assigned to the UE prior to the start of time period T1.  Note 3: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 4: The signal contains MPDCCH for UEs other than the device under test as part of OCNG.  Note 5: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.  Note 6: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.14.4.3.8.1-1. | | | | | | |

Table A.14.4.3.8.1-4: DRX-Configuration for E-UTRAN HD-FDD out-of-sync tests for UE category M1 configured in CEMode A

|  |  |  |
| --- | --- | --- |
| **Field** | **Value** | **Comment** |
| onDurationTimer | psf20 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 |
| drx-RetransmissionTimer | psf1 |
| longDRX-CycleStartOffset | sf40 |
| shortDRX | disable |

Table A.14.4.3.8.1-5: *TimeAlignmentTimer* -Configuration for E-UTRAN HD-FDD out-of-sync testing for UE category M1 configured in CEMode A

|  |  |  |
| --- | --- | --- |
| **Field** | **Value** | **Comment** |
| TimeAlignmentTimer | infinity | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 30 | For further information see clause 6.3.2 in TS 36.331 and section 10.1 in TS 36.213. |



Figure A.14.4.3.8.1-1: SNR variation for in-sync testing in DRX

##### A.14.4.3.8.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (1140 ms after the start of time duration T5) the UE shall transmit uplink signal at least once every DRX cycle, in the On-duration part of the cycle in the subframe according to the configured CQI reporting mode (PUCCH 1-0).

The rate of correct events observed during repeated tests shall be at least 90%.

<End of Change 4>

<Start of Change 5>

## A.14.5 UE measurement procedures in RRC\_CONNECTED state for satellite access

The reference channels in this clause assume transmission of PDSCH with a maximum number of 5 HARQ transmissions unless otherwise specified.

### A.14.5.1 Intra-frequency measurements for satellite access

#### A.14.5.1.1 E-UTRAN FDD-FDD intra-frequency event triggered reporting under fading propagation conditions in asynchronous cells for Cat-M1 UE in CEModeA

##### A.14.5.1.1.1 Test Purpose and Environment

The purpose of this test is to verify that the Cat-M1 UE makes correct reporting of an event. This test will partly verify the FDD intra-frequency cell search requirements for Cat-M1 UE in clause 8.13A.2.1.1.1.

The test parameters are given in Table A.14.5.1.1.1-1 and A.14.5.1.1.1-2 below. In the measurement control information it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2. At the beginning of T2 the transmission power of cell 2 is increased to the same level as for cell 1, and due to usage of an offset this shall result in reporting of Event A3.

Table A.14.5.1.1.1-1: General test parameters for E-UTRAN FDD-FDD intra-frequency event triggered reporting under fading propagation conditions in asynchronous cells for Cat-M1 UE in CEModeA

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** | **Comment** |
| E-UTRA RF Channel Number | |  | 1 | One radio channel is used. |
| Satellite information | |  | GSO |  |
| Active cell | |  | Cell 1 |  |
| Neighbour cell | |  | Cell 2 | Cell to be identified. |
| CP length | |  | Normal |  |
| DRX | |  | OFF |  |
| A3 | Offset | dB | -6 |  |
| Hysteresis | dB | 0 |  |
| Time To Trigger | S | 0 |  |
| Filter coefficient | |  | 0 | L3 filtering is not used |
| Gap pattern ID | |  | 1 |  |
| T1 | | S | 5 |  |
| T2 | | S | 5 |  |

Table A.14.5.1.1.1-2: Cell specific test parameters for E-UTRAN FDD-FDD intra-frequency event triggered reporting under fading propagation conditions in asynchronous cells for Cat-M1 UE in CEModeA

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Cell 1** | | **Cell 2** | |
| **T1** | **T2** | **T1** | **T2** |
| E-UTRA RF Channel Number |  | 1 | | | |
| BWchannel | MHz | 1.4 | | | |
| PDSCH parameters:  DL Reference Measurement Channel |  | R.48 FDD | | - | |
| MPDCCH parameters:  DL Reference Measurement Channel |  | R.46 FDD | | R.46 FDD | |
| OCNG Patterns |  | OP.21 FDD | | OP.6 FDD | |
| PBCH\_RA | dB | -3 | | -3 | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| MPDCCH\_RA | dB |
| MPDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
| Note 2 | dBm/15 KHz | -98 | | | |
|  | dB | 4 | 4 | -Infinity | 4 |
| Note 3 | dB | 4 | -1.46 | -Infinity | -1.46 |
| RSRP Note 3 | dBm/15 KHz | -94 | -94 | -Infinity | -94 |
| SCH\_RP Note 3 | dBm/15 KHz | -94 | -94 | -Infinity | -94 |
| Io Note 3 | dBm/9MHz | -64.76 | -62.42 | Specified in  Cell 1 columns | |
| Propagation Condition |  | ETU30 | | ETU30 | |
| Correlation Matrix and Antenna Configuration |  | 1x1 Low | | 1x1 Low | |
| Timing offset to Cell 1 | ms | - | | 3 | |
| Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  Note 3: Es/Iot, RSRP, SCH\_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2. | | | | | |

##### A.14.5.1.1.2 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 2.88s from the beginning of time period T2.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

#### A.14.5.1.2 E-UTRAN FDD-FDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells for Cat-M1 UE in CEModeA in DRX

##### A.14.5.1.2.1 Test Purpose and Environment

The purpose of the two tests is to verify that the Cat-M1 UE makes correct reporting of an event in DRX. The tests will partly verify the FDD intra-frequency cell search in DRX requirements in clause 8.13A.2.1.1.2.

The test parameters are given in Tables A.14.5.1.2.1-1, A.14.5.1.2.1-2, A.14.5.1.2.1-3 and A.14.5.1.2.1-4. In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2. At the beginning of T2 the transmission power of cell 2 is increased to the same level as for cell 1, and due to usage of an offset this shall result in reporting of Event A3.

In Test 1 UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furhtermore UE is allocated with PUSCH resource at every DRX cycle.

In Test 2 the uplink time aligment is not maintained and UE needs to use RACH to obtain UL allocation for measurement reporting.

Table A.14.5.1.2.1-1: General test parameters for E-UTRAN FDD-FDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells for Cat-M1 UE when DRX is used

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** | | **Comment** |
| **Test1** | **Test2** |
| E-UTRA RF Channel Number | |  | 1 | 1 | One radio channel is used. |
| Satellite information | |  | GSO | GSO |  |
| Active cell | |  | Cell 1 | Cell 1 |  |
| Neighbour cell | |  | Cell 2 | Cell 2 | Cell to be identified. |
| CP length | |  | Normal | Normal |  |
| DRX | |  | ON | ON | DRX related parameters are defined in Table A.14.5.1.2.1-3 |
| A3 | Offset | dB | -6 | -6 |  |
| Hysteresis | dB | 0 | 0 |  |
| Time To Trigger | s | 0 | 0 |  |
| Filter coefficient | |  | 0 | 0 | L3 filtering is not used |
| Gap pattern ID | |  | 0 | 0 |  |
| T1 | | s | 5 | 5 |  |
| T2 | | s | 5 | 30 |  |

**Table A.14.5.1.2.1-2: Cell specific test parameters for E-UTRAN FDD-FDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells for Cat-M1 UE when DRX is used**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Cell 1** | | **Cell 2** | |
| **T1** | **T2** | **T1** | **T2** |
| E-UTRA RF Channel Number |  | 1 | | | |
| BWchannel | MHz | 1.4 | | | |
| PDSCH parameters:  DL Reference Measurement Channel |  | R.48 FDD | | - | |
| MPDCCH parameters:  DL Reference Measurement Channel |  | R.46 FDD | | R.46 FDD | |
| OCNG Patterns |  | OP.21 FDD | | OP.6 FDD | |
| PBCH\_RA | dB | -3 | | -3 | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| MPDCCH\_RA | dB |
| MPDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
| Note 2 | dBm/15 KHz | -98 | | | |
|  | dB | 4 | 4 | -Infinity | 4 |
| Note 3 | dB | 4 | -1.46 | -Infinity | -1.46 |
| RSRP Note 3 | dBm/15 KHz | -94 | -94 | -Infinity | -94 |
| SCH\_RP Note 3 | dBm/15 KHz | -94 | -94 | -Infinity | -94 |
| Io Note 3 | dBm/9MHz | -64.76 | -62.42 | Specified in  Cell 1 columns | |
| Propagation Condition |  | ETU30 | | ETU30 | |
| Correlation Matrix and Antenna Configuration |  | 1x1 Low | | 1x1 Low | |
| Timing offset to Cell 1 | μs | - | | 3 | |
| Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  Note 3: Es/Iot, RSRP, SCH\_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2. | | | | | |

Table A.14.5.1.2.1-3: DRX-Configuration for E-UTRAN FDD-FDD intra-frequency event triggered reporting in DRX under fading propagation conditions in synchronous cells for Cat-M1 UE in CEModeA

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Test1** | **Test2** | **Comment** |
| **Value** | **Value** |
| onDurationTimer | psf1 | psf1 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | psf1 |
| drx-RetransmissionTimer | psf1 | psf1 |
| longDRX-CycleStartOffset | sf40 | sf1280 |
| shortDRX | disable | disable |

Table A.14.5.1.2.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN FDD-FDD intra-frequency event triggered reporting in DRX under fading propagation conditions in synchronous cells for Cat-M1 UE in CEModeA

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Test1** | **Test2** | **Comment** |
| **Value** | **Value** |
| TimeAlignmentTimer | sf500 | sf500 | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 0 | 0 | For further information see clause 6.3.2 in TS 36.331 and section10.1 in TS 36.213. |

##### A.14.5.1.2.2 Test Requirements

In Test 1, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1.44 s from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE send the measurement report on PUSCH.

In Test 2, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 25600 ms from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE starts to send preambles on the PRACH for scheduling request (SR) to obtain allocation to send the measurement report on PUSCH.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE 1: The actual overall delays measured in the test may be up to one DRX cycle higher than the measurement reporting delays above because UE is allowed to delay the initiation of the measurement reporting procedure to the next until the Active Time.

NOTE 2: In order to calculate the rate of correct events the system simulator shall verify that it has received correct Event A3 measurement report.

#### A.14.5.1.3 E-UTRAN HD-FDD intra-frequency event triggered reporting under fading propagation conditions in asynchronous cells for Cat-M1 UE in CEModeA

##### A.14.5.1.3.1 Test Purpose and Environment

The purpose of this test is to verify that the Cat-M1 UE makes correct reporting of an event. This test will partly verify the HD-FDD intra-frequency cell search requirements in clause 8.13A.2.1.2.1.

The test parameters are given in Table A.14.5.1.3.1-1 and A.14.5.1.3.1-2 below. In the measurement control information it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1 and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2. At the beginning of T2 the transmission power of cell 2 is increased to the same level as for cell 1, and due to usage of an offset this shall result in reporting of Event A3.

Table A.14.5.1.3.1-1: General test parameters for E-UTRAN HD-FDD intra-frequency event triggered reporting under fading propagation conditions in asynchronous cells for Cat-M1 UE in CEModeA

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** | **Comment** |
| E-UTRA RF Channel Number | |  | 1 | One radio channel is used for this test |
| Satellite information | |  | GSO |  |
| Active Cell | |  | Cell 1 |  |
| Neighbour cell | |  | Cell 2 | Cell to be identified |
| CP length | |  | Normal |  |
| DRX | |  | OFF |  |
| A3 | Offset | dB | -6 |  |
| Hysteresis | dB | 0 |  |
| Time To Trigger | s | 0 |  |
| Filter coefficient | |  | 0 | L3 filtering is not used |
| Gap pattern ID | |  | 1 |  |
| T1 | | s | 5 |  |
| T2 | | s | 5 |  |

Table A.14.5.1.3.1-2: Cell specific test parameters for E-UTRAN HD-FDD intra-frequency event triggered reporting under fading propagation conditions in asynchronous cells for Cat-M1 UE in CEModeA

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Cell 1** | | **Cell 2** | |
| **T1** | **T2** | **T1** | **T2** |
| E-UTRA RF Channel Number |  | 1 | | | |
| BW**channel** | MHz | 1.4 | | | |
| PDSCH parameters:  DL Reference Measurement Channel |  | R.49 HD-FDD | | - | |
| MPDCCH parameters:  DL Reference Measurement Channel |  | R.47 HD-FDD | | R.47 HD-FDD | |
| OCNG Patterns |  | OP.21 FDD | | OP.6 FDD | |
| PBCH\_RA | dB | -3 | | -3 | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| MPDCCH\_RA | dB |
| MPDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
| NocNote 2 | dBm/15 kHz | -98 | | | |
| Ês/Noc | dB | 4 | 4 | -infinity | 4 |
| Ês/Iot Note 3 | dB | 4 | -1.46 | -infinity | -1.46 |
| RSRP Note 3 | dBm/15 kHz | -94 | -94 | -infinity | -94 |
| SCH\_RP Note 3 | dBm/15 kHz | -94 | -94 | -infinity | -94 |
| Io Note 3 | dBm/9MHz | -64.76 | -62.42 | Specified in  Cell 1 columns | |
| Propagation Condition |  | ETU30 | | ETU30 | |
| Correlation Matrix and Antenna Configuration |  | 1x1 Low | | 1x1 Low | |
| Timing offset to Cell 1 | ms | - | | 3 | |
| Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  Note 3: Es/Iot, RSRP, SCH\_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2. | | | | | |

##### A.14.5.1.3.2 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 2.88s from the beginning of time period T2.

The UE shall not send event triggered measurement reports as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the tests may be up to 2×TTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

#### A.14.5.1.4 E-UTRAN HD-FDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells for Cat-M1 UE in CEModeA in DRX

##### A.14.5.1.4.1 Test Purpose and Environment

The purpose of the two tests is to verify that the Cat-M1 UE makes correct reporting of an event in DRX. The tests will partly verify the HD-FDD intra-frequency cell search in DRX requirements in clause 8.13A.2.1.2.2.

The test parameters are given in Tables A.14.5.1.4.1-1, A.14.5.1.4.1-2, A.14.5.1.4.1-3 and A.14.5.1.4.1-4. In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 2.

In Test 1 UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furhtermore UE is allocated with PUSCH resource at every DRX cycle.

In Test 2 the uplink time aligment is not maintained and UE needs to use RACH to obtain UL allocation for measurement reporting.

Table A.14.5.1.4.1-1: General test parameters for E-UTRAN HD-FDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells for Cat-M1 UE in CEModeA when DRX is used

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** | | **Comment** |
| **Test1** | **Test2** |  |
| E-UTRA RF Channel Number | |  | 1 | 1 | One radio channel is used for this test |
| Satellite information | |  | GSO | GSO |  |
| Active cell | |  | Cell 1 | Cell1 |  |
| Neighbour cell | |  | Cell 2 | Cell2 | Cell to be identified. |
| CP length | |  | Normal | Normal |  |
| DRX | |  | ON | ON | DRX related parameters are defined in Table A.14.5.1.4.1-3 |
| A3 | Offset | dB | -6 | -6 |  |
| Hysteresis | dB | 0 | 0 |  |
| Time To Trigger | s | 0 | 0 |  |
| Filter coefficient | |  | 0 | 0 | L3 filtering is not used |
| Gap pattern ID | |  | 0 | 0 | As specified in TS 36.133 clause 8.1.2.1. |
| T1 | | s | 5 | 5 |  |
| T2 | | s | 5 | 35 |  |

Table A.14.5.1.4.1-2: Cell specific test parameters for E-UTRAN HD-FDD intra-frequency event triggered reporting under fading propagation conditions in synchronous cells for Cat-M1 UE in CEModeA when DRX is used

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | **Unit** | **Cell 1** | | **Cell 2** | |
| **T1** | **T2** | **T1** | **T2** |
| E-UTRA RF Channel Number |  | 1 | | | |
| BWchannel | MHz | 1.4 | | | |
| PDSCH parameters:  DL Reference Measurement Channel |  | R.49 HD-FDD | | - | |
| MPDCCH parameters:  DL Reference Measurement Channel |  | R.47 HD-FDD | | R.47 HD-FDD | |
| OCNG Patterns |  | OP.21 FDD | | OP.6 FDD | |
| PBCH\_RA | dB | -3 | | -3 | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| MPDCCH\_RA | dB |
| MPDCCH\_RB | dB |
| PDSCH\_RA | dB |
| PDSCH\_RB | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
| Note 2 | dBm/15 KHz | -98 | | | |
|  | dB | 4 | 4 | -Infinity | 4 |
| Note 3 | dB | 4 | -1.46 | -Infinity | -1.46 |
| RSRP Note 3 | dBm/15 KHz | -94 | -94 | -Infinity | -94 |
| SCH\_RP Note 3 | dBm/15 KHz | -94 | -94 | -Infinity | -94 |
| Io Note 3 | dBm/9MHz | -64.76 | -62.42 | Specified in  Cell 1 columns | |
| Propagation Condition |  | ETU30 | | ETU30 | |
| Correlation Matrix and Antenna Configuration |  | 1x1 Low | | 1x1 Low | |
| Timing offset to Cell 1 | μs | - | | 3 | |
| Note 1: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.  Note 3: Es/Iot, RSRP, SCH\_RP and Io have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: The resources for uplink transmission are assigned to the UE prior to the start of time period T2. | | | | | |

Table A.14.5.1.4.1-3: DRX-Configuration for E-UTRAN HD-FDD intra-frequency event triggered reporting in DRX under fading propagation conditions in synchronous cells for Cat-M1 UE in CEModeA

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Test1** | **Test2** | **Comment** |
| **Value** | **Value** |
| onDurationTimer | psf1 | psf1 | As specified in clause 6.3.2 in TS 36.331 |
| drx-InactivityTimer | psf1 | psf1 |
| drx-RetransmissionTimer | psf1 | psf1 |
| longDRX-CycleStartOffset | sf40 | sf1280 |
| shortDRX | disable | disable |

Table A.14.5.1.4.1-4: *TimeAlignmentTimer* -Configuration for E-UTRAN HD-FDD intra-frequency event triggered reporting in DRX under fading propagation conditions in synchronous cells for Cat-M1 UE in CEModeA

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Test1** | **Test2** | **Comment** |
| **Value** | **Value** |
| TimeAlignmentTimer | sf500 | sf500 | As specified in clause 6.3.2 in TS 36.331 |
| sr-ConfigIndex | 30 | 30 | For further information see clause 6.3.2 in TS 36.331 and section10.1 in TS 36.213. |

##### A.14.5.1.4.2 Test Requirements

In Test 1, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1.44 s from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE send the measurement report on PUSCH.

In Test 2, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 32 s from the beginning of time period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE starts to send preambles on the PRACH for scheduling request (SR) to obtain allocation to send the measurement report on PUSCH.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE 1: The actual overall delays measured in the test may be up to one DRX cycle higher than the measurement reporting delays above because UE is allowed to delay the initiation of the measurement reporting procedure to the next until the Active Time.

NOTE 2: In order to calculate the rate of correct events the system simulator shall verify that it has received correct Event A3 measurement report.

## A.14.6 Measurement performance requirements for UE for satellite access

### A.14.6.1 RSRP for satellite access

#### A.14.6.1.1 FD-FDD RSRP Intra frequency case for Cat-M1 UE in CEModeA

##### A.14.6.1.1.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Sections 9.1.21A.1 and 9.1.21A.2 for FD-FDD intra frequency RSRP measurements for Cat-M1 UE in CEModeA.

##### A.14.6.1.1.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Both absolute and relative accuracy of RSRP intra frequency measurements are tested by using the parameters in Table A.14.6.1.1.2-1. In all test cases, Cell 1 is the PCell and Cell 2 the target cell.

Table A.14.6.1.1.2-1: FD-FDD RSRP Intra frequency test parameters for Cat-M1 UE in CEModeA

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Test 1** | | **Test 2** | | **Test 3** | |
| **Cell 1** | **Cell 2** | **Cell 1** | **Cell 2** | **Cell 1** | **Cell 2** |
| E-UTRA RF Channel Number | |  | 1 | | 1 | | 1 | |
| BWchannel | | MHz | 1.4 | | 1.4 | | 1.4 | |
| Satellite information | |  | GSO | - | GSO | - | GSO | - |
| PDSCH Reference measurement channel | |  | R.48 FDD | - | R.48 FDD | - | R.48 FDD | - |
| PDSCH allocation | |  | Follows R.48 FDD | - | Follows R.48 FDD | - | Follows R.48 FDD | - |
| MPDCCH Reference measurement channel | |  | R.46 FDD | | R.46 FDD | | R.46 FDD | |
| OCNG Patterns | |  | OP.21 FDD | OP.6 FDD | OP.21 FDD | OP.6 FDD | OP.21 FDD | OP.6 FDD |
| PBCH\_RA | | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| PBCH\_RB | |
| PSS\_RA | |
| SSS\_RA | |
| MPDCCH\_RA | |
| MPDCCH\_RB | |
| PDSCH\_RA | |
| PDSCH\_RB | |
| OCNG\_RANote1 | |
| OCNG\_RBNote1 | |
| Note2 | Bands FDD-M1\_SAB\_A, FDD-M1\_SAB\_B | dBm/15 kHz | -106 | | -86 | | -116 | |
|  | | dB | 6 | 1 | 6 | 1 | 3 | -1 |
|  | | dB | 2.5 | -6 | 2.5 | -6 | 0.46 | -5.76 |
| RSRPNote3 | Bands FDD-M1\_SAB\_A, FDD-M1\_SAB\_B | dBm/15 kHz | -100 | -105 | -80 | -85 | -113 | -117 |
| IoNote3 | FDD-M1\_SAB\_A, FDD-M1\_SAB\_B | dBm/9 MHz | -70.27 | | -50.27 | | -82.43 | |
| Propagation condition | | - | AWGN | | AWGN | | AWGN | |
| Antenna Configuration | |  | 1x1 | | 1x1 | | 1x1 | |
| Timing offset to Cell 1 | | ms | - | 3 | - | 3 | - | 3 |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: Es/Iot, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: For Band 26, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 865-894 MHz.  Note 5: E-UTRA operating band groups are as defined in Section 3.5.  Note 6: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz. | | | | | | | | |

##### A.14.6.1.1.3 Test Requirements

The RSRP measurement accuracy shall fulfil the requirements in sections 9.1.21A.1 and 9.1.21A.2.

#### A.14.6.1.2 HD-FDD RSRP Intra frequency case for Cat-M1 UE in CEModeA

##### A.14.6.1.2.1 Test Purpose and Environment

The purpose of this test is to verify that the RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Sections 9.1.21A.1 and 9.1.21A.2 for HD-FDD intra frequency RSRP measurements for Cat-M1 UE in CEModeA.

##### A.14.6.1.2.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Both absolute and relative accuracy of RSRP intra frequency measurements are tested by using the parameters in Table A.14.6.1.2.2-1. In all test cases, Cell 1 is the PCell and Cell 2 the target cell.

Table A.14.6.1.2.2-1: HD-FDD RSRP Intra frequency test parameters for Cat-M1 UE in CEModeA

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Test 1** | | **Test 2** | | **Test 3** | |
| **Cell 1** | **Cell 2** | **Cell 1** | **Cell 2** | **Cell 1** | **Cell 2** |
| E-UTRA RF Channel Number | |  | 1 | | 1 | | 1 | |
| BWchannel | | MHz | 1.4 | | 1.4 | | 1.4 | |
| Satellite information | |  | GSO | - | GSO | - | GSO | - |
| PDSCH Reference measurement channel | |  | R.49 HD-FDD | - | R.49 HD-FDD | - | R.49 HD-FDD | - |
| PDSCH allocation | |  | Follows R.49 HD-FDD | - | Follows R.49 HD-FDD | - | Follows R.49 HD-FDD | - |
| MPDCCH Reference measurement channel | |  | R.47 HD-FDD | | R.47 HD-FDD | | R.47 HD-FDD | |
| OCNG Patterns | |  | OP.21 FDD | OP.6 FDD | OP.21 FDD | OP.6 FDD | OP.21 FDD | OP.6 FDD |
| PBCH\_RA | | dB | 0 | 0 | 0 | 0 | 0 | 0 |
| PBCH\_RB | |
| PSS\_RA | |
| SSS\_RA | |
| MPDCCH\_RA | |
| MPDCCH\_RB | |
| PDSCH\_RA | |
| PDSCH\_RB | |
| OCNG\_RANote1 | |
| OCNG\_RBNote1 | |
| Note2 | Bands FDD-M1\_SAB\_A, FDD-M1\_SAB\_B | dBm/15 kHz | -106 | | -86 | | -116 | |
|  | | dB | 6 | 1 | 6 | 1 | 3 | -1 |
| Note3 | | dB | 2.5 | -6 | 2.5 | -6 | 0.46 | -5.76 |
| RSRPNote3 | Bands FDD-M1\_SAB\_A, FDD-M1\_SAB\_B | dBm/15 kHz | -100 | -105 | -80 | -85 | -113 | -117 |
| IoNote3 | Bands FDD-M1\_SAB\_A, FDD-M1\_SAB\_B | dBm/9 MHz | -70.27 | | -50.27 | | -82.43 | |
| Propagation condition | | - | AWGN | | AWGN | | AWGN | |
| Antenna Configuration | |  | 1x1 | | 1x1 | | 1x1 | |
| Timing offset to Cell 1 | | ms | - | 3 | - | 3 | - | 3 |
| Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  to be fulfilled.  Note 3: Es/Iot, RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: E-UTRA operating band groups are as defined in Section 3.5. | | | | | | | | |

##### A.14.6.1.2.3 Test Requirements

The RSRP measurement accuracy shall fulfil the requirements in sections 9.1.21A.1 and 9.1.21A.2.

<End of Change 5>

<Start of Change 6>

### A.14.6.2 Channel quality reporting accuracy for satellite access

#### A.14.6.2.1 E-UTRAN FD-FDD Downlink channel quality reporting accuracy for UE Category M1 in CE Mode A for Satellite access

##### A.14.6.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the downlink channel quality reporting accuracy in connected mode is within the specified limits. This test will verify the requirements in section 9.1.21A.18.

During the test, the test system shall emulate and send the GNSS signal to the test UE by AT command. The UE shall be provided with the valid information about the SAN serving cells before the test.

Table A.14.6.2.1.1-1: Supported test configurations

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | GSO, FD-FDD duplex mode |
| 2 | NGSO, FD-FDD duplex mode |
| Note: If UE supports both NGSO and GSO, the test case Config 1 can be skipped if the UE passes test case Config 2. | |

##### A.14.6.2.1.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. The MAC CE-based downlink channel quality reporting accuracy is tested by using the parameters in Tables A.14.6.2.1.2-1 and A.14.6.2.1.2-2. There are two time periods T1 and T2 with different SNR levels. At the start of T2 the active cell should trigger a downlink channel quality report (“Regular DCQR”) as described in clause 5.25 of TS 36.321. Upon receiving the DCQR from the UE, the active cell should re-configure MPDCCH according to the signaled aggregation and repetition levels.

Table A.14.6.2.1.2-1: General Test Parameters for Downlink channel quality reporting accuracy test for E-UTRAN FD-FDD Category M1 UE in CE Mode A

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comment** |
| CP length |  | Normal |  |
| DRX |  | OFF |  |
| DCI format |  | 6-1A | As defined in Table 8.13.2.8-2. |
| M-PDCCH repetition level |  | 1 |
| T1 | s | 1 |  |
| T2 Note 1 | s | ≥ 1 |  |
| Note 1: The active cell should send a DCQR command MAC CE at the start of T2. Enough time should be allowed to verify both accuracy requirements in Table 9.1.21.23-3. | | | |

Table A.14.6.2.1.2-2: Cell specific Test Parameters for Downlink channel quality reporting accuracy test for E-UTRAN FD-FDD Category M1 UE in CE Mode A

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test 1** | |
| **T1** | **T2** |
| BWchannel | MHz | 1.4 | |
| MPDCCH parameters as defined in A.3.1.3.1 |  | R.46 FDD | |
| OCNG Pattern defined in A.3.2.1.21 (FDD) |  | OP.21 FDD | |
| ρA, ρB |  | -3 | |
| MPDCCH\_RA | dB | 0 | |
| MPDCCH\_RB | dB | 0 | |
| PBCH\_RA | dB | -3 | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
|  | dBm/15 kHz | -98 | |
| SNR Note 3 | dB | 6 | 0 |
| Propagation condition |  | AWGN | |
| Antenna Configuration |  | 1x1 | |
| Channel quality report Note 4 |  | As defined in Table 9.1.21.22-1 | |
| Note 1: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The signal contains MPDCCH for UEs other than the device under test as part of OCNG.  Note 3: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.  Note 4: SIB2 field mpdcch-CQI-Reporting set to ‘fourBits’ indicates 4-bit CQI reporting is allowed. | | | |

##### A.14.6.2.1.3 Test Requirements

The downlink channel quality reporting accuracy shall fulfil the requirements in section 9.1.21A.18.

#### A.14.6.2.2 E-UTRAN HD-FDD Downlink channel quality reporting accuracy for UE Category M1 in CE Mode A for Satellite access

##### A.14.6.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the downlink channel quality reporting accuracy in connected mode is within the specified limits. This test will verify the requirements in section 9.1.21A.18.

During the test, the test system shall emulate and send the GNSS signal to the test UE by AT command. The UE shall be provided with the valid information about the SAN serving cells before the test.

Table A.14.6.2.2.1-1: Supported test configurations

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | GSO, HD-FDD duplex mode |
| 2 | NGSO, HD-FDD duplex mode |
| Note: If UE supports both NGSO and GSO, the test case Config 1 can be skipped if the UE passes test case Config 2. | |

##### A.14.6.2.2.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. The MAC CE-based downlink channel quality reporting accuracy is tested by using the parameters in Tables A.14.6.2.2.2-1 and A.14.6.2.2.2-2. There are two time periods T1 and T2 with different SNR levels. At the start of T2 the active cell should trigger a downlink channel quality report (“Regular DCQR”) as described in clause 5.25 of TS 36.321. Upon receiving the DCQR from the UE, the active cell should re-configure MPDCCH according to the signaled aggregation and repetition levels.

Table A.14.6.2.2.2-1: General Test Parameters for Downlink channel quality reporting accuracy test for E-UTRAN HD-FDD Category M1 UE in CE Mode A

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comment** |
| CP length |  | Normal |  |
| DRX |  | OFF |  |
| DCI format |  | 6-1A | As defined in Table 8.13.2.8-2. |
| M-PDCCH repetition level |  | 1 |
| T1 | s | 1 |  |
| T2 Note 1 | s | ≥ 1 |  |
| Note 1: The active cell should send a DCQR command MAC CE at the start of T2. Enough time should be allowed to verify both accuracy requirements in Table 9.1.21.23-4. | | | |

Table A.14.6.2.2.2-2: Cell specific Test Parameters for Downlink channel quality reporting accuracy test for E-UTRAN HD-FDD Category M1 UE in CE Mode A

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test 1** | |
| **T1** | **T2** |
| BWchannel | MHz | 1.4 | |
| MPDCCH parameters as defined in A.3.1.3.2 |  | R.47 HD-FDD | |
| OCNG Pattern defined in A.3.2.1.21 (FDD) |  | OP.21 FDD | |
| ρA, ρB |  | -3 | |
| MPDCCH\_RA | dB | 0 | |
| MPDCCH\_RB | dB | 0 | |
| PBCH\_RA | dB | -3 | |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
|  | dBm/15 kHz | -98 | |
| SNR Note 3 | dB | 6 | 0 |
| Propagation condition |  | AWGN | |
| Antenna Configuration |  | 1x1 | |
| Channel quality report Note 4 |  | As defined in Table 9.1.21.22-1 | |
| Note 1: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The signal contains MPDCCH for UEs other than the device under test as part of OCNG.  Note 3: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.  Note 4: SIB2 field mpdcch-CQI-Reporting set to ‘fourBits’ indicates 4-bit CQI reporting is allowed. | | | |

##### A.14.6.2.2.3 Test Requirements

The downlink channel quality reporting accuracy shall fulfil the requirements in section 9.1.21A.18.

A.14.6.2.3 E-UTRAN FD-FDD Downlink channel quality reporting accuracy for UE Category M1 in CE Mode B for Satellite access

A.14.6.2.3.1 Test Purpose and Environment

The purpose of this test is to verify that the downlink channel quality reporting accuracy in connected mode is within the specified limits. This test will verify the requirements in section 9.1.21A.19.

During the test, the test system shall emulate and send the GNSS signal to the test UE by AT command. The UE shall be provided with the valid information about the SAN serving cells before the test.

Table A.14.6.2.3.1-1: Supported test configurations

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | GSO, FD-FDD duplex mode |
| 2 | NGSO, FD-FDD duplex mode |
| Note: If UE supports both NGSO and GSO, the test case Config 1 can be skipped if the UE passes test case Config 2. | |

##### A.14.6.2.3.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. The MAC CE-based downlink channel quality reporting accuracy is tested by using the parameters in Tables A.14.6.2.3.2-1 and A.14.6.2.3.2-2. There are two time periods T1 and T2 with different SNR levels. At the start of T2 the active cell should trigger a downlink channel quality report (“Regular DCQR”) as described in clause 5.25 of TS 36.321. Upon receiving the DCQR from the UE, the active cell should re-configure MPDCCH according to the signaled aggregation and repetition levels.

Table A.14.6.2.3.2-1: General Test Parameters for Downlink channel quality reporting accuracy test for E-UTRAN FD-FDD Category M1 UE in CE Mode B

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comment** |
| CP length |  | Normal |  |
| DRX |  | OFF |  |
| DCI format |  | 6-1B | As defined in Table 8.13.3.8-1. |
| M-PDCCH aggregation level |  | 24 |
| T1 | s | 1 |  |
| T2 Note 1 | s | ≥ 1 |  |
| Note 1: The active cell should send a DCQR command MAC CE at the start of T2. Enough time should be allowed to verify both accuracy requirements in Table 9.1.21.24-1. | | | |

Table A.14.6.2.3.2-2: Cell specific Test Parameters for Downlink channel quality reporting accuracy test for E-UTRAN FD-FDD Category M1 UE in CE Mode B

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test 1** | |
| **T1** | **T2** |
| BWchannel | MHz | 1.4 | |
| MPDCCH parameters as defined in A.3.1.3.4 |  | R.50 FDD | |
| OCNG Pattern defined in A.3.2.1.21 (FDD) |  | OP.6 FDD | |
| MPDCCH\_RA | dB | -3 | |
| MPDCCH\_RB | dB |
| PBCH\_RA | dB |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
|  | dBm/15 kHz | -98 | |
| SNR Note 3 | dB | 0 | -12 |
| Propagation condition |  | AWGN | |
| Antenna Configuration |  | 1x1 | |
| Channel quality report Note 4 |  | As defined in Table 9.1.21.22-1 | |
| Note 1: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The signal contains MPDCCH for UEs other than the device under test as part of OCNG.  Note 3: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.  Note 4: SIB2 field mpdcch-CQI-Reporting set to ‘fourBits’ indicates 4-bit CQI reporting is allowed. | | | |

##### A.14.6.2.3.3 Test Requirements

The downlink channel quality reporting accuracy shall fulfil the requirements in section 9.1.21A.19.

#### A.14.6.2.4 E-UTRAN HD-FDD Downlink channel quality reporting accuracy for UE Category M1 in CE Mode B for Satellite access

##### A.14.6.2.4.1 Test Purpose and Environment

The purpose of this test is to verify that the downlink channel quality reporting accuracy in connected mode is within the specified limits. This test will verify the requirements in section 9.1.21A.19.

During the test, the test system shall emulate and send the GNSS signal to the test UE by AT command. The UE shall be provided with the valid information about the SAN serving cells before the test.

Table A.14.6.2.4.1-1: Supported test configurations

|  |  |
| --- | --- |
| **Configuration** | **Description** |
| 1 | GSO, HD-FDD duplex mode |
| 2 | NGSO, HD-FDD duplex mode |
| Note: If UE supports both NGSO and GSO, the test case Config 1 can be skipped if the UE passes test case Config 2. | |

##### A.14.6.2.4.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. The MAC CE-based downlink channel quality reporting accuracy is tested by using the parameters in Tables A.14.6.2.4.2-1 and A.14.6.2.4.2-2. There are two time periods T1 and T2 with different SNR levels. At the start of T2 the active cell should trigger a downlink channel quality report (“Regular DCQR”) as described in clause 5.25 of TS 36.321. Upon receiving the DCQR from the UE, the active cell should re-configure MPDCCH according to the signaled aggregation and repetition levels.

Table A.14.6.2.4.2-1: General Test Parameters for Downlink channel quality reporting accuracy test for E-UTRAN HD-FDD Category M1 UE in CE Mode B

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Value** | **Comment** |
| CP length |  | Normal |  |
| DRX |  | OFF |  |
| DCI format |  | 6-1B | As defined in Table 8.13.3.8-1. |
| M-PDCCH aggregation level |  | 24 |
| T1 | s | 1 |  |
| T2 Note 1 | s | ≥ 1 |  |
| Note 1: The active cell should send a DCQR command MAC CE at the start of T2. Enough time should be allowed to verify both accuracy requirements in Table 9.1.21.24-2. | | | |

Table A.14.6.2.4.2-2: Cell specific Test Parameters for Downlink channel quality reporting accuracy test for E-UTRAN HD-FDD Category M1 UE in CE Mode B

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | **Unit** | **Test 1** | |
| **T1** | **T2** |
| BWchannel | MHz | 1.4 | |
| MPDCCH parameters as defined in A.3.1.3.5 |  | R.51 HD-FDD | |
| OCNG Pattern defined in A.3.2.1.21 (FDD) |  | OP.6 FDD | |
| MPDCCH\_RA | dB | -3 | |
| MPDCCH\_RB | dB |
| PBCH\_RA | dB |
| PBCH\_RB | dB |
| PSS\_RA | dB |
| SSS\_RA | dB |
| OCNG\_RANote 1 | dB |
| OCNG\_RBNote 1 | dB |
|  | dBm/15 kHz | -98 | |
| SNR Note 3 | dB | 0 | -12 |
| Propagation condition |  | AWGN | |
| Antenna Configuration |  | 1x1 | |
| Channel quality report Note 4 |  | As defined in Table 9.1.21.22-1 | |
| Note 1: OCNG shall be used such that the resources in cell # 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The signal contains MPDCCH for UEs other than the device under test as part of OCNG.  Note 3: SNR levels correspond to the signal to noise ratio over the cell-specific reference signal REs.  Note 4: SIB2 field mpdcch-CQI-Reporting set to ‘fourBits’ indicates 4-bit CQI reporting is allowed. | | | |

##### A.14.6.2.4.3 Test Requirements

The downlink channel quality reporting accuracy shall fulfil the requirements in section 9.1.21A.19.

<End of Change 6>